

BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

JULY 31 and AUG. 7, 1931.*

I.—GENERAL; PLANT; MACHINERY.

Reactions of sulphur compounds in boiler furnaces. H. F. JOHNSTONE (Ind. Eng. Chem., 1931, 23, 620—625).—Air containing 0.428% SO_2 was passed over powdered flue dust on asbestos at various temp. The max. oxidation of SO_2 was 1.8% at 400°, the gases being dry. With moist gas and low temp. the oxidation is much greater, being catalysed by dissolved Fe salts. A number of analyses of stack gases, using the absorption method with $\text{CH}_3\text{Ph}\cdot\text{OH}$ to inhibit secondary oxidation of SO_2 , showed that only 2—3% of the S was present as SO_3 , regardless of temp., O content, or the position from which the sample was drawn. The oxidation was rather less with powdered-fuel installations. 70—90% of the S in the fuel enters the gas. In one case, where acid petroleum residues containing much sulphate were used as fuel, the SO_3 content was only slightly higher. Serious corrosion can therefore occur only when a metal surface is at a temp. lower than the dewpoint of the gas. The dewpoint of the gas is raised by high moisture content and by the presence of deposits containing Fe^{+++} salts, and may reach 80—100°. The presence of FeS is probably the cause of the formation of hard deposits in economisers. The better oxidation produced by powdered-fuel firing prevents its occurrence. C. IRWIN.

Prevention of silica scale [in boilers] with sodium aluminate. C. H. CHRISTMAN, J. A. HOLMES, and H. THOMPSON (Ind. Eng. Chem., 1931, 23, 637—646).— $\text{Na}_2\text{Al}_2\text{O}_4$ used as a coagulant for boiler feed-water reacts with SiO_2 and Ca or Mg to form complex insol. aluminosilicates. At high pressures the reaction with Mg is much more complete than with Ca. SiO_2 present in H_2O at concentrations of 5—50 p.p.m. is not precipitated by CaSO_4 or MgSO_4 alone, and $\text{Na}_2\text{Al}_2\text{O}_4$ is more effective in precipitating it than NaOH . A lengthy series of tests on % SiO_2 removed by different proportions of the reagents is described. At 400 lb. 2 pts. of SiO_2 are completely precipitated by 2 pts. of Al_2O_3 and 1 pt. of MgO . It is necessary to have excess Al_2O_3 remaining in solution, and if the MgO is deficient it should be added. The procedure recommended is to use $\text{Na}_2\text{Al}_2\text{O}_4$ as coagulant in external softening and to add further aluminate to the softened H_2O . SiO_2 is of great importance in the formation of scale in boilers fed with softened H_2O . C. IRWIN.

Properties of dispersions of the quicksand type. R. V. WILLIAMSON and W. W. HECKERT (Ind. Eng. Chem., 1931, 23, 667—670).—Certain dispersions become more viscous when stirred or shaken vigorously. This "inverted plasticity" was measured with a Stormer viscosimeter with a 2-bladed stirrer, using a dispersion

of corn starch in H_2O , EtOH , and other liquids. The critical rate of stirring increases linearly with dilution of the starch. It is suggested that the phenomenon is due to the motion of the paddles causing the particles around them to arrange themselves in concentric shells, and that the critical rate of stirring corresponds to the disruption of these shells. This inverted plasticity occurs only with good dispersions with a slow rate of settling, and is shown by pigments in certain vehicles. C. IRWIN.

Heat transfer to liquids in viscous flow. C. G. KIRKBRIDE and W. L. McCABE (Ind. Eng. Chem., 1931, 23, 625—631).—The Nusselt-Gröber theory states that for heat transfer into a liquid flowing at less than the isothermal critical velocity $hD/k = \psi(kL/D^2vc)$, where h = film coeff. at a given point, D = tube diam., k = thermal conductivity, L = tube length, v = mass velocity, and c = heat capacity of fluid. It is assumed that a preliminary "calming" zone in the pipe is provided and transverse convection currents are ignored. Experiments with H_2O and two oil samples yielded curves showing the relation of the two sides of the equation, taking the average film coeff., and these are compared with an integrated curve based on Nusselt's theory. With increasing length of tube the quantity hD/k approaches a limiting value of 3.65, and under these conditions there is good agreement between experiment and theory, but with low values for L this is not the case. The authors, however, used electrical heating equivalent to const. heat input per unit length, and data based on steam heating or theories assuming const. wall temp. required modifications, which have been made. C. IRWIN.

A viscosity paradox. E. N. DA C. ANDRADE (Trans. Faraday Soc., 1931, 27, 201—203).—The rate of flow of a liquid in a cylindrical tube is influenced to an unexpected degree by the presence of even a very fine axial wire; e.g., if the radius of the wire is 10^{-10} of that of the tube the flow is diminished by over 4%.

F. L. USHER.

Volume relations of gases at high pressures. J. R. DILLEY (Chem. Met. Eng., 1931, 38, 280—281).—At high pressures the ideal gas law is inaccurate. Curves are given by means of which the vol. relations of H_2 , N_2 , CO , and a 3 : 1 mixture of H_2 and N_2 at high pressures may be calc. D. K. MOORE.

Solid CO_2 .—See VII. **Grinding pottery material.**—See VIII. **Dust removal from gases.**—See XI.

PATENTS.

Tunnel ovens. J. DANIELS (B.P. 348,225, 17.2.30).—In a tunnel kiln the gas and air regenerators alternate

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

frequently along the length of the kiln, and the air and gas ports in the heating chamber alternate still more frequently, so that continuous sheets of flame are produced.

B. M. VENABLES.

Regenerative [recuperative] ovens or kilns. GAS LIGHT & COKE CO., C. VYSE, and W. DIETERICH (B.P. 348,607, 12.2.30).—A muffle is heated by groups of burners situated below its sides at points diagonally opposite. The gases from each group of burners pass up one side, across the roof, down the other side, across the bottom, and then zig-zag sideways and downwards through a recuperator. Secondary air passes zig-zag front and back upwards through the recuperators. An auxiliary burner is provided for creating a draught on starting the furnace.

B. M. VENABLES.

Feeding materials to rotary kilns. A. BUSCH (B.P. 348,799, 27.3.30).—In, *e.g.*, a cement kiln, the slurry is fed in the form of one or more compact jets substantially parallel to the axis of the kiln, and the jets impinge on chain curtains arranged in lines at a slight angle to the axis and attached to the interior wall of the kiln, the curtains nearest the end being short enough to permit the jets of slurry to pass under them.

B. M. VENABLES.

Devices for heating liquids. J. U. HEMINGWAY (B.P. 349,320, 2.6.30).—The liquid is heated by admixture of steam which is supplied partly to an injector device and partly to a conical coil surrounding the outlet of the injector.

B. M. VENABLES.

Means for breaking foam in steam boilers and other liquid evaporators. S. B. BILBROUGH (B.P. 349,705, 31.3.30).—The apparatus is situated preferably within the steam drum. It comprises a casing the earlier part of which is completely filled by a bundle of small tubes, and the later part contains baffles and divides upwardly into a steam outlet and downwardly into a water outlet, the latter preferably extending below the water-level of the boiler.

B. M. VENABLES.

Evaporation systems. J. A. REAVELL (B.P. 349,567, 13.2.30).—The mixture of vapour and permanent gases emitted by a submerged-flame evaporator is rendered useful either by separating the gases and vapours by a diffusion diaphragm so that the latter may be used in the same way as steam, or the unseparated mixture is passed through preheaters and/or evaporators of the thoroughfare type, in which a strong flow of exhaust gas is permitted, preferably upwards and in the opposite direction to that of the condensing vapours.

B. M. VENABLES.

Drying plant. N. PANZIREFF (B.P. 349,583, 26.11.29).—Forms of apparatus which may be made semi-portable are described. The goods are conveyed in a zig-zag manner by conveyors and are dried by indirectly heated currents of air. The exhaust gases may be passed over either the entering or the leaving goods, as desired; in the latter case, an adjustable amount of the hottest air is used to preheat the goods.

B. M. VENABLES.

Drying and/or cooling apparatus. W. DRYDEN (B.P. 348,558, 12.12.29).—Material in the form of nuts or small cakes is guided by an upper perforated cone on to the periphery of a lower, inverted, perforated cone and is raked down to the apex by means of rotating

spiral blades while drying air is forced upwards through it. Provision is made for the separate removal of dust which passes through the perforations.

B. M. VENABLES.

Absorption or adsorption refrigerating processes. ELECTROLUX, LTD., Assees. of PLATEN-MÜNTERS REFRIGERATING SYSTEM AKTIEB. (B.P. 348,350, 24.4.30. Ger., 3.5.29).—In refrigerating apparatus of this type, vapour of refrigerant is prevented from flowing back into and condensing in the evaporator (which effects the desired cooling) by the presence of another fluid ("sealing medium") which is either a liquid of different sp. gr. from, and only slightly miscible with, the refrigerant, or is a non-condensable gas. Examples are: (inert sealing medium, refrigerant, and absorbent, respectively), H_2 , NH_3 , and charcoal or $CaCl_2$; paraffin oil, SO_2 , and SiO_2 gel or charcoal; pentane, NH_2Me , and $CaCl_2$ or $SrBr_2$.

B. M. VENABLES.

Jaw crushers. NORDBERG MANUFG. CO., Assees. of E. B. SYMONS (B.P. 348,851, 23.4.30. U.S., 9.4.30).—A jaw crusher is constructed to operate on the principles of the Symons cone crusher (*cf.* B.P. 243,926; B., 1926, 111), the jaws being inclined to the horizontal and the space between them towards the outlet end being parallel for a sufficient distance to ensure that every particle is nipped at least once in the parallel zone. The swing jaw is pivoted at the inlet end and the cheeks are attached to it. The fixed jaw is normally held up against abutments by strong springs which yield only to uncrushable pieces.

B. M. VENABLES.

[Gyratory] crusher. TRAYLOR ENG. & MANUFG. CO. (B.P. 348,402, 20.5.30. U.S., 24.5.29).—The top bearing of the crusher shaft is rigidly supported in horizontal directions, but can yield to uncrushable pieces in a vertical direction, being supported by a lever and spring.

B. M. VENABLES.

Hammers for centrifugal crushing mills. G. P. LUCAS (B.P. 348,736, 25.2.30).—A form of renewable hammer head in which the securing pin is freed from shearing stresses is described.

B. M. VENABLES.

Grinding or pulverising machines. BUCKLEY & TAYLOR, LTD., and T. BUCKLEY (B.P. 349,516, 27.2.30).—The apparatus comprises mills of the ball-mill and disintegrator types communicating and co-axial, but driven at different speeds suitable to their functions.

B. M. VENABLES.

Effecting reaction between solids and gases. SULPHUR & SMELTING CORP., Assees. of E. W. WESCOTT (B.P. 348,651, 13.2.30. U.S., 28.2.29).—The apparatus resembles a pebble mill, but it is nearly filled with pebbles, to such an extent that internal circumferential ribs extend right into the mass of pebbles and prevent direct flow of gases through the free spaces at the upper part; means are provided for admitting the gaseous and powdered solid reagents (preferably at opposite ends) and for withdrawing the reaction products while retaining the pebbles. To regulate the temp. the rotating cylinder may be surrounded by a stationary cylindrical casing containing in the lower part a heavy liquid, *e.g.* molten Pb, and in the upper an inert atm. Forms of specially-shaped "pebbles" are described.

B. M. VENABLES.

Sifting of materials. C. A. GESNEL (B.P. 348,166, 2.1.30. Fr., 19.10.29).—Material is delivered intermittently on to various parts of the bolting cloth (which is in the form of a vertical cylinder) by means of a turbine-like device. B. M. VENABLES.

Centrifugal separators. AKTIEB. SEPARATOR (B.P. 349,865, 8.9.30. Swed., 10.9.29).—An accessory for the cleanly discharge of collected solid matter when the bowl is stationary is described. B. M. VENABLES.

Discharge of sludge from settling tanks. A. BORSIG GES.M.B.H., and T. STEEN (B.P. 349,720, 11.4.31).—The settling tanks are situated radially round a sludge outlet to which the floors slope, and the inlets are above the lower ends, the decantation taking place at or close to the circumference. In operation only so much sludge as will run by gravity is discharged down the slope; the outlet is then closed and the remaining clay-like sludge from the upper end is pushed to the lower where it will act as a cushion and lubricant for the sand deposited from the next charge. B. M. VENABLES.

Settling apparatus for separation of solid and liquid matters. C. STILL (B.P. 348,888, 20.5.30).—A receiver, e.g., for ammonium salts from a saturator, is formed as a tilting vessel with one trunnion solid and attached to the tilting mechanism and the other hollow and forming an overflow for mother-liquor. B. M. VENABLES.

Mixing and centrifuging machine for moulding substances. K. LEHMANN (B.P. 348,968, 5.8.30. Ger., 5.8.29).—A rotating pan for moulding sand, mortar, and the like is provided with fixed inclined stirring blades and with blades rotating at centrifugal speed on a transverse shaft, which dip into the pan and fling the material about, either back into the pan or out of it according to the position of a curved flap-door in a surrounding hood. B. M. VENABLES.

Filters. A. C. HANDLEY (B.P. 349,028, 19.2.30).—A closed tank is divided into three compartments containing prefilter, filter medium, and filtrate, respectively; the filter medium comprises vertical walls of coir and/or cellulose silk the space between which is kept filled with powdered coir or sand fed in from a hopper so as to prevent short-circuiting of unfiltered liquid across the top. The device is primarily intended for filtering oils. B. M. VENABLES.

Construction of filters. F. G. RILEY (B.P. 349,262, 1.5.30).—In a filter composed of compressed plaques of paper pulp or other material, the pressure is regulated by a nut on the end of an axial outlet pipe, which nut also serves to break the force of the incoming prefilter. B. M. VENABLES.

Filtration of liquids. OLIVER UNITED FILTERS, INC., Assees. of C. W. MOORE (B.P. 348,556, 9.12.29. U.S., 10.12.28).—The pulp in the reservoir of a vacuum filter is kept homogeneous by injecting filtrate or a similar liquid into the lower part where the sand collects. A stirring device may also be used. B. M. VENABLES.

Filtration or straining of liquids. C. B. THORNE (B.P. 349,466, 25.2.30).—Apparatus suitable for the treatment of waste water from paper mills comprises a tank or enlargement of a launder containing a number of elements with vertical filtering walls which, when

they are choked, are lifted out by a belt which also seals the opening for outflow of filtrate belonging to that element. Mechanism for automatic operation is described. B. M. VENABLES.

Devices for distillation and evaporation in vacuo. O. ANGELUCCI (B.P. 348,442, 27.6.30. Ger., 8.7.29).—Within an all-containing vacuum chamber the distillate is allowed to flow down through one or more larger spiral tubes surrounding smaller heating tubes and provided with vents so that the distillate can pass into the vacuum chamber, where it is condensed on a central cooled element. The condensate and residue are withdrawn through separate outlets. B. M. VENABLES.

Controlling the pressure of vapours produced in stills. H. W. ROBINSON (B.P. 348,397, 19.5.30).—More vapour is generated than is required to maintain the desired const. pressure in the delivery pipe, the excess being allowed to pass up a long pipe through a relief valve (which determines the pressure) at the top, then condensed, and allowed to flow back into the still through a barometric column sufficient to balance the pressure in the still. B. M. VENABLES.

Purification of feed water. O. BÜHRING (B.P. 349,554, 28.2.30. Ger., 7.3.29. Addn. to B.P. 324,428).—The sludge is taken from the boiler at a higher pressure than that in the thermic vessel, its pressure is reduced by ebullition, and the steam passed to the thermic vessel together with steam direct from the upper part of the boiler. The sludge is passed to the chemical stage together with any sludge formed in the thermic vessel. Alternatively, the sludge from the boiler may pass direct to the thermic vessel. B. M. VENABLES.

Mixing apparatus for liquids. O. RITSCHEL (B.P. 348,391, 16.5.30).—A reagent or adjuvant, which may be corrosive and is to be added in small but strictly proportional quantities to a continuous stream of a main liquid, is placed in a completely filled closed container and displaced therefrom by small quantities of the main liquid delivered by a small pump operated by a meter-motor in the main stream. The whole system is subjected to the pressure of the main liquid, the motor and pump being within one casing without high-pressure glands, and the suction of the pump and delivery of the adjuvant being both on the outlet side of the meter, the former slightly before the latter. If the two liquids are nearly equal in sp. gr. a bellows-like diaphragm may be used to separate them in the closed container, or the latter may be divided into two and a lighter inert liquid used as a diaphragm. B. M. VENABLES.

Prevention of excessive frothing in vats and other containers. DISTILLERS Co., LTD., and E. A. MEYER (B.P. 349,288, 16.5.30).—A trough of froth-killing agent of lower sp. gr. than that of the liquid, e.g., molten fat for yeast, is placed in the vat above the liquid level. When froth rises and spills into the trough it is condensed by the agent, falls below it and displaces an equal vol. of the agent into the main body of liquid, the action continuing automatically until the agent is used up. B. M. VENABLES.

Treating liquids with gases. W. E. DURRAD, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 348,244, 21.2.30).—A number of tubes of decreasing diam.

and equal length are loosely assembled within each other, are rotated in an inclined position, and are supplied with liquid which flows either con- or counter-current to the gas. The tubes (except the outermost) may be perforated or made of gauze. B. M. VENABLES.

Purification of gases. W. H. OWEN (B.P. 349,233, 10.4.30).—The gases enter the large end of a perforated cone, at which point a whirling propeller is provided; at the smaller end are liquid sprays, and just beyond, if desired, another whirling propeller and, finally, a fan for producing draught only are provided. The separated matter leaves transversely through the perforations and beyond the second propeller. B. M. VENABLES.

Air-conditioning plants. A.-G. BROWN, BOVERI & CIE. (B.P. 349,355, 11.7.30. Ger., 19.7.29).—In a conditioning system comprising a mixing valve for old and new air, an injection chamber, moisture remover, and reheater, when a temp. below that obtainable by the injected sprays is desired, the air itself is used as the refrigerant. By the movement of a pair of valves, it is subjected to compression before spraying and to expansion (with recovery of some work) after spraying, and is thus cooled to below the temp. of the spray-water. B. M. VENABLES.

Oil extractor and filter [for compressed air]. W. H. TAYLOR and C. SHAW (B.P. 349,729, 22.4.30).—A casing is provided with a number of concentric baffles and vanes which afford a large surface for the collection of oil and cause abrupt changes in direction. The air finally passes through a filter medium. B. M. VENABLES.

Storing and transporting liquefied gases of low b.p. C. W. P. HEYLANDT (B.P. 348,838, 14.4.30).—That portion of the liquefied gas that it inevitably vaporised is led through a jacket surrounding the necessary pipe connexions to the vessel, whereby heat conducted along them is prevented from reaching the vessel. B. M. VENABLES.

Treatment of gases with liquids. SOC. ANON. INDUSTRIA AMMONTACA, and F. LOPEZ (B.P. 349,230, 9.4.30).—The apparatus comprises a number of superposed chambers with bubble caps in the divisions, these caps comprising upflow pipes with loose hoods having resilient washers inside the top, forming non-return valves for the gases. The down-flow of liquid takes place through coils which are cooled in a surrounding liquid bath, so that the apparatus is suitable for the exothermic dissolution of ammonia. B. M. VENABLES.

Hardness-testing machine. C. H. WILSON (B.P. 348,915, 10.6.30. U.S., 16.4.30).—In an apparatus of the type in which the penetration of a sample is measured between the application of a minor and major load, the plunger is released from its guides, except a very narrow one at the upper end, by the application of a preliminary load even less than the minor load. B. M. VENABLES.

Apparatus for the rapid charging of a furnace. H. GARREAU (B.P. 349,918, 1.3.30. Fr., 7.10.29).

Preheater and degasifying plant for steam turbines and steam power units. MASCHINENFABR. OERLIKON (B.P. 349,878, 24.9.30. Switz., 30.10.29).

Liquid heating and storage installations [for domestic hot water etc.]. G. N. HADEN & SONS, LTD., and S. S. JEWSEBURY (B.P. 349,762, 16.5.30).

Means for compensating for changes in liquid volume due to temperature. M. CHARLES (B.P. 349,834, 22.7.30. Fr., 14.8.29).

Heat-transferring devices for use with refrigerators. ELECTROLUX, LTD., Assees. of PLATEN-MUNTERS REFRIGERATING SYSTEM AKTIEB. (B.P. 349,798, 16.6.30. Ger., 19.6.29).

Evaporators for refrigerating machines. BRIT. THOMSON-HOUSTON Co., LTD., Assees. of C. STEENSTRUP (B.P. 349,860, 28.8.30. U.S., 28.8.29).

Pretreatment of fuel for furnaces.—See II. **Retort furnace.**—See X. **Intensity of colours.**—See XI. **Decolorisation of solutions.**—See XVII.

II.—FUEL; GAS; TAR; MINERAL OILS.

Austrian coals and the possibilities of their economic utilisation. E. GALLE (Sparwirtschaft, 1931, 9, 185—189).—Low-temp. carbonisation, the production of lubricating oil from the tar, catalytic hydrogenation, pulverised-fuel firing, complete gasification, etc. are discussed in relation to the utilisation of Austrian coals. A. B. MANNING.

Clean coal in the gas industry. R. LESSING (Gas J., 1931, 94, 815—825).—The case for coal cleaning and an account of the "Clean Coal" process are presented. Tests quoted show the advantage of cleaned coal for carbonisation and water-gas production. A. KEY.

Vegetable fuels. II. T. BATUECAS (Anal. Fis. Quím., 1931, 29, 294—299).—Detailed analyses and the calorific val. are given for charcoals obtained from *Quercus lusitanica*, *Erica arborea*, and *Alnus lutea*. Dulong's formula yields low values for the calc. calorific val., whilst with the formulæ of Mahler and of Nikitin the error rarely exceeds 1%. H. F. GILBE.

Processes of formation and combustion of fuels. E. BERL (Petroleum, 1931, 27, 399—407).—Factors influencing combustion, thermal decomp., and condensation of hydrocarbons and the reduction of CO to aliphatic compounds are surveyed. The influence of pressure and length of C chain on the explosive limits of hydrocarbon vapours is discussed. Investigation of the influence of PbEt₄ and Fe(CO)₅ and of finely-dispersed Pb and Fe indicates that these materials inhibit self-ignition or knocking in motor fuels by reacting with intermediate products of partial combustion. H. E. BLAYDEN.

Routine test of the inflammability of mine dusts. A. L. GODBERT (Safety in Mines Res. Board, 1931, Paper No. 68, 9 pp.).—The apparatus consists of a transparent SiO₂ tube, 7 in. × $\frac{3}{4}$ in., heated externally by either gas or electricity to 820°, through which a mixture of O₂ and 1 g. of 100-mesh (I.M.M.) dust is blown at a definite pressure. Inflammable dusts give a white flame; those just unflammable reddish-orange sparks. The inflammability of a coal dust is determined by adding just sufficient incombustible dust to render it incapable of propagating flame, and expressing the incombustible dust as a percentage; the

uninflammability is ascertained by blending the dust with coal dust.

A. H. EDWARDS.

Intermittent vertical chambers and coal- and coke-handling plant at Southall. J. S. THORMAN (Gas J., 1931, 94, 763–783).—Descriptive, with an account of satisfactory tests, showing flexibility of output and calorific val. of gas (which contains little N_2), high steaming efficiency, and the production of a coke which is denser and has a higher resistance to shatter than that obtained from continuous vertical or horizontal retorts.

A. KEY.

Controlling pressure conditions within coal-gas retorts. R. N. WEBB (Gas J., 1931, 94, 826–830).—The pressure conditions prevailing in the foul-gas main of a setting of horizontal retorts are reproduced inside the exhaustor governor bell by means of an impulse pipe 3 in. in diam. The varying pressures on the bell are arranged to operate the steam-throttle valve of the exhaustor, so that it requires very little attention to keep the pressure in the retorts almost constant.

A. KEY.

Combustion processes in motors and the six-stoke principle. E. TERRES (Z. angew. Chem., 1931, 44, 509–519). Curves are given showing the dependence of the degree of completeness of combustion on the compression, speed of revolution, and ignition point and the relation between the composition of the products of combustion and the water-gas and other equilibria. The velocity of combustion of explosive mixtures of fuel and air increases at first with increasing initial pressure, passing through a max. at 15 atm. The greatest velocities are attained in systems consisting of finely-dispersed liquid fuel in air, and in agreement with this observation is the striking result that pre-heating the mixture reduces the velocity of combustion. The results are discussed from the mechanical point of view, as applied to the construction of internal-combustion engines.

E. S. HEDGES.

Peroxides in the gases of internal-combustion engines. DUMANOIS, MONDAIN-MONVAL, and QUANQUIN (Compt. rend., 1931, 192, 1158–1160).—With hexane as fuel, when the temp. rose to about 270° knocking began, and simultaneously peroxides and aldehydes appeared in the gases. On stopping ignition the motor continued to work for 1 min. or so with much diminished noise and absence of flame (cf. A., 1930, 167, 1157). The immediate cause of knocking is therefore detonation of peroxides.

C. A. SILBERRAD.

Manufacture of charcoal in Japan. I. MIURA (Ind. Eng. Chem., 1931, 23, 631–634).—Charcoal as made in Japan is either black charcoal made in earthen ovens, or white charcoal made in stone ovens withdrawn while hot and covered with earth etc. In the former case the temp. remains low and the yield is 15–20% on undried wood. White charcoal is harder and is made by raising the temp. at the end of carbonisation, thus causing combustion of the bark. The yield is 11–13%. Physical properties of each sort are described. The author has devised a scale of hardness, using a series of metals and alloys which is compared with Mohs' mineral scale. It is widely used in Japan in evaluating charcoal.

C. IRWIN.

Flame-pressure process for carbon black. A. W. FRANCIS (Ind. Eng. Chem., 1931, 23, 612–617).—The best C black is made by deposition on a metal plate from a flame of natural gas burning in the air. The low yield (about 3%) is due to the fact that the upper limit of CH_4 concentration in air for inflammability is 14%, and hence in all parts of the flame there is enough O_2 present to burn C to CO . Dilution with incombustible gases or enrichment with O_2 is useless, but the upper limit of inflammability is raised by increased pressure (at 50 atm. it is 29%); small-scale experiments show that this gives increased C yields. A bomb was used into which gas was passed from an auxiliary bomb under higher pressure. Yields up to 9% varying with the burner tip design were obtained. Theoretical calculations suggest an optimum yield of about 30% at 34 atm. The process is not likely to be economical with the present low value of natural gas.

C. IRWIN.

Some properties of carbon black. I. Adsorption. W. B. WIEGAND and J. W. SNYDER (Ind. Eng. Chem., 1931, 23, 646–649; India-Rubber J., 1931, 81, 13–18).—The adsorptive qualities of C black, as measured by shaking 1 g. with 50 c.c. of a solution of 2 g. of diphenylguanidine in 1 litre of EtOH for 2 hr. and determining the amount of base in 25 c.c. of the filtrate, show a fair correlation with the effect of the C black on the vulcanisation of rubber, particularly when an org. accelerator is also used. The adsorption is much more marked in the alkaline than in the acid range. The test may with advantage be used to obtain a preliminary idea of the vulcanising characteristics of C black in organically accelerated mixtures, but it is not capable of predicting precisely the relative behaviour of successive samples. C blacks activated by heating in air or steam show a marked increase in adsorption of diphenylguanidine, whilst blacks deactivated by heating in absence of air show greatly reduced alkaline and slightly increased acid adsorption, which probably explains the known anomalous I adsorption of heated blacks. In litharge mixings, without added fatty acid, highly adsorbent blacks spoil vulcanisation by removing the natural fatty acids of the rubber; it is therefore necessary to adjust the relative proportions of added fatty acid and black in order to ensure the best results. If a min. proportion of fatty acid is desired in a litharge mixing a black of low adsorption must be selected. For entirely unaccelerated mixtures, a heat-deactivated black of low adsorption gives improved results. The adsorptive properties of C black are of advantage in the production of rubber insulating materials and in the treatment of insulating oils. Highly adsorptive, heat-activated blacks advance the vulcanisation of rubber with *m*-dinitrobenzene.

D. F. TWISS.

Technical active charcoals and other adsorbents (with special reference to their application in the sugar industry). K. SKUMBURDIS (Kolloid-Z., 1931, 55, 150–155).—Comparison of the adsorptive capacity of a number of active and inactive charcoals and 2 kinds of fuller's earth in aq. isoamyl alcohol solutions with the effect of these adsorbents on the inversion of sucrose indicates that the inversion effect noted in some cases is most probably due to small amounts of acid adsorbed

by the charcoal. Charcoals containing H and the basic fuller's earths do not invert sucrose and probably neutralise the traces of acid produced by the slow decomp. of sucrose. Active charcoals do not accelerate the inversion of sucrose by capillary active or inactive acids, but, on the other hand, they withdraw a portion of the acid and reduce the amount of sugar inverted. The greater is the adsorbability of the acid, the greater is the inhibitive effect of the charcoal. The addition of a capillary active, indifferent substance such as *iso*-amyl alcohol decreases the adsorption of the acid slightly.

E. S. HEDGES.

Water-gas process: carbon and thermal balances. J. G. KING and B. H. WILLIAMS (Dept. Sci. Ind. Res., Fuel Res., Tech. Paper No. 30, 1931, 31 pp.).—A test has been carried out on a standard Humphreys and Glasgow generator in which determinations of C have been made at various points. The C burned in the hot clinker during its removal from the generator was shown to be negligible. The period of test, 35–36 hr., comprised 4 complete clinkering to clinkering periods. The fuel used was a horizontal-retort gas coke. The total C in the blow gases was determined from the vol. of air delivered to the generator and the average composition of the blow gases. The vol. of water-gas produced was measured by means of the photographic recorder previously described (B., 1931, 282). The C balance shows a loss of 2.2%, which, in view of the possible errors of measurement in the determinations involved, is regarded as satisfactory. In order to be able to draw up a thermal balance also, measurements were made of the temp. of the air and coke entering the generator, and of the blow gas, water-gas, and clinker and ashes leaving the generator. These observations were made over one complete clinkering to clinkering period, which is regarded as a unit phase of the process. The value 96,700 C.H.U./lb.-mol. was adopted for the heat of reaction $C + O_2 \rightarrow CO_2$; this value is higher than that adopted by Travers, who assumes that the C exists in the coke in the graphitic form (J.S.C.I., 1924, 43, 355 T), and is based on determinations of calorific val. of 23 gas cokes. The thermal balance shows a loss due to radiation and convection, and heat lost as heat of reaction and sensible heat of the gases issuing from the generator during clinkering operations (and errors), of 25.7 therms, or 2.9 therms/hr. This difference is of the same order as the sum of the radiation and convection losses calc. from measurements of the surface temp. of the generator (1.5 therms/hr.), and the estimated heat lost during clinkering operations (1–2 therms/hr.).

A. B. MANNING.

Determination of phenols in water from coke-benzol manufacture. L. I. KAZATCHKOV, M. M. KRASOVITSKAJA, and O. G. TEMIR (Ukrain. Chem. J., 1930, 5, [Tech.], 205–223).—Methods for determining traces of phenols in water are reviewed. Shaw's method (B., 1929, 771) is recommended.

E. B. UVAROV.

Determination of phenols in the ammonia and spent liquors from gasworks, coke ovens, etc. H. BACH (Gas- u. Wasserfach, 1931, 74, 331–334).—Liquors containing benzol are first made alkaline and then extracted with Et_2O , the Et_2O dissolved in the

liquor being finally removed by evaporation. 100 c.c. of liquor are then acidified and distilled until the whole of the phenols are in the distillate. If sulphides are present, $CuSO_4$ is added in excess and the liquid boiled under reflux until no more H_2S is evolved. $BaCl_2$ solution (5 c.c.) is added, the liquid made up to 500 c.c. and filtered, and 50 c.c. of the filtrate are treated with $KBr-KBrO_3$ solution and acid. After $\frac{1}{2}$ hr. excess Br is determined in the usual way with KI and $N-Na_2S_2O_3$ solution. An accuracy of 25 mg./litre is claimed, hence the method is not suitable for liquors containing very little PhOH. To determine PhOH in benzol, it is extracted with NaOH solution, the alkaline solution washed with Et_2O , made acid, and distilled as above.

A. KEY.

Semi-direct recovery of ammonia in gas-works' practice, and the recovery of tar acids from ammoniacal liquor. A. L. HOLTON (Gas J., 1931, 94, 790–800).—A description of plant at Manchester, dealing with 3–10 million cu. ft. of gas per day. Violent oscillations of pressure in the saturator are prevented from communicating to the retort house by the substitution of "Connerville" for rotary meters. Rock salt formation in the saturator also caused trouble. Liquor circulating in the hydraulic mains is allowed to attain a concentration of 14–18% NH_4Cl , the salt being recovered by evaporation. The ammoniacal liquor is freed from phenols by washing with a countercurrent flow of benzol in a tower, and is then passed through active C to remove higher tar acids and dissolved benzol. The purification express by the O-absorption val. is 88%, and the loss of benzol should not exceed 6.6 gals. per 100 tons of liquor. The phenol is recovered from benzol by distillation.

A. KEY.

Corrosion of tar stills. W. A. DAMON (67th Annual Rep. on Alkali etc. Works, 1930, 29–37).—The loss in wt. of strips of mild steel immersed in tar samples and in aq. and org. solutions of various tar constituents was determined. NH_4 salts and dihydric phenols both showed considerable effects in aq. solution, much less in xylene etc. Experiments with tars of known NH_4Cl content definitely established the corrosive effect of the latter, but it is not the only cause of corrosion, and the relation to NH_4Cl concentration is not linear. Phenols appear to exert a partial protective action against corrosion by NH_4Cl . During the stages of tar distillation, corrosion increases as distillation proceeds in most cases, and is maximal during steaming. The water-washing of tar reduces corrosion about 85%.

C. IRWIN.

Lignite tar. III. Ketones of lignite tar oil. IV. Aromatic and hydroaromatic compounds of lignite tar. J. HERZENBERG and E. VON WINTERFELD (Ber., 1931, 64, [B], 1025–1036, 1036–1044; cf. A., 1927, 551).—III. Although ketones form a considerable portion of the oxygenated compounds of lignite-gas benzene the nature of the preponderating remainder is unknown. This is true in still greater degree for the tar oils. Alcohols and esters comprise only a very small proportion of the oxygenated compounds, and, although terpene-like compounds are present, it appears probable that furan derivatives exist therein. The neutral gas benzene is

fractionated and the ketones are isolated from the individual fractions by phenylhydrazine; ethyl *n*-amyl ketone (semicarbazone, m.p. 115–116°), methyl *n*-hexyl ketone (semicarbazone, m.p. 121–122°), acetophenone, and cyclopentanone (dianisylidene derivative, m.p. 215°) are identified.

[With W. FISCHER.] The ketones from refined lignite generator tar oil, b.p. 70–150°/12 mm., are separated as their hydroferrocyanides. The following products are isolated: semicarbazone $C_9H_{15}ON_3$, m.p. 221.5°, not derived from tetrahydroacetophenone; semicarbazones $C_8H_{13}ON_3$, m.p. 225–226°, 236°, 221°, and 224–226°, respectively.

IV. The C_6H_6 content of lignite gas benzene is much lower than hitherto assumed. The $C_{10}H_8$ fraction of the generator tar oil contains 8% $C_{10}H_8$ and only 2.5% of hydrogenated $C_{10}H_8$, all of which are unsaturated. The free occurrence of *m*-substituted derivatives of C_6H_6 and $C_{10}H_8$ is attributed to their formation from the resins of bitumen-A and -B.

[With W. PASCH.] C_6H_6 is determined in lignite gas benzene by means of $NH_3 + Ni(CN)_2$ (A., 1903, i, 469). In the higher fractions PhMe is determined by direct mononitration and, after removal of the bulk of the unsaturated compounds by means of H_2SO_4 of gradually increased concentration, *m*-xylene, mesitylene, and ψ -cumene are separated as 2:4:6-trinitro-*m*-xylene, m.p. 180–181°, trinitromesitylene, m.p. 230–233°, and 3:5-dinitro- ψ -cumene, m.p. 171–172°. $C_{10}H_8$ is identified as the picrate, but hydrogenated $C_{10}H_8$ does not appear to be present. Dehydrogenation of partly hydrogenated $C_{10}H_8$ of generator tar oil is more readily effected with $Ni-Al_2O_3$ at 360–380° than with S. The $C_{10}H_8$ homologue $C_{13}H_{14}$ (picrate, m.p. 123–124°) is not 1-isopropyl-naphthalene, which is synthetically prepared. 1- α -Hydroxyisopropyl-naphthalene, m.p. 96°, prepared from 1-naphthyl methyl ketone or Et 1-naphthoate and $MgMeI$, is dehydrated by Ac_2O and reduced by Na and EtOH to a mixture of 1-isopropyl-di- and -tetra-hydro-naphthalenes, dehydrogenated to 1-isopropyl-naphthalene, b.p. 132–134°/10 mm. (picrate, m.p. 85–86°).

H. WREN.

Phenols in the tar of Saar coal. J. PAIRA (Ann. Office Nat. Combust. liq., 1930, 5, 651–676; Chem. Zentr., 1931, i, 1701).—The fractions, after removal of neutral oil, were subjected to fractionation at 10 mm. between 80° and 130°. The lower fractions contained PhOH and its mono- and di-methyl derivatives; the fraction of b.p. 176–181° contained 70% of PhOH, possibly owing to superheating when the tar was produced. Tar from a Salerni furnace contained only 1% of PhOH. The fraction of m.p. 180–210° contained *o*-, *m*-, and *p*-cresol, 1:3:4- and 1:3:5-xenol.

A. A. ELDRIDGE.

Asphalt from the cracking processes. G. EGLOFF and J. C. MORRELL (Ind. Eng. Chem., 1931, 23, 679–680).—The production of asphalts from liquid residue derived from cracking operations is shown to be possible, from which it appears that polymerisation as well as decomposition takes place during cracking. The properties of the asphalts obtained in this way from a number of crude oil residues are tabulated. These asphalts meet the A.S.T.M. (D102–24r and D103–24r) speci-

cations except as regards solubility in CCl_4 . The possibility of producing satisfactory asphalts from kerosene by cracking is indicated.

T. A. SMITH.

Light oil from water-gas tar. N. A. ORLOV (J. Appl. Chem., Russia, 1930, 3, 585–587).—The characteristics of the oil are recorded; it contains 1.5–2% of styrene (separated as dibromide) and 4.7% of indene (separated by Weissgerber's method).

CHEMICAL ABSTRACTS.

Composition of neutral oils obtained from the primary tars of Rumanian lignite, and volumetric determination of saturated and unsaturated aromatic hydrocarbons in this oil. N. DĂNĂILĂ and T. D. IONESCU (Bul. Chim. Pura appl., Bukarest, 1931, 31, 229–273; Chem. Zentr., 1931, i, 1546–1547).—The neutral oil fractions from the primary tars obtained up to 500° are richer in unsaturated hydrocarbons than are the corresponding petroleum fractions. The $C_6H_6 + PhMe + xylene$ fraction is <1% of the original tar. The oils are dextrorotatory.

A. A. ELDRIDGE.

Design of liquid-phase cracking equipment. P. RYABUIKH (Azerbaid. Neft. Choz., 1930, No. 12, 76–82).—The theoretical considerations involved are discussed.

CHEMICAL ABSTRACTS.

Cracking of Rumanian gas oil. C. H. ALBERDING and W. A. KEIGHTLEY (Petroleum, 1931, 27, 407–409).—By cracking Rumanian gas oil (*d* 0.86) in a Dubbs cracking plant under 227 lb./sq. in. (about 16 atm.) pressure and redistilling the pressure distillate after washing with alkali and acid, a 60–65% yield of petroleum spirit (*d* 0.73–0.74) of high antiknock val. was obtained without recirculation. The residue from redistillation could be recycled. Various oils or low-temp. tars could be treated in the experimental plant used, which is described.

H. E. BLAYDEN.

Refining of cracked spirit by physical methods. R. A. WISCHIN (Petroleum, 1931, 27, 410–413).—Absorption, adsorption, and oxidation methods of refining petroleum spirit from cracking processes are briefly reviewed. Light spirit from brown-coal tar was fractionated, washed with acid and alkali, and then fractionated over glass balls or over ferruginous bauxite with simultaneous treatment by ozonised air, ultra-violet light, or a high-frequency electric discharge. It was also fractionated over granulated Sn, washed, and refractionated. The last-mentioned four methods removed the greatest amounts of gum-forming substances.

H. E. BLAYDEN.

Contact filtration of bright [mineral oil] stocks. V. MATUSEVICH (Azerbaid. Neft. Choz., 1930, No. 12, 64–75).—A mixture of long residuum from Dossor and Makat crude oil was treated with acid and, in two stages, with clay. Optimal quantities and conditions were determined.

CHEMICAL ABSTRACTS.

Synthetic lubricating oils. Relation between chemical constitution and physical properties. F. W. SULLIVAN, JUN., V. VOORHEES, A. W. NEELEY, and R. V. SHANKLAND (Ind. Eng. Chem., 1931, 23, 604–611).—A review of much of the literature dealing with the production of lubricating oils by polymerising olefines in the presence of $AlCl_3$. In general, it is shown that the

temp.-viscosity coeff. decreases with increasing mol. wt. of the raw material. The oils obtained by polymerising cyclic olefines show the characteristics of naphthenic oils to a high degree. The effect of time, temp., and amount of AlCl_3 on the polymerisation yield and viscosity was investigated; 30 hr. at $54.5-57.2^\circ$ and 3% of AlCl_3 were found the most desirable. A commercial process has been developed.

T. A. SMITH.

Viscosity-temperature relationship of lubricating oils. R. G. SLOANE and C. WINNING (Ind. Eng. Chem., 1931, 23, 673-674).—Mathematical expressions for the variation of viscosity with temp. are either limited in the temp. range to which they apply or are too involved for graphical representation. The expression $(\log \eta_k - A)(t - B) = C$ is simpler, but contains three consts. The const. B was found to show least variation and to introduce no very serious errors when its val. is taken as -135 . The expression for the kinematic viscosity $\log \eta_k = c/(t + 135) + A$ lends itself readily to graphical representation.

T. A. SMITH.

Physical properties and constitution of mineral lubricating oils. II. S. KYROPOULOS (Z. physikal. Chem., 1931, 154, 358-363; cf. B., 1929, 931).—A reply to criticisms by Bielenberg (B., 1930, 849).

F. L. USHER.

Physical properties and constitution of mineral lubricating oils. W. BIELENBERG (Z. physikal. Chem., 1931, 154, 364-369; cf. preceding abstract).—Polemical against Kyropoulos.

F. L. USHER.

Composition and crystal form of the petroleum waxes. S. W. FERRIS, M. C. COWLES, JUN., and W. M. HENDERSON (Ind. Eng. Chem., 1931, 23, 681-688).—Petroleum wax was freed from oil, fractionally distilled *in vacuo*, and the fractions themselves were fractionally crystallised from ethylene dichloride. The products consisted partly of plate-shaped crystals, partly of needles, and partly of crystals having no very definite shape. The first have the highest m.p. for a given b.p., and the second the lowest. Only the first type exists in the lower-boiling fractions. Evidence is produced which indicates that the cryst. form is characteristic of different hydrocarbon series and independent of the solvent. If crystallisation of both types is simultaneous, the needles tend to impress their form upon the plates. Photomicrographs are given. C. IRWIN.

Refractometric investigation of paraffin products. M. FREUND (Petroleum, 1931, 27, 409-410).—The paraffin content of artificial mixtures of paraffin and filtrate oil may be calc. fairly accurately from the n val. of the paraffin, the oil, and of the mixture by application of a simple mixture formula. By determining n for the final products of petroleum refining, refractometric examination of the petroleum and calculation of the paraffin content offers a method of process control quicker than the tedious analytical method.

H. E. BLAYDEN.

Determination of water in power alcohol. K. R. DIETRICH and C. CONRAD (Z. angew. Chem., 1931, 44, 532-534).—Available methods are surveyed, and a method based on absorption by acid of the NH_3 evolved

when the liquid (50 g.) is allowed to drop slowly on to a 2-fold excess of Mg_3N_2 , and titration of the excess of acid, is described. The Mg_3N_2 reacts very readily, and only traces of H_2O may be determined; anhyd. EtOH does not react, but with MeOH at concentrations higher than about 60% NH_2Me is evolved. Accurate results are obtainable and the method is applicable to Et_2O , COMe_2 , and various types of motor spirit. Ca and Al nitrides are not satisfactory. H. F. GILLBE.

Oil-well cement.—See IX. **Dust removal from gases.**—See XI. **Hydrogenation of oils.**—See XII. **Fruit-tree emulsions.** PhOH as germicide. —See XVI. **Bagasse utilisation.**—See XVII.

PATENTS.

Apparatus for preliminary treatment of fuel during its supply to furnaces. AMER. ENG. CO. (B.P. 348,106, 3.1.30. U.S., 18.11.29).—The fuel is passed through a drying chamber, through which are circulated furnace gases of suitable temp., and thence to a vertical retort, externally heated by high-temp. furnace gases, wherein it is distilled with recovery of the volatile by-products. The treated fuel is fed directly from the bottom of the retort, e.g., by means of a reciprocating ram and an underfeed stoker, to the combustion chamber of the furnace. A. B. MANNING.

Apparatus for preheating materials containing coal and oil. J. Y. JOHNSON. From I. G. FARBERIND. A.-G. (B.P. 348,189, 10.2.30).—The material is passed through a preheating coil contained in a combustion chamber, wherein a suitable fuel, e.g., coal gas, natural gas, or vaporised fuel oil, is burned in stages in such a manner as to heat the coil uniformly. Thus a mixture of air and fuel, containing a great excess of either, is supplied to one end of the combustion chamber and the rest of the fuel or air necessary for complete combustion is admitted at suitable points along the chamber. A. B. MANNING.

Distillation of coal. F. PUENING (B.P. 348,361, 30.4.30. Ger., 30.4.29. Addn. to B.P. 312,238; B., 1930, 936).—The retort is modified by providing between the coking chambers and the heating gas ducts a gastight head-plate, which rests on water-cooled beams, supports the walls of the coking chambers, and carries the ducts for the entrance and exit of the heating gases. The head-plate is provided with expansion folds to ensure flexibility. The coal is charged into the chambers from the inner side of the annular arrangement by means of a machine which rotates with the inner part of the shell. Provision is made for levelling the charges in the chambers and returning any excess coal to the charging machine. A. B. MANNING.

Cooling the hot coke discharged from coke ovens. N.V. SILICA EN OVENBOUW MIJ., Assees. of C. OTTO & Co. G.M.B.H. (B.P. 348,207, 14.2.30. Ger., 14.2.29).—The hot coke is charged into a shaft wherein it is cooled with the simultaneous production of water-gas by introducing steam or H_2O countercurrent to the coke. The small coke is separated from the larger as it leaves the oven and is charged into a chamber forming an extension of the upper part of the shaft, which is externally heated to a temp. sufficiently high to ensure

the practically complete conversion therein of the CO_2 in the water-gas into CO . A. B. MANNING.

Manufacture of products from coal and the like solid carbonaceous materials, asphalts, various petroleum products, tars, phenols, cresols, and the like by the action of hydrogen at elevated temperatures and pressures. H. D. ELKINGTON. From N.V. DE BATAAFSCHE PETROLEUM MAATS. (B.P. 348,243, 20.2.30).—The process is carried out in the presence of a catalyst prepared by treating metal oxides or hydrated metal oxides, *e.g.*, Fe or Co oxides, with H_2S prior to hydrogenation. The oxides are heated to 200–300° during at least part of the treatment with H_2S . A. B. MANNING.

Manufacture of products from coal, tars, oils, and the like carbonaceous materials. H. D. ELKINGTON. From N.V. DE BATAAFSCHE PETROLEUM MAATS. (B.P. 348,721, 21.2.30).—Catalysts which are used in the destructive hydrogenation of carbonaceous materials, *e.g.*, Fe, Co, Ni, Mo, etc., or their oxides, supported on carriers such as absorptive C or pumice, are reactivated by being heated in the presence of air or other oxidising gases. A. B. MANNING.

Preparation of catalysts for use in the manufacture, by destructive hydrogenation, of hydrocarbons from carbonaceous material. I. G. FARBENIND. A.-G. (B.P. 348,690, 15.2.30. Addn. to B.P. 247,584; B., 1927, 595).—The catalysts are prepared by treating oxides of metals of groups II and VI, *e.g.*, oxides of Mo, W, Cr, or U, mixed with oxides of Zn, Mg, or Al, etc., with volatile S, Se, or Te compounds, in the presence of H_2 at raised temp. (Cf. B.P. 273,228; B., 1927, 695.) A. B. MANNING.

Treatment of coals, tars, mineral oils, and the like, by hydrogenation under high pressure and at high temperature. J. E. LÖFFLER (B.P. 348,449, 3.7.30).—The reaction components, the reaction vessel, and the reaction products are heated, or cooled, by means of high-pressure steam. The steam is preferably circulated in closed circuits, *e.g.*, by means of pumps, the heating or cooling action being controlled by varying the vol. in circulation or the temp. The circuit may include a heat accumulator. A. B. MANNING.

Manufacture of hydrocarbons from coal, tars, mineral oils, and the like. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 348,252, 26.2.30).—In the destructive hydrogenation of carbonaceous materials under pressure, the desired reaction temp. is maintained by introducing O-containing compounds of C, *e.g.*, CO_2 or phenols, which under the working conditions are reduced to hydrocarbons with evolution of heat, at one or more points in the course of the hydrogenation where an undesired fall of temp. would otherwise occur. A. B. MANNING.

Destructive hydrogenation of high-boiling hydrocarbons with the formation therefrom of hydrocarbons of lower b.p. GAS LIGHT & COKE CO., R. H. GRIFFITH, and R. N. B. D. BRUCE (B.P. 348,803, 29.3.30).—High-boiling hydrocarbons rich in open-chain compounds are blended with high-boiling closed-chain compounds and the mixture is subjected to destructive hydrogenation under pressure and at raised temp. The

effect of such blending is to stabilise the reaction temp. The process is preferably carried out in the presence of a suitable catalyst, *e.g.*, Mo promoted by Si, B, Li, Ca, or P. A. B. MANNING.

Manufacture of carburetted water-gas. HUMPHREYS & GLASGOW, LTD., Assees. of J. A. PERRY (B.P. 348,501, 20.10.30. U.S., 20.11.29).—The carburetting oil is sprayed on to the fuel bed, the heating of the top of which is increased during both the "blow" and the "run," by providing a pier of refractory material extending up through the centre of the bed. With this device an oil producing a relatively large quantity of coke on gasification can be used. A. B. MANNING.

Production of combustible gas mixtures which include constituents supplied from a distance. A. C. BECKER and W. BERTELSMANN (B.P. 349,453, 19.2.30. Ger., 9.4.29).—Coal gas is treated by fractional compression and low-temp. cooling, and the hydrocarbon fraction formed as a by-product is passed under pressure into long-distance piping. At the point of distribution it is blended with gas mixtures, *e.g.*, H_2 , water-gas, etc., substantially free from CO , in such proportions that, after treating with catalysts in order to remove any CO , the final gas mixture is substantially identical with ordinary town gas. H. S. GARLICK.

Recovery of carbon disulphide [from gas mixtures]. IMPERIAL CHEM. INDUSTRIES, LTD., and J. MCAULAY (B.P. 349,061, 19.12.29).—A mixture of (*e.g.*, equal vols. of) a stripping oil (creosote oil) and "heavy liquid paraffin" is used for absorbing CS_2 , *e.g.*, from the exit gases of the process described in B.P. 331,734 (B., 1930, 862). The CS_2 is recovered from the solution by steam-distillation. L. A. COLES.

Treatment of distillate petroleum products. STANDARD OIL CO. OF NEW YORK (B.P. 349,427, 21.11.29. U.S., 23.4.29).—Decolorisation of petroleum oils, *e.g.*, gasoline and kerosene, and the prevention of the formation of colour, odour, and gums are effected by the addition of > 0.1% of a 10% solution of a polyhydroxybenzene compound, *e.g.*, pyrogallol, in an oil-miscible solvent, *e.g.*, an aliphatic alcohol. [Stat. ref.]

H. S. GARLICK.
Heat-treatment of gasoline. (Sir) H. W. A. DETERDING (B.P. 349,812, 27.6.30. Holl., 16.8.29).—A gasoline fraction obtained by straight distillation without substantial cracking is separated into 2 fractions and the heavier fraction is subjected to heat treatment under cracking conditions, preferably under pressure, and with or without a catalyst. The treated fraction is united with the lighter fraction or some corresponding fraction from another source. H. S. GARLICK.

Production of motor driving spirits. W. W. TRIGGS. From GES. F. TEERVERWERTUNG M.B.H. (B.P. 349,655, 6.3.30).—Benzines from the low-temp. distillation of coal etc. are hydrogenated at 300–400°/100–200 atm. in the presence of an active C catalyst, under such conditions that min. cracking occurs. [Stat. ref.]

H. S. GARLICK.
Separation of olefines by distillation. N.V. DE BATAAFSCHE PETROLEUM MAATS., Assees. of R. M. DEANESLY (B.P. 348,817, 5.4.30. U.S., 5.6.29).—Mixtures of olefines and paraffins, the components of which

have little difference in v.p., *e.g.*, mixtures of butane and butylene, are separated by fractional distillation under suitable pressure in the presence of liquid anhyd. NH_3 or NH_2Me . By suitably controlling the distillation the bulk of the paraffin appears in the distillate, whilst the olefine remains in the residue. A. B. MANNING.

Burners for pulverised fuel. H. WADE. From BÜTTNER-WERKE A.-G. (B.P. 350,051, 13.3.30).

Oxy-acetylene and similar heating burners. ALLEN-LIVERSIDGE, LTD., and A. STEPHENSON (B.P. 349,433, 26.11.29).

[Feeding device for] acetylene generators. C. S. MILNE (B.P. 250,166, 30.4.30).

Coke-oven doors. R. WILHELM (R. WILHELM, MASCHINENFABR.) (B.P. 350,368, 3.11.30. Ger., 2.11.29).

Doors for coke ovens or the like. SOC. GÉN. DE FOURN. À COKE SYSTÈMES LECOCQ (B.P. 350,340, 9.9.30. Belg., 27.9.29). H. KOPPERS A.-G. (B.P. 349,623, 1.3.30. Ger., 2.3.29).

Doors of carbonising chambers, such as coke ovens and the like. WOODALL-DUCKHAM (1920), LTD., and A. T. KENT (B.P. 349,737, 24.4.30).

Filters [for oil]. Settling apparatus [for NH_4 salts].—See I. H_2SO_4 from NH_3 saturators. Bicarbonates.—See VII. Inhibitor for protecting metals.—See X. Firedamp-proof lamp.—See XI. Rubber compounding.—See XIV. Artificial turf.—See XVI. Testing for CO in air. Disinfectant.—See XXIII.

III.—ORGANIC INTERMEDIATES.

Determination of phenols. [Phenol from] ammoniacal liquor. Phenols in coal tar.—See II. Abs. EtOH.—See XVIII. **Detection of chloramine-T. Test for CH_2O in milk.**—See XIX.

PATENTS.

Hydration of acetylene to acetaldehyde. R. RILEY, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 346,883, 31.1.30).—In order to maintain the activity of the $\text{HgSO}_4\text{--Fe}_2(\text{SO}_4)_3$ catalyst, part (*e.g.*, $\frac{1}{3}$) of the liquor is withdrawn (preferably continuously) and FeSO_4 oxidised with O_2 gas before returning to the circuit. The concentration of $\text{Fe}_2(\text{SO}_4)_3$ may thus be maintained sufficiently high to avoid reduction of HgSO_4 to Hg. C. HOLLINS.

Manufacture of acetic acid from acetaldehyde. HOLZVERKÖHLUNGS-IND. A.-G. (B.P. 347,323, 3.2.30. Ger., 26.2.29).— MeCHO and at least twice the theoretical quantity of O_2 (with or without N_2) are introduced into a mixing vessel at 60–75°, whereby dangerous concentrations of peracetic acid are avoided. The waste gases are washed successively with a portion of the liquid reaction product, with reaction product freed from MeCHO , and with H_2O . The yield of 96% AcOH is 98% on the unrecovered aldehyde. C. HOLLINS.

Manufacture of alkoxyaldehydes. DR. A. WACKER GES. F. ELEKTROCHEM. IND. G.M.B.H. (B.P. 347,943 and Addn. B.P. 348,001, [A] 12.6.30, [B] 15.9.30. Ger., [A] 20.7.29, [B] 25.11.29).—(A) The alkoxyacetals

formed by addition of 3 mols. of an alcohol to an unsaturated aldehyde are partly hydrolysed by acid (HCl , H_2SO_4 , alkyl- HSO_4 , H_3PO_4 , oxalic acid, toluene-sulphonic acid) at 20–25°, with production of alkoxyaldehydes. The formation and partial hydrolysis may be effected without isolation. β -Ethoxybutaldehyde, b.p. 137–138°/720 mm. or 40°/12 mm., and the β -methoxy-compound are described. (B) The alkoxyaldehyde is separated rapidly and continuously by distillation as formed. C. HOLLINS.

Purification of methanol [methyl alcohol] and other alcohols of b.p. below 100°. IMPERIAL CHEM. INDUSTRIES, LTD., and J. W. ARMIT (B.P. 346,658, 13.12.29).—The alcohol is treated with halogen equiv. to the unsaturated compounds present, distilled through hot aq. NaOH to remove halogen acid, and fractionated. C. HOLLINS.

Manufacture of polymerised hydrocarbons and application thereof [as insulating materials]. STANDARD TELEPHONES & CABLES, LTD., and W. E. HUGH (B.P. 345,939, 16.12.29).—A mixture of a styrene and a diolefin with conjugated double linkings is polymerised, *e.g.*, by heating at 100°, with or without catalyst, antioxidant, swelling agent, rubber, wax, etc.; 60% of styrene and 40% of $\beta\gamma$ -dimethylbutadiene, with 5–15% of mineral wax, are polymerised in an autoclave to give an insulating material for cables. C. HOLLINS.

Manufacture of acrolein [acraldehyde]. SCHERING-KAHLBAUM A.-G. (B.P. 346,221, 10.6.30. Ger., 15.6.29).—Glycerol vapour is led over a salt of a tribasic (or higher) acid (Li, Cu, Bi, Ag, or Fe phosphates, Mg borate, etc.), preferably on a carrier (pumice), at 400–500°. C. HOLLINS.

Manufacture of odoriferous substances [cyclic acetals]. I. G. FARBERIND. A.-G. (B.P. 346,115, 28.2.30. Ger., 28.2.29).—The cyclic acetals obtained by condensing a dihydric alcohol with a phenylated aliphatic aldehyde have value in perfumery. Examples are: phenylacetaldehyde with glycol (product has b.p. 115–120°/12 mm. and rose odour), with propylene glycol (b.p. 100°/5 mm., rose), $\alpha\beta$ -butylene glycol (b.p. 107–110°, hyacinth), $\alpha\gamma$ -butylene glycol (b.p. 133–135°/14 mm., hyacinth), $\beta\delta$ -isohexylene glycol (b.p. 110–115°/5 mm., mignonette); hydratropaldehyde with glycol (b.p. 106–108°/5 mm., earth and mushroom), with $\beta\delta$ -isohexylene glycol (b.p. 115–120°/5 mm., herbaceous and mignonette); β -phenyl-*n*-propaldehyde with glycol (b.p. 115–120°/5–6 mm., flowery and fruity), $\beta\delta$ -isohexylene glycol (b.p. 130°/5 mm., flowery and fruity); cinnamaldehyde with glycol (b.p. 140–145°/8 mm., cinnamon), or $\beta\delta$ -isohexylene glycol (b.p. 155–160°/5 mm., cinnamic). C. HOLLINS.

Treatment [separation] of mixtures of amines. H. S. ADAMS and L. MEUSER, ASSRS. to NAUGATUCK CHEM. CO. (U.S.P. 1,782,112 18.11.30. Appl., 4.8.25).— CS_2 is added to the mixed amines and the whole oxidised with acid H_2O_2 ; primary amine (preferably present only in traces) is converted into carbimide, secondary into thiuram disulphide, and tertiary is obtained as salt. The process is applied, *e.g.*, to mixed methylamines and to the by-product from the manufacture of triethyltrimethylenetriamine. C. HOLLINS.

Manufacture of tetra-alkylated thiuram disulphides. H. S. ADAMS and L. MEUSER, Assrs. to NAUGATUCK CHEM. CO. (U.S.P. 1,782,111, 18.11.30. Appl., 4.8.25).—In the oxidation of dialkylamine dialkyldithiocarbamates with H_2O_2 , CS_2 equiv. to the amine which would be liberated is added so that all the amine is converted into thiuram disulphide. C. HOLLINS.

Manufacture of pyridine derivatives. E. KOENIGS and H. GREINER (B.P. 346,246, 23.7.30. Ger., 23.7.29).—Pyridine is converted by SOCl_2 in 5 hr. at 100° or in 2–3 days at 15° into *N*-4-pyridylpyridinium chloride hydrochloride, $\text{C}_5\text{H}_5\text{N}(\text{Cl})\cdot\text{C}_5\text{H}_4\text{N}\cdot\text{HCl}$, which is dimorphic, m.p. $171\text{--}172^\circ$ (stable) and $151\text{--}152^\circ$. Fission by KOH at 200° or conc. aq. NH_3 at $150\text{--}160^\circ$ gives 4-aminopyridine and glutacondialdehyde (which is resinified); aniline gives aminopyridine and glutacondialdehyde dianil. C. HOLLINS.

Manufacture of piperidine. SCHERING-KAHLBAUM A.-G. (B.P. 346,222, 10.6.30. Ger., 21.6.29).—The catalytic hydrogenation of pyridine, using active Ni on SiO_2 gel, is effected at or below $160^\circ/100\text{--}150$ atm. The H may be supplied by tetrahydronaphthalene etc. C. HOLLINS.

Manufacture of substitution products of carbazolesulphonic acids. I. G. FARBENIND. A.-G. (B.P. 347,193, 23.1.30. Ger., 23.1.29).—The NH_2 group in aminocarbazolesulphonic acids is diazotised and exchanged for other groups. 4:2:6:8- and 2:4:6:8-Hydroxycarbazolettrisulphonic acids, 6-iodo-4-hydroxycarbazole-2:8-disulphonic acid, 2:2':6:6':8:8'-hexasulpho-4:4'-dicarbazolyl disulphide, 4-chloro-, 4-bromo-, 4-iodo-, and 4-cyano-carbazole-2:6:8-trisulphonic acids, are described. C. HOLLINS.

Decreasing the inflammability of organic nitro-compounds. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 347,101, 17.12.29).—An acid amide, e.g., urea, is incorporated with Na *p*-nitrophenoxide, 2:4-dinitrophenoxide, etc., especially for use in wood preservation. 1–2 pts. of urea are added to 1 pt. of nitrophenol etc. C. HOLLINS.

Manufacture of substituted phenolcarboxylic acids. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 347,407, 12.3.30).—*o*-4-Xylenol or 2-chloro-*p*-cresol are carboxylated by Kolbe's method, giving acids of m.p. 200° and $210\text{--}212^\circ$, respectively. C. HOLLINS.

Manufacture of condensation products containing halogen [chloromethyl compounds]. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 347,887, 3.5.30).—Aq. CH_2O saturated with HCl reacts with PhOH to give at $40\text{--}45^\circ$ a viscous resin, or at $5\text{--}10^\circ$ 6:8-bis(chloromethyl)benz-1:3-dioxan, $\text{CH}_2\text{C}(\text{CH}_2\text{Cl})\cdot\text{C}\cdot\text{O}\text{—CH}$
 $\text{C}(\text{CH}_2\text{Cl})\text{:CH}\cdot\text{C}\cdot\text{CH}_2\cdot\text{O}$, m.p. 117° ; *p*-cresol at 20° gives 3:5-bis(chloromethyl)-*p*-cresol, m.p. 86° , technical cresols at 40° a resin. C. HOLLINS.

Manufacture of aromatic condensation products [chloromethyl derivatives of aryl alkyl ethers or thioethers]. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 347,892, 7.5.30).—Aryl alkyl ethers or thioethers (the aryl being Ph, alkylated or halogenated

Ph, or nitrophenyl) are treated with CH_2O and HCl so as to introduce 1 or 2 chloromethyl groups in *p*- and/or *o*-positions to the ether group. 2:4-Bis(chloromethyl)anisole, m.p. 65° , 3-chloro-2(?):4-bis(chloromethyl)anisole, m.p. $47\text{--}48^\circ$, b.p. $172\text{--}174^\circ/10$ mm. (from *m*-chloroanisole), 2-methoxy-5-methylbenzyl chloride, m.p. 9° , b.p. $118\text{--}120^\circ/15$ mm. (from *p*-tolyl methyl ether), 2:5-bis(chloromethyl)quinol dimethyl ether, m.p. 165° , 4(?)-methoxy-3-nitrobenzyl chloride, m.p. 87° , b.p. $175^\circ/5$ mm. (from *o*-nitroanisole), 2-methylthiol-5-methylbenzyl chloride, m.p. 31° , b.p. $132\text{--}134^\circ$ (from *p*-tolyl methyl sulphide), and 2:4-bis(chloromethyl)thiophenol methyl ether, m.p. 46° , are described. C. HOLLINS.

Manufacture of aromatic methyleneamino compounds [4-hydroxy-3-carboxybenzylated arylamines]. M. KAHN, W. SCHEPSS, and L. ZEH, Assrs. to GEN. ANILINE WORKS, INC. (U.S.P. 1,781,982, 18.11.30. Appl., 23.6.27. Ger., 19.8.26).—The chloromethyl derivatives obtained from salicylic or cresotic acids by action of HCl and CH_2O are condensed with arylamines, pyridines, etc. to give coupling components for azo dyes. Products from 5-chloromethylsalicylic acid and metanilic acid, from 5-chloromethyl-*o*-cresotic acid and γ -acid (specially claimed) or methylaniline or pyridine (a quaternary salt) are described. C. HOLLINS.

Manufacture of monoacyl[*m*- and *p*-]diamines of the benzene series. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 347,774, 7.2.30).—Arylsulphonyl derivatives of *m*- and *p*-nitroanilines (which may carry halogen, alkyl, or alkoxyl as substituents) are reduced and acylated (the reduction products being sol. in alkali), and the arylsulphonyl group is removed by hydrolysis with H_2SO_4 . The following are described: 6-benzamidocresidine, m.p. 185° (benzenesulphonyl derivative, m.p. $168\text{--}171^\circ$), from 6-nitro-*N*-benzenesulphonylcresidine, m.p. $207\text{--}208^\circ$; corresponding ethyl ether, m.p. 158° (benzenesulphonyl derivative, m.p. 148°), Bu ether, m.p. 120° (benzenesulphonyl derivative, m.p. 134°); 6-*op*-dichlorobenzamidocresidine, m.p. 160° (benzenesulphonyl derivative, m.p. 203°); 6-anisamidocresidine, m.p. 212° ; 6-phenylacetamidocresidine, m.p. 158° (benzenesulphonyl derivative, m.p. 183°); 6-*o*-chlorophenoxyacetamidocresidine, m.p. 135° (benzenesulphonyl derivative, m.p. 196°); 6-cinnamidocresidine (benzenesulphonyl derivative, m.p. 198°); 4-chloro-5-benzamido-*o*-anisidine, m.p. 174° (toluene-*p*-sulphonyl derivative, m.p. 175°); 5-benzamido-*o*-toluidine, m.p. 154° (toluene-*p*-sulphonyl derivative, m.p. 195°); 6-benzamido-*m*-4-xylidine, m.p. 176° ; 4-benzamido-*o*-anisidine, m.p. 139° (toluene-*p*-sulphonyl derivative, m.p. 183°); 4-benzamido-2:5-dimethoxyaniline, m.p. 168° (benzenesulphonyl derivative, m.p. 175°); diethoxy-compound, m.p. 101° ; 2-methoxy-5-ethoxy-compound, m.p. 121° . C. HOLLINS.

Manufacture of halogenated aminoaryl[ene]thiazole compounds. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 347,141, 22.1.30. Cf. B.P. 345,735; B., 1931, 667).—A 2-aminoarylenethiazole is chlorinated or brominated with substantially the theoretical amount of halogen. The thiazole may be produced by chlorinating an arylthiocarbamide, and brominated without

isolation. The production of 6-chloro- (m.p. 198—200°), 6-bromo- (m.p. 210—212°), 5 : 6-dichloro-4-methyl- (m.p. 250—255°), 6-chloro-4-methyl-, 6-bromo-4-methyl- (m.p. 215—218°), 5-bromo-6-ethoxy- (m.p. 200—205°) derivatives of 2-aminobenzthiazole, 5-chloro-2-amino- β -naphthathiazole, m.p. 247°, and 6-bromo-2-*p*-bromo-anilinobenzthiazole, m.p. 215—217°, is described.

C. HOLLINS.

Oxidation of organic substances [with selenium dioxide etc.]. J. Y. JOHNSON. From I. G. FARBERIND. A.-G. (B.P. 347,743, 31.1.30).—Aromatic compounds containing Me or CH₃ groups are oxidised to aldehydes, ketones, or acids by heating with O compounds of Se, e.g., SeO₂ or H₂SeO₄. Ring systems, e.g., benzanthrone, susceptible to other oxidants are unattacked. 2-Methylbenzanthrone with SeO₂ in H₂O at 230—240°, or with conc. H₂SeO₄ in boiling AcOH, gives 2-aldehydobenzanthrone; with SeO₂ in boiling PhNO₂ the 2-carboxylic acid is formed. The methyl-naphthanthraquinone from 1-methylnaphthalene and phthalic anhydride gives with aq. SeO₂ at 240° either the acid or the aldehyde. 4-Benzylbenzanthrone similarly yields 4-benzoylbenzanthrone, and 1 : 5-dibenzoyl-2 : 6-dimethylnaphthalene is oxidised to the 2 : 6-dicarboxylic acid.

C. HOLLINS.

Manufacture of chloro-derivatives of the anthraquinone-acridone series. J. Y. JOHNSON. From I. G. FARBERIND. A.-G. (B.P. 347,095, 20.11.29).—1-Anilino-2-methyl- or *o*-toluidino-anthraquinone, which may contain Cl, is chlorinated in absence of acid-binders and H₂O until a hexachlorophthaloylacridone is obtainable on hydrolysis. The hydrolysis product may be partly dehalogenated by reduction, e.g., by vatting and re-oxidising. The less sol. leuco-compounds may be separately oxidised. Rapid chlorination of 1-anilino-2-methylantraquinone at 170°, followed by hydrolysis, vatting at 55°, and re-oxidation leads to a pure red vat dye. [Stat. ref.]

C. HOLLINS.

Hydrogenation of phenols etc. Separation of olefines.—See II. Al salts.—See VII. Application of moulds. BuOH and COMe₂ by fermentation. Acids by fermentation.—See XVIII.

IV.—DYESTUFFS.

PATENTS.

Manufacture of condensation products [acid wool dyes] of the benzanthrone series. I. G. FARBERIND. A.-G. (B.P. 346,896, 7.2.30. Ger., 7.2.29. Addn. to B.P. 248,791; B., 1927, 550).—A 2-aryloxy-3-naphthoic acid, ester, or amide is converted by acid condensing agents (NaAlCl₄) into benzanthrone derivatives. 5-Hydroxybenzanthrone-4-carboxylic acid, m.p. 285°, from 2-benzoyloxy-3-naphthoic acid or its Et ester, and 8-chloro-5-hydroxybenzanthrone-4-carboxylic acid, m.p. 250—252°, from the 2-*m*-chlorobenzoyloxy-compound, are chromable wool dyes.

C. HOLLINS.

Preparation of [vat] dyes of the anthraquinone series. IMPERIAL CHEM. INDUSTRIES, LTD., H. A. PIGGOTT, and W. W. TATUM (B.P. 345,982, 30.9.29).—Aminoanthraquinones are condensed with halogenated pyrimidines, and, if desired, aroylated. Examples are : 2 : 4-dichloropyrimidine with 1 : 4-diaminoanthraquinone

(blue-violet; benzoylated, blue-red), 1-aminoanthraquinone (orange), 1 : 4-aminohydroxyanthraquinone (red-violet), and 1 : 5-diaminoanthraquinone (orange-red).

C. HOLLINS.

Production of condensation products [vat dyes of the anthraquinone series] containing nitrogen. J. Y. JOHNSON. From I. G. FARBERIND. A.-G. (B.P. 346,677, 8.10.29).—An *o*-aminoanthraquinonecarboxylic ester or amide is condensed with polynuclear (at least 4-ringed) carbocyclic or with heterocyclic compounds having reactive halogen etc., preferably in a solvent (C₁₀H₈ or PhNO₂) in presence of acid-binder and a Cu catalyst; or an *o*-halogenanthraquinonecarboxylic ester or amide is condensed with a corresponding amine. The products are finally cyclised to acridones. Examples are : Me or Et 1-aminoanthraquinone-2-carboxylate with dibromo-1 : 2 : 6 : 7-dibenzpyrene-3 : 8-quinone (red-violet; acridonated, red-brown), with 8-chlorobenzanthrone (fused with KOEt, violet-grey to black), or with 10-chlorobenzanthrone (acridonated, brown); Et 1-chloroanthraquinone-2-carboxylate with amino-*allo*-*ms*-naphthadanthrone (acridonated, red-violet) or with amino-*ms*-benzodanthrone (acridonated, brown-green).

C. HOLLINS.

Manufacture of vat dyes of the anthraquinone [carbazole-acridone] series. I. G. FARBERIND. A.-G. (B.P. 348,849, 22.4.30. Ger., 22.4.29).—Anthraquinones, pyranthrones, dibenzanthrones, or other anthraquinone derivatives, carrying reactive halogen, are condensed with an NH₂ derivative of a carbazole of the anthraquinone series containing at least one acridone ring (see B.P. 323,543; B., 1930, 365). Dichloro-2-amino-3 : 4 : 6 : 7-dipthaloylcarbazole-8 : 9-acridone, obtained from 2 : 4 : 8-trichloro-6 : 7-phthaloylacridone by condensation with 1-amino-4-benzamidoanthraquinone, carbazolisation, and hydrolysis, is condensed with 1-chloroanthraquinone (grey vat dye) or 4-chloro-1-benzamidoanthraquinone (grey to black); dichloro-6 : 7-phthaloyl-3 : 4-(3'-amino-phthaloyl)carbazole-8 : 9-acridone, obtained similarly from 1-amino-5-benzamidoanthraquinone, is condensed with 5-chloro-1-benzamidoanthraquinone (red-grey), dibrominated pyranthrone (black-brown), or dibrominated anthanthrone (deep black).

C. HOLLINS.

Manufacture of halogenanthraquinone- β (N)-benzacridones [halogenated 6 : 7-phthaloylacridones]. J. Y. JOHNSON. From I. G. FARBERIND. A.-G. (B.P. 347,722, 31.10.29).—6 : 7-Phthaloylacridones, which may already contain Cl or Br, are improved in strength and purity of shade by further chlorination or bromination in ClSO₃H preferably in presence of Fe or S at 20—40°; ClSO₃H itself may be used as chlorinating agent at 60° in presence of I. Amongst the examples are : 6 : 7-phthaloylacridone with Cl or Br and I at 60° for 2—3 hr. (powerful red vat dye); 2 : 4-dichloro-6 : 7-phthaloylacridone with Cl and Fe at 20—40° (yellowish-red); 6 : 7-phthaloyl-2-methylacridone with Cl and S (bluish-red); bisacridone from 1 : 5-dichloroanthraquinone and anthranilic acid, with Cl and FeCl₃ at 20° (violet-red). H₂SO₄ or oleum may be used in place of ClSO₃H.

C. HOLLINS.

Manufacture of vat dyes of the anthraquinone-acridone series. From I. G. FARBERIND. A.-G. (B.P.

346,849, 23.10.29).—6:7-Phthaloylacridones and their halogen derivatives are treated with PCl_5 , POCl_3 , etc., preferably in a solvent (trichlorobenzene), and then halogenated; if sol. products are obtained (e.g., at lower temp.) hydrogen halide is removed by means of PhOH , SO_2 , etc. Trichlorinated 6:7-phthaloylacridone with PCl_5 in trichlorobenzene at 200° gives on chlorination at 175° a pure red vat dye. [Stat. ref.] C. HOLLINS.

Manufacture of [mono]azo dyes [for wool, pigments, etc.]. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 347,288, 27.1.30).—An arylamine, especially an *o*-aminophenol, is diazotised and coupled with an aminonaphtholsulphonamide. Examples are: aniline-*o*-sulphonic acid \rightarrow di(methylanilide) of acetyl-H-acid (red), or dianilide of H-acid (wine-red); *o*-aminophenol-4-sulphonic acid \rightarrow dianilide of H-acid (red-violet, green-blue on chroming); *m*-nitroaniline-6-sulphonic acid \rightarrow ethylanilide of γ -acid (brick-red); aniline-2:5-disulphonic acid \rightarrow methylanilide of γ -acid (red); 2-amino-4'-hydroxy-3'-carboxydiphenylsulphone-4-sulphonic acid \rightarrow methylanilide of γ -acid (blue-red, bluer on chroming). C. HOLLINS.

Manufacture of azo dyes containing chromium. I. G. FARBENIND. A.-G. (B.P. 347,290, 27.1.30. Addn. to B.P. 306,843; B., 1930, 811).—A pyrazolone derived from an aminoarylsulphonylsalicylic acid is treated with a Cr compound and then coupled with a diazotised arylamine other than an *o*-aminophenol. Examples are: 2-chloro-*p*-toluidine \rightarrow Cr compound of 1-[5-sulpho-2-(4'-hydroxy-3'-carboxyphenylsulphonyl)phenyl]-3-methyl-5-pyrazolone (greenish-yellow on wool); *o*-toluidine \rightarrow Cr compound of 1-[5-sulpho-2-(2'-hydroxy-3'-carboxy-5'-methylphenylsulphonyl)phenyl]-3-methyl-5-pyrazolone (yellow). C. HOLLINS.

Manufacture of [chrome-yellow] azo dyes. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 345,930, 25.9.29).—3-Methyl-5-pyrazolones derived from amino-salicylic acids are coupled with diazotised non-hydroxylated aminobenzenesulphonamides or aminobenzamides free from further sulphonic or carboxylic groups. Examples are: aniline-*m*-sulphonamide or *m*-aminobenzamide \rightarrow 1-(2-hydroxy-5-sulpho-3-carboxyphenyl)-3-methyl-5-pyrazolone. [Stat. ref.] C. HOLLINS.

Manufacture of [galloxyaniline] dyes. DURAND & HUGENIN A.-G. (B.P. 346,243, 19.7.30. Addn. to B.P. 301,329; B., 1930, 502).—The simple *m*-substituted galloxyanilines used as starting materials in the process of the prior patent are condensed in acid (HCl) with phenols, and, if desired, sulphonated, to give printing colours stable to discharge pastes. The galloxyaniline from 6-nitrosodimethyl-*m*-toluidine and gallamide is condensed with resorcinol; that from 6-nitrosodimethyl-*m*-toluidine and gallic acid, with Schäffer acid. C. HOLLINS.

Chlorinated anthraquinoneacridones.—See III.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Production of esparto fibre. C. DE NEYMAN (Chim. et Ind., 1931, 25, 1078—1080).—The raw material is freed from encrusting substances by successive treatments with aq. suspensions of CaO either at room temp.

or at 100° . The amounts of CaO to be added in the first and succeeding baths and the duration of the treatments vary according to the temp. Either fresh or sea-water may be used, and if fuel is scarce, as in some tropical regions, an alternative maceration treatment with a more conc. CaO suspension is employed and the vats are heated by the sun. Na_2CO_3 is not so efficient as CaO , but NaOH liquor is more satisfactory. Soda liquors such as are used in obtaining cellulose in papermaking have also been tried, both alone and with the addition of CaO after each boil. The latter method gives a product of better quality. Suitable apparatus for the boiling is described, and when water is scarce countercurrent washing should be employed. Beating or other mechanical treatment is necessary in order to free the fibres. B. P. RIDGE.

Determination of the moisture content of fabrics by cobalt chloride test-paper. K. YAMADA, H. OTSUKA, T. NAKAMURA, and F. TATEBE (J. Soc. Chem. Ind., Japan, 1931, 34, 135—136 B).—The duration of the colour change of a CoCl_2 test-paper, at const. H_2O v.p., is proportional to the quantity of the salt present. Since the velocity of evaporation of moisture from a fabric is proportional to the H_2O content, the duration of the colour change may be employed to determine the latter; the error rarely exceeds 3%. H. F. GILLBE.

Manufacture of sulphite pulp from young wood. C. G. SCHWALBE and K. BERNDT (Papier-Fabr., 1931, 29, 145—148).—Sulphite pulps have been prepared from young fir trees (6 yrs.) of 4—5 cm. diam., cut during the "thinning" of forests. Digestion at 70 — 140° for 18 hr. with liquor containing 4.2% SO_2 and 0.94% CaO yields 45.9% of a pulp containing 89.6% α -cellulose and 0.36% fats and resins, with a Cu number of 2.86. 2% of active Cl is required for bleaching. Beating is slow, but sheets of high strength are produced. T. T. POTTS.

Cooking sulphite pulp with strong cooking acids. E. HÄGGLUND (Zellstoff u. Papier, 1931, 11, 338—341).—Yields 5—10% higher may be obtained by using Ca or Mg bisulphite liquors containing 8% SO_2 instead of the usual 4.3% and concentrations of CaO or MgO above 0.9%. The $[\text{HSO}_3^-]$ has a great effect on the quality of the pulp and on its lignin content, and for pulps of the same yield the lignin content is smaller, i.e., the purer is the pulp, the higher is this concentration. Dissolution of lignin is more complete with $\text{Ca}(\text{HSO}_3)_2$ than with $\text{Mg}(\text{HSO}_3)_2$, and white pulps cannot be obtained if the base content of the liquor is too low. For solutions of equivalent base concentration better cooking is effected, but poorer yields of sugar are given, by the Ca than by the Mg salt, but since the latter is much more sol. than the former at the temp. of decomp., this difference may be evened out by using more conc. $\text{Mg}(\text{HSO}_3)_2$ solutions. B. P. RIDGE.

Measurement of bleachability and cooking degree of sulphite pulp. VON POSSANNER and R. A. KRAUSS (Papier-Fabr., 1931, 29, 317—322, 335—339, 348—357).—The principal known methods of testing bleachability of pulps and of determining cellulose and incrustants are considered in detail, comparative analyses being given. Tests on 35 pulps show the Willstätter

method for determining lignin to give consistently lower results than the Becker method. Lignin determinations are considered too lengthy for control purposes. Indirect methods depending on Cl consumption are critically examined, the methods of Sieber and of Roe being found the most reliable. The KMnO_4 absorption method of Joachim is found to be simple and reliable, KMnO_4 consumption being proportional to lignin content when exceeding 3%. Methods employing malachite-green or phloroglucinol are of no value. An extensive bibliography is given.

T. T. POTTS.

Developments in the production of yellow and bleached straw pulp. R. RUNKEL (Zellstoff u. Papier, 1931, 11, 342—345).—Use of dil. (1.5%) NaOH at 25° for 72 hr. gives a higher yield of pulp and a better removal of lignin than is obtained with CaO, soda ash and sulphite, or more conc. NaOH at 100° or 150°. Milder and continuous maceration processes are rendered possible by use of the new bar mill instead of the edge mill, and bleaching is then carried out by a combined Cl-HOCl process. Economical working depends on the demand for alkali and the cost of Cl, but even if the cost of chemicals is higher than for the older processes the greatly increased yield effects an economy.

B. P. RIDGE.

Relation between chlorine consumption and copper number [of wood pulps]. E. FABRIZI (Papier-Fabr., 1931, 29, 361—367).—During the bleaching of wood pulp, Cu number decreases with the initially rapid consumption of Cl, rising then with further Cl consumption after a point which differs for varying types of pulp, the ratio Cu/Cl becoming const. This relationship may be used to determine the optimum point on a bleach consumption/time curve.

T. T. POTTS.

Determination of α -cellulose content and copper number of paper. J. O. BURTON and R. H. RASCH (Bur. Stand. J. Res., 1931, 6, 603—619).—Determination of α -cellulose (portion insol. in NaOH of mercerising concentration under standard conditions) by modification of Jentgen's method (B., 1911, 125), and of the Cu number (no. of g. of Cu in Cu_2O precipitated from alkaline solution of $\text{Cu}(\text{OH})_2$ under specified conditions by 100 g. of material) by modification of Braidy's method (Rev. gén. Mat. Col., 1921, 25, 35), may be applied to paper testing providing the sample is reduced to cotton-like form by mechanical grinding (process described), which avoids heating or bruising the fibre, and providing allowance is made for the amount of sizing and loading materials present. Various factors affecting the accuracy of the results have been investigated, and the processes described in detail give results reproducible to 0.3 and 1.0%, respectively.

J. W. BAKER.

Bursting-strength tests in evaluation of paper and corrugated board. G. CLEMENS (Papier-Fabr., 1931, 29, 97—101, 129—135, 148—155, 167—171, 181—187, 198—203).—The investigations described arise out of the necessity for standardisation of corrugated board containers. The Schopper-Dalén bursting tester is critically examined. Dalén's assumption that paper forms a truly spherical surface in the bursting tester is found to be correct.

T. T. POTTS.

Durability of paper. KORN (Papier-Fabr., 1931, 29, 155—156).—A review of recent British and American official publications regarding durability standards for paper.

T. T. POTTS.

Recovery of cotton from tyre scrap.—See XIV.
Fibre in podophyllum rhizome.—See XX.

PATENTS.

Production of filaments, yarns, threads, etc. from [waste] natural silk. BRIT. CELANESE, LTD. (B.P. 349,220, 4.4.30. U.S., 19.4.29).—The silk, preferably degummed, is dissolved in acid, e.g., H_2SO_4 of 25—75% concentration, syrupy H_3PO_4 , conc. HCl, etc., at from —10° to 10° and spun into a large vol. of an alcohol either alone or in admixture with H_2O , NaOH, AcONa, or the like also at about 0°.

D. J. NORMAN.

Manufacture of cellulose esters. SOC. CHEM. IND. IN BASLE (B.P. 349,322, 2.6.30. Switz., 1.6.29).—Ripened or unripened cellulose xanthate is treated for a short time at raised temp. with an org. acid anhydride optionally in the presence of diluents and/or catalysts. The esterification is easily controlled and the resulting products are free from S and show the dyeing properties of ordinary cellulose esters. E.g., cotton fabric may be printed with viscose solution, dried, and treated for $\frac{1}{4}$ —2 hr. at 140° with Ac_2O to give a fabric suitable for effect dyeing. Alternatively, cellulose xanthate filaments may be spun from viscose solution, e.g., using as coagulant a solution of an alkali salt acidified with AcOH, and subsequently esterified in filament form in the absence of solvents for cellulose xanthate or other esters.

D. J. NORMAN.

Manufacture of esters of cellulose or of its transformation products or of other carbohydrates. I. G. FARBENIND. A.-G. (B.P. 348,960, 21.7.30. Ger., 19.7.29. Addn. to B.P. 301,036; B., 1930, 504).—Esterification is carried out in the presence of liquid SO_2 under increased pressure produced by means of N_2 or compressed air.

F. R. ENNOS.

Manufacture of cellulose acetates. CELLULOSE ACETATE SILK CO., LTD., P. C. CHAUMETON, and G. H. WAKEFIELD (B.P. 348,292, 19.3.30).—Cellulose material is pretreated below 20° with a lower fatty acid (AcOH) and a relatively small quantity of SO_2 (not more than 5% of the total amount of the acetylating bath), with addition of conc. H_2SO_4 and/or AcOH, if desired, and is afterwards acetylated in the usual manner. Alternatively, the SO_2 may be added to the complete acetylating bath before addition of the cellulosic material; the products are acetates of relatively high viscosity.

F. R. ENNOS.

Manufacture of artificial fibres and films from cellulose esters. I. G. FARBENIND. A.-G. (B.P. 348,931 and Addn. B.P. 348,959, [A] 23.6.30, [B] 18.7.30. Ger., [A] 11.7.29, [B] 18.7.29).—(A) The reaction mixture containing cellulose acetate dissolved in liquid SO_2 obtained by the process of B.P. 301,036 (B., 1930, 504) is dry-spun (e.g., into air) or wet-spun (e.g., into H_2O or a salt solution) without preliminary isolation of the cellulose ester. In the dry-spinning process the catalyst and any free

AcOH present in the reaction mixture are just neutralised by addition of conc. Na_2CO_3 solution, the H_2O and salts thus formed being removed by freezing and filtration. This procedure, however, is unnecessary in wet spinning. (B) The reaction mixture containing, *e.g.*, liquid SO_2 55%, cellulose acetate 22%, AcOH 16%, H_2O 5–6%, and catalyst 1–2%, is dry-spun into air and the resulting somewhat swollen filament, the composition of which is approx. cellulose acetate 50%, AcOH 33%, H_2O 12%, and catalyst 5%, is completely coagulated in, *e.g.*, H_2O or a salt solution at 20–70°.

D. J. NORMAN.

Manufacture of artificial silk from viscose. BREDA-VISADA, LTD., and R. O. JONES (B.P. 348,743, 27.2.30).—Viscose silk of dull lustre is obtained by emulsifying with the viscose solution, before spinning, up to 1% of a non-glyceride ester of animal or vegetable origin which is resistant to hydrolysis by alkalis, *e.g.*, sperm oil, lanoline, carnauba wax, beeswax, etc.

D. J. NORMAN.

Manufacture of artificial silk. S. WILD (B.P. 348,168, 3.1.30. Switz., 9.1.29).—The spinning solution is maintained at a const. temp. in the region of the nozzle by means of a surrounding jacket or heat exchanger, into which liquid is introduced at an initial temp. not more than 2° below that at which the spinning solution is to be kept. After leaving the heat exchanger, the liquid is cooled below and subsequently heated to the required initial temp. for re-entry.

F. R. ENNOS.

Manufacture of artificial silk and the like. B. BORZYKOWSKI (B.P. 348,644, 11.2.30. Ger., 1.3.29).—While being brought from the spinning bobbin or spun cake to a wound form suitable for the textile industry, the filaments are cleaned, preferably by hairy material such as skin, shaved by means of an adjustable slit, and oiled or finished.

F. R. ENNOS.

Spinning of acid solutions of silk fibroin. I. G. FARBENIND A.-G. (B.P. 349,387, 20.8.30. Ger., 31.8.29).—Stronger and softer filaments are obtained by the process of B.P. 339,089 (B., 1931, 153) if two coagulating baths are used. The first bath contains a conc. aq. solution of alkali salts of mineral acids (*e.g.*, mixed KCl and NaCl) with addition of 16–33 vol.-% of a saturated solution of alkali formate or acetate and about 15 g. of CH_2O per litre. The second consists of a saturated solution of alkali (or NH_4) formate or acetate with addition of about 12.5% of Na lactate solution (64%). The coagulated filament is then passed through air for several metres without tension and stretched to 5–8 times its length. The finished silk is washed on the spool, soaped, and dried. The addition of 0.02–0.1% of an essential oil, *e.g.*, turpentine, to the spinning solution minimises the tendency of the spun filaments to stick together.

D. J. NORMAN.

Production of artificial filaments, threads, ribbons, etc. H. DREYFUS (B.P. 346,678, 10.10.29).—High-melting org. compounds, preferably H_2O -insol. and in fine division (0.0001–0.0005 mm.), are incorporated in the spinning solution to give artificial (especially acetate) silks with subdued lustre. Particularly suitable are diacetyl-benzidine or -tolidine, dibenzoyl-

benzidine, di- β -naphthyloxamide, diphenyloxamide, succinic α -naphthylamide, thiocarbonylbenzidine, carbonylbenzidine, 4:4'-dicarbamidodiphenyl, 4:4'-bis-phenylcarbamidodiphenyl, etc.

C. HOLLINS.

Direct manufacture and employment of artificial filaments. B. BORZYKOWSKI (B.P. 348,759, 10.3.30. Ger., 24.6.29. Addn. to B.P. 347,241; B., 1931, 626).—The washed and, if desired, after-treated cake is placed with its lower edge on a plane soft-faced support; a tensioning device, inserted in the cake so as to project above its upper edge, is fixed to the plane support so that loosening of the thread layers on unwinding or lateral displacement of the cake is prevented.

F. R. ENNOS.

Treatment of cellulosic materials. DISTILLERS CO., LTD., W. P. JOSHUA, and P. EAGLESFIELD (B.P. 348,740, 26.2.30).—The liquor resulting from the acid hydrolysis of cellulose is passed while still hot and under pressure (12–15 atm.) through a coil where it is heated at 160–180° for 6–10 min. to convert unfermentable polysaccharides into monoses. The hot liquor is then passed through a defecating tower containing, *e.g.*, Lahn phosphate or bone charcoal to remove fermentation inhibitors and replace the acid used in the hydrolysis by H_3PO_4 . The liquor must at all stages show an acid reaction and, if the defecating material is of an alkaline nature, this must be washed with acid before use.

D. J. NORMAN.

Saccharification of carbohydrates. H. DREYFUS (B.P. 349,032, 19.2.30).—Cellulosic material, *e.g.*, sawdust, is impregnated with 10–20 times its wt. of 0.25–1% (preferably 0.25–0.5%) H_2SO_4 , pressed until it retains <1% of H_2SO_4 on the wt. of carbohydrates present, and heated under a pressure of 4–9 (preferably 6–7) atm. at 145–155° for 8–15 hr.

D. J. NORMAN.

Filters.—See I. Diazotisable fibres.—See VI. Non-splintering glass.—See VIII. Roofing elements. Floor covering.—See IX. Insulation for cables.—See XI. Adhesive plaster.—See XX.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Theories of lustre [in fabrics]. J. M. PRESTON (J. Soc. Dyers and Col., 1931, 47, 136–143).—A review of theories of lustre and methods of measurement, with particular reference to the lustre of fabrics of different constructions and colour. The dyeing of cellulose acetate silk, dulled by a treatment with boiling soap, to a deep shade of black restores its lustre; this does not occur when dulling is obtained by abrasion of the surface of the silk fibres. Lustre is associated with the longitudinal appearance of a fibre rather than with its cross-section, although the latter has a secondary effect. Reflected light from dull, non-desulphurised viscose silk has a distinct bluish tinge due to greater diffusion by refraction of blue than of red light. A method has been developed for recording simultaneously on a photographic film mounted cylindrically the light reflexions in different directions from fabrics.

A. J. HALL.

Laundering of fabrics. J. T. HOLDEN (J. Soc. Dyers and Col., 1931, 47, 143–144).—Fabrics and garments are sorted according to size and colour and

then washed in three stages (low-temp. washing, boiling, and rinsing), of which full details are given. Lack of balance in the construction of a fabric gives rise to creases during laundering, and white lines appear if the fabric is poorly penetrated by dyes. "Marking-off" of vat dyes (particularly the yellows) is a common fault and is probably due to reduction. A. J. HALL.

Bleaching of pulps.—See V.

PATENTS.

Liquids or plastic preparations for textiles and leather. H. T. BÖHME A.-G. (B.P. 349,586, 9.12.29. Ger., 29.12.28).—Aq. dispersions of the alkyl or cyclo-alkyl esters of the aromatic sulphonic acids derived from monohydric alcohols are used as wetting or dispersing agents. E. LEWKOWITSCH.

Production of bleaching agents [for flour etc.]. S. P. SCHOTZ (B.P. 345,985, 28.11.29).—Bleaching agents are produced by the interaction of an acid halide and an aldehyde, and are applied in admixture with powdered anhyd. oxides, hydroxides, carbonates, etc. of Li, Na, K, NH₄, Ca, Mg, Zn, Th, Ce, or tungstates, vanadates, molybdates, or titanates. Examples are: PhCHO, BzCl, NaOH, and MgCO₃, with or without Na₃VO₄; *o*-chlorobenzaldehyde, BzCl, etc.; PhCHO, AcCl, Na₂CO₃, KHCO₃, MgCO₃, Ce₂(CO₃)₃. C. HOLLINS.

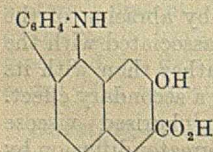
Coloration of materials made of or containing organic derivatives [esters or ethers] of cellulose. BRIT. CELANESE, LTD., and G. H. ELLIS (B.P. 346,751, 9.1.30).—Pyrazolone dyes, preferably unsulphonated, are stable to reducing discharges and are added to the discharge paste for coloured discharge printing. Examples are: aniline, *o*- or *p*-anisidine, or amino-acetanilide → 1-phenyl-3-methyl-5-pyrazolone.

C. HOLLINS.

Vat assistant for use in dyeing. J. G. KERN and C. J. SALA, Assis. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,782,122, 18.11.30. Appl., 4.8.27).—"Tri-ethanolamine" or other hydroxylated alkylamine is added to a vat-dye paste to improve the exhaust, depth and brightness of shade, and levelling power.

C. HOLLINS.

Manufacture of azo dyes on the fibre [ice colours]. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 347,113, 20.1.30).—An unsulphonated diazo-compound is coupled on the fibre with an arylamide of 5-hydroxy- α -naphthacarbazole-4-carboxylic acid (annexed formula). Examples are: *o*-toluidide with diazotised 5-nitro-*o*-anisidine (blue-black) or 5-chloro-*o*-toluidine (violet-brown); *p*-anisidine with diazotised 5-nitro-*o*-anisidine (blue-black) or 5-chloro-*o*-toluidine (green-black); β -naphthylamide with diazotised 5-nitro-*o*-anisidine (red-black) or 5-chloro-*o*-toluidine (brown); 5-methoxy-*o*-toluidide with diazotised 5-nitro-*o*-anisidine or *o*-toluidine (black). C. HOLLINS.



Manufacture of diazotisable fibres. C. GRÄNACHER (B.P. 347,117 and 347,263, [A] 21.1.30, [B] 23.1.30. Switz., [A] 17.4.29. [A] Addn. to B.P. 346,385; B., 1931, 672).—Cotton fibres, regenerated or partly acetyl-

ated cellulose, etc. are heated at 90–100° with (A) a homologue of nitrobenzyl halide, e.g., nitromethylbenzyl chloride, or a chloronitrobenzene, e.g., 1-chloro-2:4-dinitrobenzene, or (B) an *o*-dinitrobenzene, e.g., 4-bromo- or 4:5-dichloro-1:2-dinitrobenzene, in presence of acid-binders (Li₂CO₃, Na₂CO₃) other than a caustic alkali; the NO₂ groups are then reduced.

C. HOLLINS.

Treatment [printing] of [cellulose ester or ether] textiles etc. BRIT. CELANESE, LTD., and G. H. ELLIS (B.P. 346,694, 2.1.30).—*p*-Dihydroxy-compounds, e.g., quinol, toluquinol, and their mono-ethers and halogen derivatives, are added to printing pastes, especially in discharge printing, as aids to penetration.

C. HOLLINS.

[Production of crêpe effects in] textile materials. BRIT. CELANESE, LTD., and W. A. DICKIE (B.P. 348,589, 13.11.29).—Threads of degummed silk or of org. derivatives of cellulose are impregnated with materials containing casein, rubber, etc., which are then treated with CH₂O, tannin, etc. to prevent softening during the swelling process. The coated threads, after highly twisting, are incorporated into fabrics which are treated with H₂O, aq. EtOH, or salt solutions to cause swelling of the coating without rendering it relatively soft or yielding; the coating is subsequently removed in the swelling bath, if necessary after adjustment of its temp. and/or composition. F. R. ENNOS.

Protection of wool, fur, hair, etc. against attack by textile pests [mothproofing agents]. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 346,039, 9.1.30).—H₂O-sol. thiuronium salts obtained, e.g., from phenyl- or tolyl-thiocarbamide and ethylene dibromide or benzyl or 2:6-dichlorobenzyl chloride, are used. C. HOLLINS.

Rotary machines for washing, decolorising, disinfecting, etc. [fabrics]. E. S. EYMERIC (B.P. 349,674, 10.3.30. Tunis, 3.4.29).

Cellulose esters. See V. **Bleaching powder.** Al salts.—See VII. **Laundry soaps.**—See XII. **Moulded articles.**—See XIII. **Rubber-fabric finishes.**—See XIV.

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

Characteristics of a [calcium-]vanadium catalyst and a new catalyst for sulphuric acid [manufacture]. W. W. SCOTT and E. B. LAYFIELD (Ind. Eng. Chem., 1931, 23, 617–620).—Conversions of SO₂ into SO₃ with the Holmes-Elder Ca-V catalyst (B., 1930, 659) with varying rates of flow were determined in the laboratory. A similar catalyst prepared by adding K vanadate and Na silicate to 5% BaCl₂ solution was similarly tested. It was found to operate slightly better at 450° than at 500° and better than the Ca-promoted catalyst under corresponding conditions; 1 lb. of catalyst with a flow of 17–35 cu. ft. of 8% SO₂ per hr. gives a conversion of 98.0–98.8%. Otherwise 1 lb. of V will produce 5–10 lb. of H₂SO₄ per hr. at 98% or 13 lb. at 97%. C. IRWIN.

Dehydration of salts of phosphoric acid. S. S. DRAGUNOV (Udobr. Urozhai, 1930, 2, 409–416).—The percentage of pyro- and meta-phosphates, and the speed

of transformation at various temp., are determined from graphs for the acid and for the Na, K, and Ca salts. $\text{CaHPO}_4 \cdot 2\text{H}_2\text{O}$ is more sol. in citrate solution than CaHPO_4 . Phosphate should not be dried above 100° for more than 30–50 min. Insol. $\text{Ca}(\text{PO}_3)_2$ can be re-hydrated at high pressure. CHEMICAL ABSTRACTS.

Causticisation of sodium carbonate by ferric oxide. XV. Thermal change in a mixture of sodium carbonate and ferric oxide in an atmosphere of carbon dioxide. M. MATSUI and K. BITO (J. Soc. Chem. Ind., Japan, 1931, 34, 149–150 B; cf. A., 1928, 243).—Experiments with 2–3 mg. of the reactants gave for the dissociation temp. 855 – 856° . H. F. GILLBE.

Determination of free alkali and carbonate in alkaline hypochlorites. KERNY (J. Pharm. Chim., 1931, [viii], 13, 570–573).—Neutral H_2O_2 (B.P.; 5 c.c.) is agitated with 10 c.c. of Dakin's solution or eau de Javelle diluted with H_2O (1:10) until effervescence has ceased; 50 c.c. of boiled, distilled H_2O and 3 drops of phenolphthalein solution are added and the mixture is titrated with $0.1N\text{-H}_2\text{SO}_4$ 2–3 drops at a time, and with const. shaking. The carbonate is determined on the same solution and in a similar manner after the addition of methyl-orange. E. H. SHARPLES.

Determination of total nitrogen in commercial calcium cyanamide. R. POHLAND (Z. angew. Chem., 1931, 44, 386–388).—Total N in the impurities in commercial CaCN_2 may be determined by the Kjeldahl method, heating for more than 1 hr. being unnecessary under the conditions described. H. F. GILLBE.

Ammonium carbonate treatment of polyhalite. J. R. HILL and J. R. ADAMS (Ind. Eng. Chem., 1931, 23, 658–661).—In Texas and New Mexico large deposits of polyhalite, $2\text{CaSO}_4 \cdot \text{MgSO}_4 \cdot \text{K}_2\text{SO}_4 \cdot 2\text{H}_2\text{O}$, occur. As it is only very slowly sol. in H_2O it has been proposed to extract the K by leaching with $(\text{NH}_4)_2\text{CO}_3$ solution. This alone was found to ppt. less than half the Mg, but with the addition of an equal wt. of aq. NH_3 precipitation of Mg as also of Ca is practically complete. The insol. salt, $\text{MgCO}_3 \cdot (\text{NH}_4)_2\text{CO}_3 \cdot 4\text{H}_2\text{O}$, is formed. The solution can readily be brought to saturation with respect to K_2SO_4 by shaking for 1.5 hr. at room temp. The liquor forms mixed crystals of $(\text{NH}_4)_2\text{SO}_4$ and K_2SO_4 on evaporation, and the NH_3 content of the filter cake can readily be recovered by steaming. The saturated mother-liquor contains 5.43 g. K_2SO_4 per 100 c.c. Much higher concentrations can be obtained by treatment with $(\text{NH}_4)_2\text{CO}_3$ alone, but the product contains considerable quantities of MgSO_4 . C. IRWIN.

Determination of phosphoric acid in phosphate rock. E. N. ISAKOV and V. A. KAZARINEVA (Udobr. Urozhai, 1930, 2, 416–420).—The material (15–20 g.) passed through a 0.5-mm. sieve is dried for 3.5 hr. at 105° ; 4 g. are dissolved in 40 c.c. of aqua regia during 30 min. After dilution to 0.0001 Denigès' colorimetric method is employed. The max. error is 2%.

CHEMICAL ABSTRACTS.

Oxidation of ferrous sulphate. W. A. DAMON (67th Annual Rep. on Alkali etc. Works, 1930, 21–27).—When hot conc. FeSO_4 solution is oxidised with HNO_3 in presence of H_2SO_4 the primary gaseous product is NO, and NO_2 is formed only if HNO_3 is present in excess.

The evolution of gas is at first slow, but when about two thirds of the total gases have been evolved rises suddenly and rapidly. It is doubtful whether this is entirely due to the solubility of NO in FeSO_4 . If cryst. FeSO_4 be added to the mixed acids the reaction is essentially similar, but the rate of gas evolution is determined by the rate of crystal addition. The best method of recovering NO if a chamber H_2SO_4 plant is available is by its absorption in H_2SO_4 . Alternatively, passage of the exit gases through scrubbers packed with cryst. FeSO_4 leads to a recovery of 16–27% of HNO_3 , as determined in the laboratory. The actual oxidising agent is probably N_2O_3 as the reaction proceeds readily at atm. temp. The residual gases may then be absorbed in H_2O . C. IRWIN.

Densities of molten cryolite and of molten mixtures of cryolite and barium fluoride. N. KAMEYAMA and A. NAKA (J. Soc. Chem. Ind., Japan, 1931, 34, 140–142 B).—Contrary to earlier reports, the sp. gr. of cryolite increases continuously with rise of temp. The sp. gr. of mixtures of cryolite and BaF_2 have been determined from 950° to 1122° . At 1050° cryolite has d 2.03, and a mixture containing 75.1 mol.-% of BaF_2 has d 3.74. The sp. gr. required in the electrolytic refining of Al by the three-layer method may thus be obtained by use of a suitable mixture of these compounds. H. F. GILLBE.

Utilisation of secondary reactions in igneous electrolysis. L. ANDRIEUX (Chim. et Ind., 1931, 25, 1047–1057).—A discussion. The prep. of TiB_2 , TaB_2 , CbB_2 , and borides of the rare-earth metals by the electrolysis of fused materials is described.

C. W. GIBBY.

Technology of solid carbon dioxide. G. T. REICH (Chem. Met. Eng., 1931, 38, 271–274).—When liquid CO_2 at 1100 lb. per sq. in. pressure is subjected to a sudden release of pressure it is partly solidified. The CO_2 snow is compressed into blocks at 800 lb. per sq. in. The yield is 50%. In the Dry Ice and Frick machines the chamber for collecting the snow acts also as the chamber for compressing it. In the Carba process the snow with much adhering liquid is formed first, and on lowering the pressure the whole solidifies to a block. The economics of the process and the uses of solid CO_2 are discussed. D. K. MOORE.

Oxidation of phosphorus by water and the preparation of phosphoric acid. L. HACKSPILL (Chim. et Ind., 1931, 25, 1058–1063).—An account of the methods available for the manufacture of H_3PO_4 .

C. W. GIBBY.

S compounds.—See I. NH_3 from gasworks.—See II. Metal powders from salts.—See X. S oxidation in soils.—See XVI. PH_3 in spring waters.—See XXIII.

PATENTS.

Production of sulphuric acid from waste gases [from ammonia saturators] containing hydrogen sulphide and carbonic acid. W. W. GROVES. From Dr. C. OTTO & Co. G.M.B.H. (B.P. 349,238, 14.4.30).—The gases are introduced into a furnace, heated to 700° , into which air is admitted to convert the H_2S into SO_2 . The furnace is of the double-tube type, one portion being

subjected to external heating, the other embedded in a bad heat-conducting material, *e.g.*, bauxite. The gases are dried, first by indirect cooling and then by H_2SO_4 , and subsequently enter a contact furnace, the SO_3 produced being absorbed by the H_2SO_4 used in the drying process.

W. J. WRIGHT.

Recovery of gas mixtures rich in sulphur dioxide [for the sulphuric acid contact process]. M. SCHROEDER (B.P. 349,287, 14.5.30. Ger., 15.5.29).—Gas mixtures containing SO_2 , after purification, compression, and cooling, are treated under pressure with H_2O so as to give a relatively conc. solution of SO_2 . The solution is passed down a tower in countercurrent to air, which may be heated, at atm. pressure or under, a gas mixture having a higher % of SO_2 than the original one being thus obtained.

W. J. WRIGHT.

Purification of sulphuric acid. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 348,866, 6.5.30).—To remove nitric constituents from H_2SO_4 above 60% concentration, SO_2 dissolved in H_2SO_4 or water is added to the impure acid and the mixture is treated with a current of air or flue gas at 100–200°. About 1.5 mols. of SO_2 should be added for each mol. of HNO_3 .

H. ROYAL-DAWSON.

Manufacture of sodium and ammonium bicarbonates. A. MENTZEL (B.P. 348,482, 21.8.30. Ger., 23.8.29).—The CO_2 required in the NH_3 -soda process is derived from gases obtained in the low-temp. carbonisation of coal or lignite, these being first purified from tar and, after the precipitation, being utilised as fuel.

W. J. WRIGHT.

Production of alkali carbonates. WINTERSHALL A.-G. (formerly KALI-IND. A.-G.), C. T. THORSSELL, and A. KRISTENSSON (B.P. 348,825, 8.4.30. Ger., 16.4.29. Addn. to B.P. 300,629; B., 1929, 850).—Crude sylvinic salts are substituted for the KCl formerly employed, so that a mixture of solid K and Na carbonates is obtained, these being converted into the bicarbonates and separated.

W. J. WRIGHT.

Fixation of ammonia-nitrogen. N. CARO and A. R. FRANK (B.P. 349,001, 29.1.30. Addn. to B.P. 347,641; B., 1931, 630).—Wet humic acid, or vegetable matter containing or capable of forming it, is heated under pressure to 200° to render it more dense, and after filtering is treated at 50–300° in a wet condition with NH_3 and gases containing O_2 under pressure. Steam or CO_2 may be introduced. The speed of oxidation may be regulated by adding positive catalysts, *e.g.*, alkaline substances or heavy metal salts, or negative catalysts, *e.g.*, oxides or carbonates.

W. J. WRIGHT.

Treatment of phosphate rock and the like. ODDA SMELTEVERK A./S., and E. JOHNSON (B.P. 349,877, 23.9.30. Nor., 28.9.29. Addn. to B.P. 339,340; B., 1931, 201).—Part of the mother-liquor from the crystallisation in the prior process is used for washing and cooling the escaping gases and is then added to the HNO_3 used for dissolving fresh phosphates; another part, cooled to –20°, is added to the solution prior to or during crystallisation. The quantities of the materials and the concentration of the HNO_3 are so adjusted that the mother-liquor yields immediately a dry product on neutralisation with NH_3 .

L. A. COLES.

Production of potassium monophosphate. KALI-FORSCHUNGS-ANSTALT GES.M.B.H. (B.P. 349,409, 30.9.30. Ger., 25.10.29. Addn. to B.P. 327, 885; B., 1930, 861).—KCl and H_3PO_4 (1 : 1 mol.) are heated, without reduction of the H_2O content, with the mother-liquor of the process, which is saturated with KH_2PO_4 , H_3PO_4 , until the Cl is completely expelled; on cooling the solution, KH_2PO_4 crystallises and is removed.

L. A. COLES.

Production of diammonium phosphate. KUNST-DÜNGER PATENT VERWERTUNGS A.-G. (B.P. 348,970, 12.8.30. Swed., 23.8.29).— NH_3 is absorbed by a boiling solution of H_3PO_4 or $\text{NH}_4\text{H}_2\text{PO}_4$, loss of NH_3 being avoided by passing the mixture of steam and escaping NH_3 into dil. H_3PO_4 , preferably heated to the b.p.

W. J. WRIGHT.

Manufacture of sodium hyposulphite and pure zinc oxide or carbonate. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 348,776, 17.3.30).—The solution obtained by treating a suspension of Zn dust with 1 equiv. of SO_2 is treated with Zn dust, ZnO, or ZnCO_3 , and is then filtered and treated with NaOH or Na_2CO_3 to ppt. ZnO or ZnCO_3 , which is washed and dried.

L. A. COLES.

Composition for skating surfaces. M. H. GURTH (B.P. 348,178, 6.2.30).—A fused mixture of cryst. $\text{Na}_2\text{S}_2\text{O}_3$ (100 pts.), up to 10 pts. of Na lactate, and (if desired) 2–20 pts. of cryst. Na_2SO_4 , Na_2CO_3 , and/or Na_2HPO_4 is used.

L. A. COLES.

Manufacture of double [nitrate] salts. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 349,301, 24.5.30).—Salts of the type $\text{M}^+(\text{OH})\text{NO}_3$, MNO_3 are obtained by fusing the constituents salts and allowing the product to cool slowly. Instead of $\text{M}^+(\text{OH})\text{NO}_3$ equimol. quantities of $\text{M}^+(\text{OH})_2$ and $\text{M}^+(\text{NO}_3)_2$ may be used. In the above formulæ $\text{M}^+ \equiv \text{Ca}$, Sr, Ba, or Mg and $\text{M}^- \equiv \text{K}$, NH_4 , or $\text{CO}(\text{NH}_2)_2$.

A. R. POWELL.

Production of stable bleaching powder. I. G. FARBENIND. A.-G. (B.P. 348,992, 25.9.30. Ger., 26.10.29).—Finely-divided bleaching powder is brought for a few sec. in contact with a current of air at above 150° (preferably 160–180°) flowing in the same direction.

L. A. COLES.

Production of storage-proof bleaching powder. A. L. MOND. From I. G. FARBENIND. A.-G. (B.P. 349,358, 15.7.30).—Bleaching powder containing at least 36% available Cl is mixed with 0.5–1.0 pt. of CaO per 1 pt. of total H_2O and, after the CaO has slaked, the mixture is treated with a current of hot air to reduce the H_2O content to about 1%.

L. A. COLES.

Manufacture of aluminium compounds and phosphoric acid. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 348,363, 1.5.30).—Material containing Al compounds and H_3PO_4 is leached at 60–100° by HCl in countercurrent, the solution being evaporated, cooled, treated with gaseous HCl to ppt. AlCl_3 , and filtered. The filtrate is heated or treated with a current of gas or air to remove the HCl and recover H_3PO_4 .

W. J. WRIGHT.

Manufacture of aluminium (A) complex compounds, (B) salts of organic acids, and (C) solid water-soluble salts of oxalic acid. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 347,419, 348,790,

and 348,789, 24.3.30).—(A) Alkali aluminates alone or together with K, Na, Ba, Ca, or Mg carbonates are dissolved in aq. solutions of aliphatic dicarboxylic or hydroxycarboxylic acids containing $< C_6$ per mol. Complex salts of two or more of these elements with oxalic, tartaric, and lactic acid are described; formulæ of the cryst. salts are given in many cases. (B) Granulated Al is activated by immersion in a solution of $HgCl_2$ and is then dissolved by boiling with a solution of an aliphatic di- or hydroxy-carboxylic acid, e.g., lactic, oxalic, tartaric, or glycolic acid. (C) Solutions of neutral or basic Al oxalates are dehydrated at above 100° , preferably in the form of thin films or as spray, in a heated gas stream or in vac. Application of such Al salts in the dyeing industry and for pharmaceutical purposes is indicated. A. R. POWELL.

Manufacture of titanium preparations. I. G. FARBENIND. A.-G. (B.P. 348,724, 21.2.30. Addn. to B.P. 346,009; B., 1931, 645).—Part of the excess H_2SO_4 in the solution is removed as $CaSO_4$ by addition of $CaCO_3$, and the Ti in the filtrate is then precipitated by hydrolysis as basic sulphate. A. R. POWELL.

Manufacture of antimony oxides. DEUTS. SCHMELZ-U. RAFFINIERWERKE A.-G., and H. W. GRIMM (B.P. 348,138, 4.2.30).—Powdered Sb or Sb ore is introduced into a combustion furnace into a current of gas or vapour, and the latter is burned with addition of O_2 or air. The material may also be introduced into the flame of burning coal dust or oil fuel, so that it is held in suspension by the flame. The oxide which fuses and flows away may be mixed with further quantities of Sb ore. W. J. WRIGHT.

Manufacture of satisfactory emanating preparations. DEUTS. GASGLÜHLICHT-AUER-GES.M.B.H. (B.P. 348,705, 18.2.30. Ger., 6.3.29).—Conc. preparations containing Ra, meso-Th, etc. dispersed on $Fe(OH)_3$ ($Fe:Ra = 16:1$) are prepared by precipitating the $Fe(OH)_3$ in the presence of Ra salts, and washing the ppt. with $(NH_4)_2CO_3$ solution to prevent dissolution of the Ra. L. A. COLES.

Apparatus for decomposing salts or the like. H. B. BISHOP (B.P. 349,065, 11.1.30. U.S., 25.9.29).—The apparatus comprises a reaction chamber with two sets of stirring arms, a spraying device, fed by means of a siphon, and a dust catcher through which the gaseous products of decomp. pass. In operation, the salt is heated below its m.p. and volatilised, and the acid is sprayed in during agitation. W. J. WRIGHT.

Preventing the caking of salts. PATENTVERWERTUNGS A.-G. ALPINA (B.P. 348,060, 28.1.30. Ger., 28.1.29).—Fertilising salts in a finely-divided state are subjected to pressure in an extrusion press, with heating or cooling, the extruded material being reduced to granules of the desired size, either by the jerky action of the press or by cutting. W. J. WRIGHT.

Production of hydrogen by the action of steam on metals. T. LICHTENBERGER and L. KAISER (B.P. 348,018, 30.1.30. Ger., 10.7.29).—In a continuous process, the molten metal and a molten salt mixture are contained in a conical trough, in which is fixed a gas-collecting bell, permeable to H at its tapered lower

portion only. The metal oxides, formed by introducing steam into the metal, rise to the surface and are there reduced by water-gas generated by the action of steam on a layer of coal, the reduced metal falling to the base of the trough. The H produced by oxidation of the metal thus passes directly into the bell without contamination by the oxides. Residual gases from the reduction of the oxides are utilised to heat the trough.

W. J. WRIGHT.

Electrolytic manufacture of chlorine. WESTVACO CHLORINE PRODUCTS, INC., Assees. of F. S. LOW (B.P. 348,792, 24.3.30. U.S., 27.1.30).—HCl (20% solution) is continuously supplied to the cathode chamber of an electrolytic cell and maintained therein at $45-100^\circ$. Leaving the anode chamber as 10% solution, it passes through a blow box, in which the Cl is expelled by air into a tower, where it is regenerated by upward-flowing HCl solution, being finally pumped back to the supply tank. Graphite anodes and a cathode of Cu coated with spongy Cu give the best results. Cl of 99.9% concentration is obtained. W. J. WRIGHT.

Settling apparatus [for NH_4 salts]. Treating gases with liquids.—See I. CS_2 from gas mixtures.—See II. Fertilisers.—See XVI. Regeneration of sulphites from fermentation process.—See XVIII. Testing for CO in air.—See XXIII.

VIII.—GLASS; CERAMICS.

Insulation of glass-furnace regenerators. R. M. LANGLEY (J. Amer. Ceram. Soc., 1931, 14, 376—381).—The economy to be effected by insulation is greater than that calc., because air leakage is also reduced and more accurate combustion control is made possible.

J. A. SUGDEN.

Hydraulic classifiers as an aid to batch grinding; some possible economies in grinding pottery material. L. ANDREWS (Trans. Ceram. Soc., 1931, 30, 98—111).—During an 8-hr. grind on a pan mill, the material was examined at 2-hr. intervals, and the relative proportions of different grain-sizes, the relative quantities of -0.01 mm. material produced, and the relative increase in the surface of the material for each successive period were determined. A simple hydraulic classifier for use with existing pan mills or cylinders is described, and its advantages are pointed out. A rapid laboratory elutriator for continuous works use is also described. F. SALT.

Grading and sampling of Missouri burley and diaspore clays. C. R. FORBES (J. Amer. Ceram. Soc., 1931, 14, 382—388).—Confusion in the present terminology of Missouri high- Al_2O_3 clays is pointed out, and a uniform practice of sampling and analysis and a sliding scale of prices, based on the Al_2O_3 content, are recommended. J. A. SUGDEN.

Florescence. III. Effect of firing conditions on the soluble salt content of clayware. F. L. BRADY and E. H. COLEMAN (Trans. Ceram. Soc., 1931, 30, 169—184).—Two brick-making clays were fired to various temp. between 400° and 1100° in atm. of air, air plus 1.5% of SO_2 , and these with the addition of steam. Little variation in the sulphate content of a calcareous clay free from pyrites fired in air was noted,

but there was a well-marked max. at about 700° when SO₂ was present, and firing to the highest temp. did not remove the sulphate. A pyritic clay fired in air showed a max. sulphate content at 700°, which was increased when SO₂ was added. Firing above this temp. caused a marked reduction in sulphate content.

F. SALT.

Calcium fluoride porcelain. A. DAMIENS (Compt. rend., 1931, 192, 1235—1237).—A mixture of 75 pts. of natural fluor, ground to 120-mesh, with 25 pts. of carefully washed CaF₂ precipitated from very dil. solutions of KF and CaCl₂, is worked up with 20% of H₂O, then pressed, and dried at 100°, forming a compact mass which can be worked or turned into tubes, crucibles, etc. These are then baked at 800—1300°, care being taken to prevent contact with furnace gases. The product is semi-transparent, impermeable to H₂O, and capable of withstanding rapid changes of temp. Different portions can be united by aid of the original mixture and reheating.

C. A. SILBERRAD.

Metal constituents in bright-gold [lustre used in ceramic decoration]. I. Heat-resisting metals. II. Fastening metal, bismuth. III. Metals other than bismuth and rhodium. A. NAKATSUCHI (J. Soc. Chem. Ind., Japan, 1931, 34, 164—165 B, 165—166 B, 166 B).—I. Ordinary bright-gold lustre when fired on ceramic ware above 500° leaves a deposit of metal which shows many grain boundaries and cracks. Rh, Al, Th, and Sn compounds in the lustre prevent this graining effect. There is an optimum concentration of Rh above which the fired lustre acquires a dark colour, but just below which a very bright smooth surface is obtained. The Rh in the metal film fired at 768° is present as finely-divided Rh₂O₃.

II. Bi compounds in Au lustre act as fluxes for fastening the Au film on the ware, but do not restrain grain growth, which, however, is retarded by addition of Rh. An excess of Bi in the lustre inhibits the beneficial action of Rh; optimum brilliancy is obtained only with certain definite proportions of Au, Bi, and Rh and with slow heating to 760° followed by slow cooling.

III. Addition of Cr, Al, Fe, and Ru resins to Au lustres containing Bi and Rh improves the brilliancy and still further restrains grain growth. More than 1.27% Cr in the metal deposit darkens the film.

A. R. POWELL.

Testing the effect of slags on refractory bricks. J. SCHAEFER and F. BAUMHAUER (Feuerfest, 1931, 7, 33—36).—Three types of bricks, one of SiO₂ and two of magnesite, were tested for slag-resistance in a new type of furnace. At 1600° the SiO₂ brick was badly corroded by open-hearth furnace slag; with the magnesite bricks little fusion took place between the slag and the refractory, but the slag penetrated the structure of the brick, forming two layers. The chemical composition, sp. gr., and thickness of these layers were determined. From these data the degree of corrodibility is presented numerically, but the appearance of the brick and of its fracture after testing give sufficient indication to the skilled observer.

F. SALT.

Refractories for furnaces.—See XI.

PATENTS.

Non-splintering glass. C. H. FIELD and D. HASLETT (B.P. 348,723, 21.2.30).—An adhesive for uniting two glass sheets with or without an interposed cellulose ester sheet contains a cellulose ester, lactic acid, and (preferably) Et lactate.

L. A. COLES.

Manufacture of splinterless glass. I. G. FARREN-IND. A.-G. (B.P. 349,283, 13.5.30. Ger., 13.5.29).—The strengthening layer comprises a previously prepared vinyl ester (e.g., acetate) final polymerisation product, incorporated, if desired, with a softening agent.

L. A. COLES.

Manufacture of graphitic refractories. R. M. DOIDGE, and MORGAN CRUCIBLE Co., LTD. (B.P. 348,149, 7.2.30).—Mixtures comprising Si (or a Si alloy) and more than 1 equiv. of graphite, together with SiC, amorphous C, tar, clay, binders, fluxes, etc., as desired, are moulded and fired at 1200—1500°.

L. A. COLES.

Manufacture of bonded abrasive articles. CARBORUNDUM Co., LTD., Assees. of R. C. BENNER (B.P. 349,602, 25.2.30. U.S., 14.10.29).—A dispersing agent (e.g., bentonite) and H₂O are kneaded successively at about 50° into rubber swollen with, e.g., benzene, and the mixture is heated at 82° to effect inversion of phase; abrasive fillers, H₂O, Pb(OAc)₂, and S are then added and the mixture is vulcanised.

L. A. COLES.

Grinding or polishing of sheet glass. SOC. ANON. DES MANUF. DES GLACES ET PROD. CHIM. DE ST.-GOBAIN, CHAUNY & CIREY, Assees. of P. TOMMY-MARTIN and D. A. LOUPE (B.P. 349,928, 1.2.30. U.S., 4.2.29).

Centrifugal machines [for kaolin etc.].—See I. **Abrasive wheels.**—See XIII.

IX.—BUILDING MATERIALS.

Reactions in rotary cement kilns. T. HASHIMOTO and K. AKIYAMA (J. Soc. Chem. Ind., Japan, 1931, 34, 130—132 B).—Examination of samples of cement taken at intervals along kilns of 200 ft. length reveals the existence of 4 reaction zones, viz., those of preheating, calcining, sintering, and cooling. The length of each zone and the progress of the reaction vary with the method of firing. The reaction between Al₂O₃ and CaO commences only when all the CaCO₃ has decomposed; it appears, however, that after the decomp. has commenced part of the CaO is free and part combined. The free CaO is removed very rapidly on passing beyond the limit of the calcining zone.

H. F. GILLBE.

Hydrated lime and diatomaceous earth (diatomite) in oil-well cement. A. REID (J. Inst. Petroleum Tech., 1931, 17, 211—224).—A cement grout with a 40—50% H₂O—cement ratio can be easily handled by a pump, but the large excess of H₂O above that required for proper hydration reduces the ultimate strength of the cement. Experiments made to reduce the viscosity of the cement grout by adding CaO and diatomaceous earth showed that these substances in all proportions appeared rather to increase the viscosity, but for structural work they might be used to make the material more workable. Addition of CaO slightly increases the setting time and tensile strength up to 7 days.

J. A. SUGDEN.

Relations between burning practice and the main components of the raw meal [for cement]—lime, silica, and alumina. O. FREY (Cement, 1931, 4, 392—397).—Results of careful sampling and examination of a raw stratified deposit determine the curve of uniformity of the raw materials, which is a valuable factor in selecting the nature of the kiln lining. The most important factor is the clinkering temp., which may be low (1300—1350°), normal (1350—1450°), or high (1450—1550°), the last indicating high SiO_2 or high Al_2O_3 contents. Taken in conjunction with the fusing effect of the fuel ash the character of the lining may be selected, as the best quality of firebrick is unsuitable above 1400°, a high- Al_2O_3 brick or clinker concrete being generally more suitable. C. A. KING.

Mixed Portland cements. VIII. S. NAGAI (J. Soc. Chem. Ind., Japan, 1931, 34, 162—164 B).—The free CaO in hydrated Portland cement products is increased by heating and on subsequent exposure to the air the CaO is converted first into $\text{Ca}(\text{OH})_2$ and then into CaCO_3 ; the resulting expansion causes disintegration of the cement or concrete. On the other hand, mixed cements of the "soliditite" and "neo-soliditite" types show a smaller content of free CaO after heating than when freshly mixed, and hence do not disintegrate.

A. R. POWELL.

Hardening of Portland cement. F. F. TIPPMMANN (Zement, 1930, 19, 1225—1234; Chem. Zentr., 1931, i, 1658—1659).—Hydrolysis of Ca silicate to SiO_2 gel and $\text{Ca}(\text{OH})_2$ is followed, in hardening, by interaction of the products. A micro-procedure for observing the process in mortar is described and the effect of gypsum is discussed.

A. A. ELDRIDGE.

Hydraulic lime in concrete. G. W. HUTCHINSON (Eng. News-Rec., 1931, 106, 974—976).—Measurements of the compressive strengths of concrete mixtures obtained by mixing Portland cement with hydraulic CaO indicate the possible usefulness of the latter material for making concrete more watertight, durable, and uniform.

O. J. WALKER.

Titanium mineral in ultrabasic titaniferous slags. C. W. CARSTENS (Z. Krist., 1931, 77, 504—505).—Analysis and X-ray examination show the brownish-yellow skeleton crystals occurring in Al slags and Al cement clinker to be perovskite. There is no trace of a TiO (cf. A., 1929, 19).

C. A. SILBERRAD.

Refractory coatings. L. LITINSKY (Feuerfest, 1931, 7, 65—80).—The thermal expansion of a refractory cement or coating must be closely adapted to that of the brickwork. Brief descriptions are given of the many commercial cements etc. and of the different types of sprayers. An appendix gives about 170 references to the literature.

F. SALT.

Effect of building materials on paint.—See XIII.

PATENTS.

Concentration of [raw cement] sludge material. F. KRUPP GRUSONWERK A.-G. (B.P. 348,062, 29.1.30. Ger., 21.12.29).—The sludge is drawn in thin layers from a recess in the bottom of the exhaust gas duct of the calcining furnace by rotating discs set in the direction of the gas stream and dipping into the recess.

The partly dried sludge is scraped from the discs and falls to the bottom of the recess, whence it is conveyed to the furnace.

L. A. COLES.

Anhydrite or gypsum cementing compositions. P. P. BUDNIKOFF (B.P. 348,766, 12.3.30).—Cements are prepared by adding natural or artificial anhydrite, or hydrated CaSO_4 to dolomite which has been baked at 600—900°, or to mixtures of MgO , MgCO_3 , and CaCO_3 . Sulphates of heavy or alkali metals may be added during the crushing process.

C. A. KING.

Production of building material. EUREKA GES. F. LEICHTBAU U. ISOLIERPLATTEN, and C. E. DUNZ (B.P. 349,629, 20.10.30).—Vegetable fillers are worked up with a suspension of a hydraulic binder (Portland cement, plaster of Paris, etc.) in agar-agar solution to a plastic mass which is moulded hot and allowed to set.

L. A. COLES.

Manufacture of imitation marble. S. GAUDIO (B.P. 349,485, 27.1.30).—Slabs etc. prepared by the setting of plastic mixtures comprising "Keene's superfine white cement," marble or alabaster powder, CaO , alum, and H_2O , with the addition, if desired, of colours, are immersed in H_2O on the surface of which a linseed oil-turpentine colour solution is floated and stirred to give a stripe effect to the slabs. After removal and drying, the slabs are steeped successively in oil, in liquid bronze, and in lacquer, and are finally wax-polished.

L. A. COLES.

Metal [copper]-clad roofing elements. INTERNAT. COPPERCLAD CO., ASSEES. OF S. LEVY (B.P. 349,690, 22.3.30. U.S., 22.3.29).—Felted fibrous material impregnated with a waterproofing compound is coated on the under surface with asphalt into which, e.g., crushed slate is pressed, and on the upper surface with electroconductive material (bronze powder) which is covered electrolytically with Cu over the parts to be exposed to the air.

L. A. COLES.

Felt-base floor covering. ARMSTRONG CORK CO., ASSEES. OF E. J. PIEPER (B.P. 349,792, 12.6.30. U.S., 17.6.29).—A felt base impregnated with bituminous material is provided with successive coatings of a casein size, an alkyd resin (e.g., "Glyptal"), and a decorative oil- or nitrocellulose-base paint.

L. A. COLES.

Mixing machines [for concrete]. J. S. WITHERS. From KOEHRING CO. (B.P. 348,837 and 349,723, 14.4.30).

Production of laminated wooden boards. B. F. MISKIN (B.P. 350,169, 1.5.30 and 31.1.31).

Feeding rotary kilns. Liquid heating and storage. Mixing of moulding substances.—See I. **Nitro-compounds of decreased inflammability.**—See III. **Floor coverings etc.**—See XIII.

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

Yield point and initial stages of plastic strain in mild steel subjected to uniform and non-uniform stress distribution. G. COOK (Phil. Trans., 1931, A 230, 103—147).—The relation between the stress at the yield point in simple tension and in the distribution produced by torsion, flexure, and internal pressure in a

hollow cylinder was determined. All the results were consistent with the supposition that the initial dislocation resulting in elastic breakdown takes place at a critical value of the shear stress at a certain depth in the material, *e.g.*, the surface layer possesses a higher elastic limit than the interior. C. A. KING.

Analysis of the coating of galvanised sheet steel. F. W. SCOTT (Chemist Analyst, 1931, 20, No. 2, 4–5).—The coating is removed by 3.3*N*-H₂SO₄ in contact with pure Zn, and the loss in wt. determined. The solution is titrated for Fe²⁺ with KMnO₄, and Pb is determined as PbSO₄. Cd in the filtrate is determined as CdS. Sn is determined in another sample by precipitation as Sn(OH)₂ and ignition to SnO₂. Zn is determined by difference. CHEMICAL ABSTRACTS.

Determination of iron in the coating of galvanised steel. B. E. COHN (Chemist Analyst, 1931, 20, No. 2, 4).—The solution (*cf.* preceding abstract) is treated with HgCl₂ before titration with KMnO₄.

CHEMICAL ABSTRACTS.

Products of corrosion of steel [in oxygenated water]. H. O. FORREST, B. E. ROETHELI, and R. H. BROWN (Ind. Eng. Chem., 1931, 23, 650–653).—A 0.01*M*-solution of Fe²⁺ on agitation with O₂ precipitates Fe(OH)₃ at up to *p*_H 8.5. At *p*_H 11 the ppt. consists of Fe(OH)₃. At intermediate points interaction produces a magnetic oxide. The corrosion rate of cleaned low-C steel cylinders in oxygenated H₂O with and without rotation was measured. With initial rotation an impervious film of Fe(OH)₃ was formed and the corrosion rate was low. In the second, stationary, period local concentrations allowed the formation of Fe(OH)₂ in addition, and as the resulting magnetic oxide was not coherent corrosion increased. When rotation recommenced corrosion decreased again.

C. IRWIN.

Resistance of "Silumin" to corrosion by acid and alkaline solutions. O. SPENGLER and J. WIGAND (Z. Ver. deut. Zucker-Ind., 1931, 81, 260–266).—Laboratory experiments showed distilled H₂O, 40% sugar solution, first-carbonatation juice, and molasses to have little effect at 30°, though the loss in wt. in contact with 0.1*N*-H₂SO₄ and 0.1*N*-HCl was appreciable at this temp. after 32 days. At 80°, however, there was distinct evidence of attack after 21 days in the case of the 40% sugar solution (*p*_H 3.2), of alkaline juice, of molasses, and of 0.1*N*-H₂SO₄. 0.1*N*-HCl caused a marked amount of attack at this higher temp.

J. P. OGILVIE.

Influence of siliceous matter on the reduction of magnetic sands. K. IWASE and M. FUKUSHIMA (J. Study Met., 1930, 7, 524–534).—The effect at 900–1150° was studied. At lower temp. the effect is small, but at higher temp. FeO and other substances combine with the SiO₂ forming semi-fused substances, and the rate of reduction is considerably retarded.

CHEMICAL ABSTRACTS.

Influence of colloidal ferric hydroxide on the properties of moulding sand. E. TAKAHASHI (J. Study Met., 1930, 7, 552–562).—The addition of colloidal Fe(OH)₃ increases either the plasticity or the gas-permeability according to the ramming conditions.

The increase in gas-permeability appears to be due to the coagulation of clayey particles.

CHEMICAL ABSTRACTS.

Microchemical and luminescence-analytical examination of metal surfaces. A. KUTZELNIGG (Mikrochem., 1931, 9, 360–366).—The presence of protective films of lacquer or varnish on metals can be recognised by their characteristic fluorescence on exposure to ultra-violet light; films of ZnO and basic Zn compounds under these conditions also fluoresce. Sulphide films may be detected by the azide-iodide reaction, and Cu₂O and CuO films by their reaction with dil. H₂SO₄, the former turning black due to conversion into CuSO₄ and Cu, and the latter dissolving completely. Metal coatings are best identified by the streak test followed by treatment of the streak with a reagent giving a characteristic test for the metal; certain tests for Au, Ag, Cu, Sb, Sn, Pb, Ni, Cd, Fe, Zn, and Al are briefly described. A. R. POWELL.

Experimental flotation of oxidised silver ores. H. S. GIESER (Amer. Inst. Min. Met. Eng. Tech. Pub., 1931, No. 401, 9 pp.).—A discussion of the org. S compounds available and their effects.

CHEMICAL ABSTRACTS.

Micro-determination of platinum in alloys. R. STREBINGER and H. HOLZER (Mikrochem., 1931, 9, 401–421).—The alloy is dissolved in aqua regia and the solution evaporated to dryness on the water-bath with a few drops of H₂O₂. The residue is dissolved in HCl and the solution evaporated with a few mg. of KCl. The dry mass is extracted with a 1:1 mixture of EtOH and Et₂O free from aldehydes and the K₂PtCl₆ collected in a micro-Neubauer crucible, washed with the extraction solution, dried, and ignited at 1200° in an electric furnace. The KCl is then extracted with hot H₂O and the residual Pt ignited and weighed. Au, Pd, Rh, and base metals do not interfere; Ir quantitatively accompanies the Pt. For the colorimetric determination of Pt the K₂PtCl₆ ppt. is washed with EtOH saturated with KCl, dried in a current of cold air, and dissolved in hot H₂O. The solution is treated with 2 drops of HCl and a few mg. of KI and the colour of the resulting red solution of K₂PtI₆ compared with that of a standard. A. R. POWELL.

Throwing power of electroplating solutions. S. KANEKO (J. Soc. Chem. Ind., Japan, 1931, 34, 135 B).—An equation is given relating the quantity of metal deposited with the distance between the electrodes *l*, the current density *I*, the current efficiency *ε*, the potential drop, *v*, at the cathode, and the resistance of the electrolyte *ρ*. The uniformity of a deposit is increased by increasing *l*, decreasing *ρ*, or increasing the value of *∂v/∂l*. H. F. GILLBE.

Preparation of metal powders by electrolysis of fused salts. III. Tantalum. F. H. DRIGGS and W. C. LILLIENDAHL (Ind. Eng. Chem., 1931, 23, 634–637; *cf.* B., 1931, 118).—Ta may be prepared by the electrolysis of a mixture of 700 g. KCl, 280 g. KF, 100 g. K₂TaF₇, and 100 g. Ta₂O₅ in a Ni crucible with a current density of 90 amp./sq. dm. The KCl causes the metal to have a coarse grain and markedly increases the current efficiency. The cathode deposit

of metal and solidified salt is treated with H_2O to remove the latter and the metal ground and boiled with a H_2SO_4 - HNO_3 mixture to remove impurities. The metal (of about 99.9% purity) is then pressed into bars and degassed by heat treatment *in vacuo*. If this is omitted it is brittle. It is also possible to plate Fe, Ni, or Mo cathodes with tantalum under suitable conditions, and such plating retains its lustre in the presence of all corrosive reagents except HF. C. IRWIN.

Densities of molten cryolite.—See VII. **Bright-gold lustre.**—See VIII.

PATENTS.

[Flotation] concentration of mineral. A. C. DAMAN (B.P. 349,108, 20.1.30. U.S., 3.6.29).—Ore delivered to a flotation apparatus is ground so that only a portion is freed from gangue, the tailings being separated and returned for regrinding. The pulp is delivered over an impeller to give intimate contact with air or gas introduced under pressure, and the cover is provided with openings to permit heavy sand and minerals to return from the flotation chamber into the region of the impeller. C. A. KING.

Operation of blast furnaces. E. BAUMGARTNER, Assee. of H. SCHMOLKA (B.P. 349,015, 11.2.30. Ger., 11.2.29).—The charge is made up with a flux, *e.g.*, limestone or dolomite, which has been calcined without losing its shape or mechanical strength. Such method may expel only 65–85% of the CO_2 content, and the product should be charged in a freshly burned condition. C. A. KING.

Furnaces [for pre-reduction etc. of oxide ores]. A. STANSFIELD (B.P. 346,874, 27.1.30).—A rectangular stack is provided with vertical partitions between which and the walls are supported hearths which slope alternately from front and back. Comminuted material, *e.g.*, ore, slides down the hearths in succession, being controlled by reciprocating rakes. Apertures are formed in the partitions and connecting passages in the side walls through which gases (usually of a heating and reducing nature) flow upwards in transverse zig-zags over the ore, though some hearths may be provided with muffle roofs so that the gases evolved from the ore may be collected separately. At the bottom the ore may be discharged to a cooler or to an electric furnace which fuses the material and provides the pre-treating gases as described in U.S.P. 1,748,805 (B., 1930, 672). B. M. VENABLES.

Single or multi-stage retort furnace [for ore reduction]. A. MUSSO and W. P. DEPPE (B.P. 348,012, 26.11.29).—A rotary cylindrical furnace is heated by radiation from surface-combustion elements outside the shell. It is provided with fixed ends projecting inside, and with sealing means between the fixed and moving parts outside, the cylindrical part of the shell. An axial hollow shaft or girder serves to support a number of pipes through which gaseous products are withdrawn from different zones of the furnace, which may be operated under vac. Internal transverse partitions permit slight differences in vac. between different zones. B. M. VENABLES.

Production of molten and refined metals from their crude ores. A. E. WHITE. From DOHERTY RES. CO. (B.P. 349,625, 1.3.30).—A column of electrically conducting material is forced upwardly through a feed barrel to the centre of the hearth of a furnace, and the top of the column is used as an electrode to strike an arc with one or more electrodes through the walls of the furnace. The degree of heating is determined by the rate of feed of the column, which may also be caused to give contact with the second electrode to provide resistance-heating. C. A. KING.

Furnaces for melting metals and the heat treatment of metal objects. WELLMAN SMITH OWEN ENG. CORP., LTD., and H. W. SOWARD (B.P. 349,745, 1.5.30).—A furnace of the reversing regenerative type is provided with a central gas port with an air port on either side so directed that the air stream mixes with the gas. A third air port above the gas outlet has means for directing the air current either downwards into the flow from the gas port or away from this stream, *e.g.*, along the furnace arch. C. A. KING.

Furnaces for annealing metals under a protective dome. SIEMENS-SCHUCKERTWERKE A.-G. (B.P. 348,859, 29.4.30. Ger., 1.5.29).—The bottom of a circular pit annealing furnace is provided with a centrally disposed depression and radial channels to allow circulation of heat. A draw rod passes through the dome and base plate on which the material is stacked. C. A. KING.

Heat-treating continuous metal strips. W. W. TRIGGS. From DURHAM DUPLEX RAZOR CO. (B.P. 348,050, 3.1.30).—Material such as safety razor-blade strip is heated by being continuously drawn through a furnace, then cooled and hardened throughout by being sandwiched between liquid-cooled tanks which are reciprocated transversely, the temper of the centre portion alone being drawn by contact with a heated fin. [Stat. ref.] B. M. VENABLES.

Melting of metals in induction furnaces without iron cores. M. TAMA, and HIRSCH, KUPFER- U. MESSINGWERKE A.-G. (B.P. 348,655, 15.2.30).—The induction coil is mounted so that it can be lowered in relation to the crucible. During melting the whole charge is surrounded by the coil, which is lowered when the charge is fluid, and a number of tappings are provided to use only the portion of the coil around the crucible. C. A. KING.

Electric shaft furnace for treating metal scrap or ores. J. HALÁSZ (B.P. 349,449, 17.2.30).—One electrode is built in the bottom of a shaft furnace, the other being an extension of the upper part of the shaft when scrap is treated. For smelting ore the upper tubular electrode is of smaller diam. than that of the shaft. A resistance layer of C, CaO , or slag with high m.p. is arranged at the bottom of the furnace. C. A. KING.

Refining of metals in electric inductor furnaces. G. H. CLAMER (B.P. 349,446, 13.2.30. U.S., 20.2.29).—A melted charge is introduced into the furnace, to the coils of which current of comparatively low frequency is applied so that the heat available is sufficient

only to maintain the molten condition, but by the known pinch effect the metal is caused to circulate. Additional heat is supplied by independent means, e.g., by arc discharge. A jet of air or other gas is directed on to the crown produced on the surface of the metal.

C. A. KING.

Electrically heated salt-bath furnace [for metal articles]. A. G. E. HULTGREN (B.P. 348,907, 4.6.30).—The shape and arrangement of the furnace are such that the current passing between co-ordinated electrodes arranged in pairs does not traverse the space to be occupied by the immersed articles. The faces of the pair of electrodes turned toward each other should not be closer than half the width of the crucible, and may approach each other towards the bottom of the furnace.

C. A. KING.

Reduction of iron ore. A. MUSSO and W. P. DEPPE (B.P. 349,477, 21.11.29).—Fe ore is reduced by the fixed C of coal by heating the mixture below 950° in a gastight retort. The chamber is exhausted constantly by means of pumps and the final mixture of gangue and Fe, both in an unfused condition, is separated mechanically.

C. A. KING.

Production of spongy iron. F. KRUPP A.-G., FRIEDRICH-ALFRED-HÜTTE (B.P. 348,033, 5.2.30. Ger., 8.2.29).—A mixture of finely-divided Fe ore and sufficient (2%) $MgCl_2$ or Na_2SiO_3 solution to form a damp mass is rotated in a drum so as to break the mass up in balls, which are heated until they harden, screened into various sizes, and reduced in graded layers by means of CO or water-gas.

A. R. POWELL.

Manufacture of iron having special magnetic properties. J. Y. JOHNSON. From I. G. FARBERIND. A.-G. (B.P. 347,304, 30.1.30).—Fe powder obtained by the decomposition of $Fe(CO)_5$ and containing approx. equal percentages of C and O is heated at 650° in H_2 to remove C and O, and the sintered product is heated and compressed into ingots at 1100°, which are rolled in a series of steps with intermediate annealing in H_2 at 800–850°. The resulting thin sheets have high initial and high max. permeabilities, a small coercive force, and a small hysteresis loss.

A. R. POWELL.

Magnetic [iron-nickel] alloys. CALLENDER'S CABLE & CONSTRUCTION CO., LTD., and S. BECKINSALE (B.P. 347,305, 30.1.30).—Alloys containing 65–80% Ni, 15–33% Fe, 0.05–10% Co, 0.05–15% Si, and 0.05–10% Mo are claimed. For the manufacture of wire the preferred composition is 75% Ni, 23.4% Fe, 0.5% Co, 0.1% Si, and 1% Mo, and of alloys for dust cores 72% Ni, 16% Fe, 7% Si, 2% Co, and 3% Mo. The alloys after working are annealed in a non-oxidising atm. at 875–925°, then slowly cooled to 625°, and quenched.

A. R. POWELL.

Austenitic non-corrodible steels. F. ATKINSON and T. HAGON (B.P. 348,586, 2.11.29).—The intercryst. disintegration of austenitic steels containing 10–25% Cr and 5–12% Ni is prevented by adding 0.5–6% Si and one or more of the metals, W, Mo, Cu, Ti, or V to spheroidise the carbides. The steels are annealed at 900° and quenched, then reheated at 500–900°. [Stat. ref.]

A. R. POWELL.

Manufacture of stainless irons and steels. F. ATKINSON and T. HAGON (B.P. 349,009, 11.1.30).—The alloys consist of Fe with 14–20% Cr, 0.1–2.5% Ni, 0.08–0.25% C, and 0.75–2% Cu; they are softer than Ni-steel and free from tendency to hot-shortness.

A. R. POWELL.

[Inhibitor] for protecting [ferrous] metals from the attack of acids. V. BERTLEFF (B.P. 348,596, 5.2.30. Addn. to B.P. 293,701; B., 1929, 176).—The inhibitor comprises the product obtained by sulphonating with conc. H_2SO_4 or oleum a tar-oil base having a b.p. above 240°. Liquorice extract, saponin, or glycyrrhizic acid is also added to the pickling bath as foam-producing agent.

A. R. POWELL.

Manufacture of steel alloys. A. E. G. T. VON VEGESACK, and UDDEHOLMS AKTIEBOLAG (B.P. 349,326, 6.6.30. Addn. to B.P. 268,616; B., 1927, 448).—The steel contains 1.1–1.3% C, 10–16% Cr, and 0.75–1.3% Mn.

A. R. POWELL.

Elimination of iron from inorganic materials. VEREIN. STAHLWERKE A.-G. (B.P. 349,033, 15.2.30. Ger., 15.3.29. Addn. to B.P. 341,060; B., 1931, 296).—After reduction of the Fe compounds to metal, Cl is passed over the red-hot material to volatilise the Fe as $FeCl_3$.

A. R. POWELL.

Heat treatment of copper ores etc. [for recovery of copper by flotation]. MINERALS SEPARATION, LTD., and T. J. TAPLIN (B.P. 348,024, 31.1.30).—Sulphide or mixed sulphide and oxidised ores of Cu are subjected to a sulphating roast at below 650° and the product is mixed with 2% of charcoal and 0.5% NaCl for 1–2 hr. at 650° in a rotating furnace free from oxidising gases. The Cu is thus reduced to metal and Cu_2S , which are recovered by oil-flotation. The process is applicable to the recovery of Cu from burnt pyrites.

A. R. POWELL.

Improvement of copper-titanium alloys. M. and H. LISSAUER, B. GRIESMANN, and W. KROLL (B.P. 349,142, 28.2.30. Ger., 28.2.29).—Cu alloys with a max. of 4% Ti and up to 10% of one or more of the elements Ni, Cr, Mn, Fe, Co, or Mo, or up to 5% of S, Mg, or Al, are quenched from 650–1000° and aged at 250–600°.

A. R. POWELL.

[Copper-zinc-tin] alloy. H. KANZ (B.P. 349,484, 25.1.30. Switz., 1.2.29).—An alloy having anti-frictional properties which are improved on heat treatment and containing 62% Cu, 30% Zn, 4% Sn, 2.5% Pb, and 1.5% Ni is claimed.

H. ROYAL-DAWSON.

Smelting of material containing tin oxide. "BERZELIUS" METALLHÜTTEN GES.M.B.H., M. G. FREISE, and H. MASCHMEYER (B.P. 349,313, 29.5.30).—The material is heated in a rotary furnace with finely-divided coke or coal and fluxes to form a pasty mass in which the globules of reduced Sn are suspended. The mass is broken up and the Sn recovered by chemical or electrochemical means or by gravity concentration. Alternatively, the charge is melted down in a shaft or reverberatory furnace to recover the Sn.

A. R. POWELL.

Recovery of tin from scrap tinsplate etc. J. W. HINCHLEY (B.P. 346,674, 14.1.30).—The detinning liquor comprises an alkaline solution of Na plumbite

containing Pb, NaOH, and H_2O in the ratio 1:23:19. The solution is made by dissolving Pb sponge in NaOH. solution which is agitated by a current of air or by dissolving $Pb(OH)_2$ [from $Pb(OAc)_2$ and NaOH] in NaOH. The Sn in the scrap replaces the Pb in solution and is subsequently recovered by precipitation with $Ca(OH)_2$, the resulting NaOH solution being used to redissolve the Pb sponge formed in the detinning operation and thus regenerate the detinning solution. A. R. POWELL.

Refining of metals [lead] and alloys [lead-tin] of low m.p. A. HENDERSON (B.P. 347,222, 24.1.30).—Crude Pb from the blast furnace is freed from Cu, Sb, etc. by filtering the molten metal at just above the m.p. If the amount of Sb present exceeds that required to combine with the Cu, further quantities of Cu are added or after the first filtration the metal may be heated with Al or Zn and again filtered. The process is applicable to the purification of Sn-Pb alloys containing Cu or Sb. A. R. POWELL.

Preparation of solder. J. D. FRY (B.P. 348,113, 6.2. and 23.10.30).—Molten solder is allowed to fall in a series of drops from a jet on to a cold, moving, metallic plate, or into a liquid, or into two liquids, of which one floats on the other, so that it solidifies in pellets with flattened bottoms. A. R. POWELL.

[Zinc] alloy, particularly for bearing surfaces. H. C. HALL (B.P. 349,378, 5.6.30).—An alloy of Zn with 3–8 (5)% Al, 0.1–1.8 (1.1)% Cu, 0.2% Ni, 0.05% Mn, and 0.05% Fe is claimed. A. R. POWELL.

[Tungsten and/or molybdenum] alloys. W. MÜLLER and OLGA, PRINZESSIN ZUR LIPPE (B.P. 348,641, 10.2.30).—A mixture of 55–70% Mo and/or W, 2% C, and 26–40% of one or more of the metals Fe, Mn, Co, Ni, or Cr (of which at least 20% is Cr) is melted for a short time with up to 3% of known hardening agents. The alloys are suitable for cutting and abrading tools. A. R. POWELL.

Electrolytic cleaning of [iron or steel] wires, bands, etc. [prior to galvanising]. F. A. HERRMANN (B.P. 348,205, 14.2.30).—The wire (etc.) is passed continuously through a solution of H_2SO_4 containing 35–250 g./litre wherein it is cleaned anodically with a c.d. exceeding 20 amp./sq. dm., so that the metal becomes passive and the O_2 bubbles cause the scale to become detached. A. R. POWELL.

Electroplating process [for nickel-chromium on iron or steel articles]. METALS PROTECTION CORP. (B.P. 349,747, 3.5.30. U.S., 10.5.29).—See U.S.P. 1,774,269; B., 1931, 303.

Furnaces for wire heating. H. B. BLYTHE (B.P. 349,671, 10.3.30).

Casting of metals [of high m.p.]. C. PIEL (B.P. 349,863, 3.9.30. Ger., 7.9.29).

Welding [machine]. E. G. BUDD MANUFG. CO., Assees. of A. F. HANSON (B.P. 350,292, 14.7.30. U.S., 8.8.29).

Separator [for foundry sand]. Mixing of moulding substances. Hardness tester.—See I. Roofing elements.—See IX. Rubberising surfaces.—See XIV.

XI.—ELECTROTECHNICS.

Welded zig-zag windings and refractory shapes for high-temperature [electric] furnaces. L. NAVIAS (J. Amer. Ceram. Soc., 1931, 14, 365–375).—New methods of construction of the furnace tubes both for external and internal windings are described. Mo windings on alundum were used up to 1650° and W windings on MgO tubes up to 2000° , the windings being protected from oxidation by H_2 . W is too brittle to be spirally wound; a zig-zag winding with welded joints should be employed. J. A. SUGDEN.

Dust removal from industrial gases by the Cottrell process of electrical precipitation. C. W. HEDBERG (Proc. Eng. Soc. W. Penn., 1931, 47, 63–106).—Cottrell plants for detarring coke-oven gas consist of a number of 6- or 8-in. pipes, 9 ft. long, in each of which hangs a weighted rod. The gas passes down outside the pipes and up through them. The power consumption is 5–8 kw.-hr. per 10^6 cu. ft. of gas. They are installed after the primary coolers. Precipitators for the removal of "fly-ash" from powdered-fuel steam plants are usually placed between the fan and the stack. Large units are employed of two sections in series each with 8–15 ducts with wire discharge electrodes separated by reinforced concrete slabs. The power consumption is about 5 kw.-hr. per 10^6 cu. ft. of gas cleaned; a single precipitator can deal with the gases corresponding to a steam output of 500,000 lb./hr. The primary cleaning of blast-furnace gas leaves a dust content of 0.1–0.5 grain per cu. ft. Such gas can be used as steel mill fuel if the content is reduced to 0.01 grain per cu. ft., which is possible by the Cottrell process; it may then be used also for gas engines. The process is attractive in cases where water is scarce or difficulties occur with effluents. In working such plants it is desirable to add 25–30 lb. of coal to the furnace per ton of Fe, as the hydrocarbon vapours prevent "back ionisation." Single-unit precipitators of the powdered-fuel type are used, and the temp. should not much exceed 280° or insulator failures become frequent. Such hot dry-cleaning may save 5% of the total heat in the gas. Where cooling is permissible, as when the gas is required for gas engines, initial spray-cooling followed by electrical precipitation is a cheaper process. Plate-and-wire or pipe precipitators are then used. Another lay-out uses two precipitators in series, each preceded by a cooler. C. IRWIN.

Refining of cracked spirit.—See II. Igneous electrolysis.—See VII. Metal powders from salts. Electroplating solutions.—See X. Nutrients in soil.—See XVI.

PATENTS.

Heating grids for electric-resistance furnaces. W. S. SMITH and C. V. H. GARNETT (B.P. 349,138, 28.2.30).—Bars triangular in cross-section are arranged so that two sides of the triangle face the area to be heated. J. S. G. THOMAS.

Production of insulating materials. ELECTRICAL RES. PRODUCTS, INC., and F. C. TOMLINS (B.P. 348,213, 14.2.30. Addn. to B.P. 307,966; B., 1929, 401).—Distilled H_2O is employed for the washing and heat-treatment processes already referred to. J. S. G. THOMAS.

Insulating compounds. ELECTRICAL RESEARCH PRODUCTS, INC., Assees. of A. R. KEMP (B.P. 348,192, 10.2.30. U.S., 2.3.29).—Compounds resulting from the exothermic reaction of rubber and/or balata with a sulphonic compound containing the group $R\cdot SO_2\cdot X$, in which R represents an org. radical or OH, and X represents OH or Cl, *e.g.*, *p*-phenolsulphonic acid, to which, if necessary, an antioxidant, *e.g.*, a mixture of acetaldol and α -naphthylamine, may be added, are claimed. J. S. G. THOMAS.

Electrical insulation [for cables etc.]. I. G. FARBENIND. A.-G. (B.P. 348,129, 2.1.30. Ger., 13.2.29).—Insulating material comprising a mixed fatty acid ester of cellulose, one radical of which is preferably Ac, is claimed. Thus, *e.g.*, a solution of cellulose acetate-butyrate in CO_2 is cast and cut into tapes. J. S. G. THOMAS.

[Active mass for cathodes of] electric accumulators. I. G. FARBENIND. A.-G. (B.P. 348,421, 5.6.30. Ger., 6.6.29).—A mixture of at least 20% of finely-powdered, highly active Fe with $Cd(OH)_2$ and, if desired, about 7% of glycerin is used. J. S. G. THOMAS.

Sealing compositions for electrical condensers. BAKELITE CORP., Assees. of E. R. HANSON and M. E. DELANEY (B.P. 349,116, 14.2.30. U.S., 15.2.29).—Compositions composed of 3–9 pts. of a chlorinated $C_{10}H_8$, *e.g.*, tri- or tetra-chloronaphthalene, and 1 pt. of gilsonite are claimed. J. S. G. THOMAS.

Electric-discharge lamps. GEN. ELECTRIC CO., LTD., J. W. RYDE, and H. G. JENKINS (B.P. 349,261, 30.4.30).—The form, position, and/or intensity of the luminous column of an electric-discharge lamp is caused to vary continually by introducing into the lamp a continuous stream of an impurity, *e.g.*, $C_{10}H_8$ vapour, which is cleaned up by the discharge. J. S. G. THOMAS.

Metal-vapour [electric-discharge] lamps. H. STAMMEREICH (B.P. 348,677, 11.2.30).—Lamps having at least one electrode composed of a liquid alloy, *e.g.*, Zn amalgam, are operated so that, during operation, separation of the constituents of the alloy is effected, and those constituents of the electrode not desired in the formation of the arc are removed, *e.g.*, by centrifugal force, from the arc space. J. S. G. THOMAS.

Firedamp-proof electric incandescence lamp. L. MELLERSH-JACKSON. From SIEMENS-SCHUCKERT-WERKE A.-G. (B.P. 348,670, 16.12.29).—The space between the lamp bulb and a surrounding glass globe is filled with a gas or vapour, *e.g.*, O_2 or CCl_4 , which, on fracture of the lamp during operation, accelerates destruction of the lamp filament and extinguishes the incandescence. [Stat. ref.] J. S. G. THOMAS.

Cements for capping electric lamps etc. GEN. ELECTRIC CO., LTD., Assees. of PATENT-TREUHAND GES. F. ELEKTR. GLÜHLAMPEN M.B.H. (B.P. 349,244, 15.4.30. Ger., 24.4.29).—A cement comprising one or more esters of high b.p., more especially phosphoric esters of homologous phenols, *e.g.*, phenyl and tolyl phosphates, in addition to the usual resins, solvents, and fillers is claimed. J. S. G. THOMAS.

Manufacture of coloured electric-light bulbs. IMPERIAL CHEM. INDUSTRIES, LTD., and E. A. BEVAN (B.P. 349,160, 6.3.30).—Coloured lacquers comprising synthetic resin compositions of "glyptal" and CH_2O -urea or -thiourea and dyes are applied to the bulbs by dipping, and are hardened by the normal heat of the lamp. S. S. WOOLF.

Coating of [metallic] filamentary material [for use as electron emitters]. STANDARD TELEPHONES & CABLES, LTD. From WESTERN ELECTRIC CO., INC. (B.P. 348,176, 5.2.30).—The filament, *e.g.*, of Pt-Ni alloy, is continually passed through coating, baking, and flashing units, first in one direction and then in the other, so that successive coatings may be applied. F. R. ENNOS.

Determining the intensity of colours. J. RAZEK and P. J. MULDER (B.P. 349,565, 28.12.29).—Photoelectric currents produced by the incidence of successive parts of the spectrum of the radiation from a source are amplified by a thermionic device, including a network with a second thermionic device for compensating fluctuations of current supply to the amplifier. J. S. G. THOMAS.

Manufacture of recording media for rendering visible signs or symbols in electrochemical facsimile and picture-recording apparatus. V. BAUSCH, JUN., T. BAUSCH, V. BAUSCH, SEN., and F. BAUSCH (F. SCHOELLER & BAUSCH) (B.P. 349,189, 15.3.30. Ger., 16.3.29).—Paper impregnated with the iodide of a multivalent element, *e.g.*, CdI_2 , is used. J. S. G. THOMAS.

Photoelectric devices. KOLSTER-BRANDES, LTD. From KOLSTER RADIO CORP. (B.P. 350,075, 18.3.30).

Thermionic cathodes for electric-discharge tubes. BRIT. THOMSON-HOUSTON CO., LTD., and L. J. DAVIES (B.P. 348,679, 11.2.30).

Introduction of gas into sealed vessels such as those of electric-discharge devices. GEN. ELECTRIC CO., LTD., J. W. RYDE, and N. L. HARRIS (B.P. 350,069, 17.3.30).

[Heating of solid cathodes in] mercury-vapour rectifiers. GRAMOPHONE CO., LTD., and R. B. MORGAN (B.P. 350,070, 17.3.30).

Manufacture of electron-emitting cathodes for multiple-electrode thermionic valves. LOEWE AUDION GES.M.B.H., and B. WIENECKE (B.P. 349,667, 8.3.30. Ger., 8.3.29).

Heat accumulators.—See I. Insulating materials.—See III. Cl.—See VII. Roofing elements.—See IX. Production of molten and refined metals. Furnace for metal scrap etc. Salt-bath furnace. Magnetic Fe and Fe-Ni alloys. Cleaning of wires etc.—See X. Rubber for insulation.—See XIV. Tobacco.—See XX. Testing for CO in air. Treatment of water.—See XXIII.

XII.—FATS; OILS; WAXES.

Effect of light on the oxidation of fat. C. H. LEA (Proc. Roy. Soc., 1931, 108 B, 175–189).—A new test for rancidity is described in which the oil or fat is heated, in an atm. of N_2 , with a solvent mixture of

AcOH and CHCl_3 in the presence of solid KI. After cooling, the reaction mixture is added to 5% KI solution and titrated with 0.002N- $\text{Na}_2\text{S}_2\text{O}_3$. The result so obtained measures the active O originally present in the fat. A quantitative modification of the Kreis reaction is described also. Oxidation of fats is accelerated sensibly by weak artificial light, whilst exposure for a few min. to direct sunlight is sufficient to produce rancidity. The reaction on exposure to light is autocatalytic, subsequent oxidation of the fat being accelerated by a previous brief exposure. The differences in susceptibility between fats cannot be attributed to any of the non-fatty substances present, but are probably due to differences in the chemical nature of the fats. Bleaching of the yellow pigment of beef fat occurs at a comparatively early stage in the oxidation process. The intensity of the Kreis test does not run strictly parallel with the active O content. Increase in active O following exposure to light was associated with, at most, a very small increase in free acidity. W. O. KERMACK.

Free fat in soap and its determination. S. KAWAI and R. TONOIKE (J. Soc. Chem. Ind., Japan, 1931, 34, 153—154 B).—The free fat in toilet soaps (about 0.02—0.09%) is extracted with light petroleum from an aq. EtOH solution of the soap. The extract is saponified, freed from unsaponifiable matter, and recovered for weighing as fatty acids. The fatty acids from the free fat had neutralisation val. about 140 and I val. about 50—80, the corresponding figures for the combined fatty acids being 204—210 and 36—38.

E. LEWKOWITSCH.

Determination of naphthasulphonic acid soaps in soap-mineral oil mixtures. W. SCHAEFER (Chem. Umschau, 1931, 38, 131—132).—After saponification and extraction of the unsaponifiable matter (modified Spitz-Hönig method), the EtOH is distilled off from the soap solution, which is acidified with dil. H_2SO_4 and extracted with light petroleum. The extract, after repeated washing with 50% MeOH, yields the fatty, naphthenic, and resin acids. The alcoholic washings are evaporated, dissolved in H_2O , acidified with conc. HCl, and extracted with Et_2O . The Et_2O solution is washed with 20% Na_2SO_4 solution, dried, and on evaporation yields the naphthasulphonic acids as soaps. The soaps have a small acid val. (about 10), possibly due in part to traces of naphthenic acids.

E. LEWKOWITSCH.

Germicidal assay of soaps. H. C. HAMILTON and F. THISTLETHWAITE (J. Lab. Clin. Med., 1931, 16, 391—396).—In tests employing the skin of guinea pigs toilet and washing soaps were ineffective, whilst a soap base containing HgI_2 (1%) was effective.

CHEMICAL ABSTRACTS.

Influence of anti-oxidants on the rate of oxidation of linseed oil. II. Phenols and aromatic amines. A. M. WAGNER and J. C. BRIER (Ind. Eng. Chem., 1931, 23, 662—666; cf. B., 1931, 401).—Pyrogallol (70), α -naphthol (40), resorcinol (4), compared with quinol (100), represents the order of efficiency of the phenols in prolonging the induction period of the oxidation of linseed oil at 100°. β -Naphthol, diphenylamine, α -naphthylamine, and phenyl- β -naphthylamine have no anti-oxidant effect at 100°. *m*- and *p*-Phenylene-

diamines are slightly more effective at 100° than is quinol, and, unlike the latter, can interrupt oxidation that has already set in; they have no anti-oxidant action at 30°, and it appears that decomposition products of these diamines are the actual retarding agents at the higher temp. E. LEWKOWITSCH.

Substitution of steam for carbon dioxide in the hydrogenation of oils. V. YASHCHENKO (Masloboino Zhir. Delo, 1929, No. 5, 23—24).—Before removing the catalyst, steam at 120—140° is passed through the vessel. CHEMICAL ABSTRACTS.

New compounds produced during the hydrogenation of fish oils. S. UENO and R. YAMASAKI (J. Soc. Chem. Ind., Japan, 1931, 34, 151—152 B; cf. B., 1931, 499).— C_{10} -, C_{12} -, C_{14} -, and C_{16} -aldehydes, apparently of the isoaliphatic series (which are the cause of the odour of hardened fish oils) were isolated from the unsaponifiable fraction of the malodorous volatile products of hydrogenation. E. LEWKOWITSCH.

The sulphur monochloride reaction of fatty oils. V. Reaction velocity and viscosity of sulphochlorinated oils. E. H. HARVEY and H. A. SCHUETTE (Ind. Eng. Chem., 1931, 23, 675—676).—Neither the velocity of the thermal reaction of fatty oils treated with S_2Cl_2 (6.7%; cf. B., 1928, 935) nor the viscosities of the products bear any consistent relation to the I val. of the original oils. The rate of temp. rise is exceptionally great for menhaden oil. The viscosities of the products plotted against the viscosities of the original oils give a smooth curve. E. LEWKOWITSCH.

Composition of the oil from *Soja hospida*. A. HEIDUSCHKA and H. EGER (Chem. Umschau, 1931, 38, 129—130).—Oils extracted from the same sample of soya beans by light petroleum in the laboratory and in the factory did not differ essentially. The fatty acid composition (%) of the oil (I val. 132.6), determined by the Pb salt- Et_2O separation and bromination experiments, was: palmitic 13.31, α -linolenic 2.7, α -linoleic 19.51, β -linoleic 33.58, oleic 24.18. No stearic acid could be detected. E. LEWKOWITSCH.

Jack pine.—See XIII. Fruit-tree emulsions.—See XVI.

PATENTS.

Sulphonation of higher fatty acids and fatty acid derivatives. N.V. CHEM. FABR. "SERVO," and M. D. ROZENBROEK (B.P. 347,592 and 349,527, 21.1.30. Holl., 22.1.29).—(A) A higher proportion of H_2SO_4 can be organically combined by sulphonating the higher fatty acids (above C_{12}) etc. in the presence of aliphatic sulphohydroxy-acids, e.g., isethionic acid, their salts, or sulphuric esters. (Cf. B.P. 312,283; B., 1931, 71.) (B) The fatty acids are sulphonated in the presence of mixed anhydrides of AcOH (or its homologues) with inorg. oxy-acids (except H_2SO_4), e.g., H_3BO_3 , oxy-acids of P (which may still retain one or more OH groups).

E. LEWKOWITSCH.

Manufacture of soap. HENKEL & Co. G.M.B.H. (B.P. 348,689, 14.2.30. Ger., 30.3.29. Cf. B.P. 301,020; B., 1929, 825).—Liquid potash soaps to which K acetate or lactate has been added remain liquid down to -8° and do not discolour with age. [Stat. ref.]

E. LEWKOWITSCH.

Soaps for laundry and other purposes. M. SIFF [ORIENT SOAP WORKS (LONDON)] and H. SWITHENBANK (B.P. 349,003, 15.4.31).—A blueing or whitening soap containing up to 2% of alkali-blue or sol.-blue and sufficient alkali, *e.g.*, Na silicate, is colourless, but yields a blue liquor on dissolution. E. LEWKOWITSCH.

Thickening of vegetable [castor] oil. W. W. TRIGGS. From M. MORGAN (B.P. 349,684, 18.3.30).—Castor oil (80 pts.) is thickened or solidified by heating to about 47.5° and stirring in dropwise 1 pt. of HNO₃ (*d* 1.4–1.42) and then raising the temp. to about 116° until "crackling" ceases. E. LEWKOWITSCH.

Artificial turf.—See XVI.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Relation between thixotropy and levelling characteristics of paint. E. L. McMILLEN (Ind. Eng. Chem., 1931, 23, 676–679).—The Kampf rotation viscosimeter has been modified so that consistency measurements can be made at shearing stresses below 1 dyne/sq. cm. and rates of shear as low as 10⁻⁶ sec.⁻¹ Waring's discussion (Soc. of Rheology, Dec., 1930) of levelling properties neglects the variation in yield val. after brushing-out due to the thixotropic nature of paint. The fluidity of all paints immediately after brushing-out or stirring is high and approx. of the same order, but decreases very rapidly (< 2 min.) after stirring has ceased. For good levelling, a paint must be formulated so that this regain of plasticity after brushing is slow enough to permit elimination of brush marks, but sufficiently rapid to prevent sag on vertical surfaces. E. LEWKOWITSCH.

Effect of building materials on paint films. H. M. LLEWELLYN (Dept. Sci. Ind. Res., Building Res., 1930, Bull. No. 11, 4 pp.).—The chief factor which affects the soundness of a paint film on building materials is the moisture content of the material at the time of painting, as, in addition to the weaker bond on a damp surface, hydrostatic pressure may be set up in various ways behind the impermeable film. Sol. salts may cause similar effects by efflorescence, and drying oils, *e.g.*, linseed oil, are attacked by caustic alkalis to form sol. soaps. Oil paints are liable to failure by saponification when applied to damp surfaces containing free CaO and salts of Na and K, *e.g.*, Portland cement, asbestos cement, etc. Prussian blue, chrome, and many org. pigments are sensitive also to the same reaction. C. A. KING.

Viscosity research into protective [nitrocellulose] coatings. A. W. VAN HEUCKEROOTH and J. R. STEWART (J. Rheology, 1931, 2, 223–229).—Various viscosity cups for the rapid testing of paints, lacquers, and paint oils are described and compared, the Pratt-Lambert type being recommended for the factory and the Gardner mobilometer for the laboratory. A chart is shown for the determination of the viscosity of a blend of nitrocelluloses of different known viscosities. The tensile strengths of nitrocellulose films prepared from AcOBu solutions increase in approx. proportion with the resistance to exposure (roof test) and with the viscosity (except for very high viscosities, when both these properties decrease). J. GRANT.

Resins of jack pine. J. B. PHILLIPS (Pulp Paper Mag. Can., 1931, 31, 211–219).—The resins consist chiefly of resin acids and fatty and unsaponifiable matter. The fatty constituents consist largely of acids and glycerides of the unsaturated type (oleic, linoleic, and traces of linolenic acids). The fats of seasoned wood contain much oxidised fatty acid.

CHEMICAL ABSTRACTS.

Dispersions of the quicksand type.—See I.
Resins in podophyllum rhizome.—See XX.

PATENTS.

Production of [primer] coatings. BRIT. CELANESE, LTD. (B.P. 348,266, 5.3.30. U.S., 5.3.29).—The surface is "filled" with powder or pasty primers containing over 50% of a cellulose derivative and/or plasticiser, and is then given a coat of a cellulose composition. E. LEWKOWITSCH.

Preparation of [cellulosic] coating materials [floor coverings, plastic masses, etc.]. IMPERIAL CHEM. INDUSTRIES, LTD., and B. W. FOSTER (B.P. 348,156, 4.11.29. Cf. B.P. 331,837; B., 1930, 872).—H₂O-wet cellulose esters or ethers (*e.g.*, nitrocellulose) are incorporated with a non-volatile combined gelatiniser and plasticiser (*e.g.*, Bu phthalate, camphor oils, etc. or *p*-toluenesulphonamide and castor oil) and, if desired, a softener, in quantities such that the wt. of the plasticiser and softener together does not greatly exceed the dry wt. of the ester or ether; the H₂O which separates is poured off, and the remainder may be removed by heating. Inert fillers, pigments, etc. may also be added. L. A. COLES.

Synthetic resins and coating compositions prepared therefrom. BAKELITE CORP., Assees. of V. H. TURKINGTON (B.P. 349,522, 27.2.30. U.S., 28.2.29).—The product obtained by reaction between a phenol and a fatty oil (*e.g.*, cresol 100 pts., tung oil 100 pts.) in the presence of hexamethylenetetramine (10–25 pts.) (with or without subsequent heating with, *e.g.*, paraformaldehyde) is sol. in turpentine and petroleum distillates, and with driers dries to a clear resistant film at room temp. E. LEWKOWITSCH.

Production of synthetic resins and coating compositions made therefrom. IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 349,442, 23.1.30. U.S., 23.1.29).—Furylethylene is polymerised by heating for at least 3 hr. at 180° with an oxidising or acid catalyst, *e.g.*, Bz₂O₂, H₂O₂, KClO₄, O₃, linseed oil acids, etc., and solvents, *e.g.*, PhMe, tolyl phosphate; nitrocellulose and solvents therefor may be incorporated. S. S. WOOLF.

Coating and impregnating compositions. IMPERIAL CHEM. INDUSTRIES, LTD., and W. BAIRD (B.P. 349,464, 24.2.30).—Aq. emulsions of "glyptal-type" resins dissolved, if desired, in org. solvents are prepared prior to or simultaneously with their incorporation with aq. solutions or dispersions of rapid thermohardening resin, *e.g.*, PhOH— or urea-CH₂O resins. S. S. WOOLF.

Application of synthetic resins to surfaces. BRIT. THOMSON-HOUSTON CO., LTD. Assees. of J. G. E. WRIGHT (B.P. 349,399, 9.9.30. U.S., 10.9.29).—Surfaces

are coated with an "alkyd" resin mainly in the "B stage," together with a small amount in the "A stage," in the form of a suspension in an inert volatile liquid, *e.g.*, CCl_4 , pigment being present if desired; the film is "cured" *in situ* at 125–180° for about 5 hr.

S. S. WOOLF.

[Synthetic-resin] varnishes etc. BAKELITE CORP., Assees. of H. L. BENDER (B.P. 349,599, 22.2.30. U.S., 23.2.29).—Resinoids, *e.g.*, PhOH - or PhOH -oil- CH_2O , urea- or thiourea- CH_2O , in the A condition are advanced towards the C condition, *e.g.*, by heating with a high-boiling A-resinoid solvent which is a non-solvent for C-resinoids, *e.g.*, BuOH , giving a colloidal dispersion of the advanced resinoid having low penetrative power for test paper. Alternatively, the A-resin is heated in the absence of solvent, the latter being incorporated at a later stage to break down the gel structure. Air-drying varnishes needing no further heat-curing are thus obtained.

S. S. WOOLF.

Mouldable compositions. BAKELITE CORP., Assees. of H. L. BENDER (B.P. 349,521, 27.2.30. U.S., 28.2.29).—Fibrous fillers or sheet materials are impregnated with a reactive phenolic resinoid comprising residual amounts of a CH_2O -containing agent (*e.g.*, CH_2O etc.) and a non-phenolic ingredient to combine therewith, *e.g.*, urea.

S. S. WOOLF.

Manufacture of plastic substances. DEUTS. GASGLÜHLICHT-AUER-GES.M.B.H. (B.P. 348,593, 14.1.30. Ger., 2.3.29).—Durable elastic materials are prepared by condensing azelaic acid with glycerol by heating at about 160–180° with or without the aid of condensing agents.

E. LEWKOWITSCH.

Manufacture of artificial [plastic] masses. I. G. FARBENIND. A.-G. (B.P. 348,077, 6.2.30. Addn. to B.P. 304,612; B., 1930, 677).—Synthetic rubber, *e.g.*, from dimethylbutadiene, is used in conjunction with linoxyn (and nitrocellulose, plasticisers, fillers, resins, etc.) in linoleum cement.

E. LEWKOWITSCH.

Softeners for plastic materials. W. W. TRIGGS. From E. I. DU PONT DE NEMOURS & Co. (B.P. 349,100, 21.11.29).—Compositions comprising a vinyl ester polymeride as sole binding agent, an ester of phthalic acid, *e.g.*, the Bu_2 or Bu cyclohexyl ester, as softener, solvents, and pigments are claimed.

S. S. WOOLF.

Coating and plastic materials. W. W. TRIGGS. From E. I. DU PONT DE NEMOURS & Co. (B.P. 349,562, 21.11.29).—Mixtures of vinyl ester polymerides and as softener therefor an aryl ether of a polyalcohol in which the ratio ether group : OH group is not less than 2 : 1, *e.g.*, di- or tri-benzylin, together with a suitable solvent mixture and, if desired, pigments, are claimed as non-brittle compositions.

S. S. WOOLF.

Manufacture of resinous condensation products. IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 348,420, 4.6.30. U.S., 4.6.29).—The product of the condensation of NH_4CNS with CH_2O in an acid, alkaline, or neutral medium is evaporated and hardened at 90–100°.

E. LEWKOWITSCH.

Bonded materials. BAKELITE CORP., Assees. of H. KLINE (B.P. 347,738, 28.1.30. U.S. 29.1.29).—Fibrous fillers and a reactive (phenolic) resinoid (with or without a suitable solvent) are consolidated by heating at 170°

under pressure (<500 lb./sq. in.) until the resin liquefies and then sets.

E. LEWKOWITSCH.

Bonded articles [abrasive wheels] embodying synthetic resins. BAKELITE CORP., Assees. of R. S. DANIELS (B.P. 347,577, 20.11.29. U.S., 24.11.28).—An abrasive (as filler) is incorporated and moulded with a glycerol (1 pt.)-phthalic anhydride (2 pts.) resinoid which has been prepared by heating to the point of incipient gelation.

E. LEWKOWITSCH.

Production of variegations in plastic masses. N.V. PHILIPS' GLOEILAMPENFABR. (B.P. 349,670, 8.3.30. Holl., 19.11.29).

Manufacture of [veined] ornamental articles from synthetic resin. SYNTHAFORM FABR. F. FORMTEILE AUS SYNTHETISCHEN EDEIHARZEN G.M.B.H. (B.P. 349,753, 7.5.30. Ger., 17.12.29).

Manufacture of [lacquered or painted] moulded articles. R. WEITZEL (B.P. 348,216, 15.2.30. Fr., 22.2.29).

Chloromethyl compounds.—See III. Azo pigments.—See IV. Coloured electric-light bulbs.—See XI. Pigments in rubber dispersions.—See XIV. [Painters'] size.—See XVII.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

X-Ray diffraction study of chicle. C. W. STILLWELL (Ind. Eng. Chem., 1931, 23, 703–706).—The X-ray patterns for crude and refined chicle differ in that the former contains a few extra lines, indicating that in crude chicle the gutta is present as a cryst. constituent, but not in refined chicle. The operations of melting, filtration, and resolidification involved in the refining process presumably reduce the size of the gutta particles to such an extent that they no longer give a cryst. pattern. Crude chicle is a mixture of at least 3 cryst. constituents, *viz.*, the gutta, the resin, and the C_6H_6 -insol. matter (mainly Ca oxalate) and at least one amorphous fraction which is sol. in H_2O . Chicle gutta is identical with the hydrocarbon of gutta-percha and balata. Unlike rubber and gutta-percha, the crystals in chicle do not assume a preferred orientation on stretching.

D. F. TWISS.

Manganese in raw rubber. R. O. BISHOP and K. C. SEKAR (Rubber Res. Inst. Malaya, 1931, 2, 239–245).— KMnO_4 is only a weak disinfectant, especially at low concentrations, and its presence in a certain proprietary fungicide is undesirable. If KMnO_4 is added to latex sufficient Mn remains in the rubber after coagulation and washing to cause development of tackiness on accelerated ageing and to effect definite retardation of vulcanisation.

D. F. TWISS.

Rate of deposition of [rubber] latex on porous moulds. H. W. GREENUP (Ind. Eng. Chem., 1931, 23, 688–691).—Variation of pressure, rubber concentration, and temp. in the deposition of rubber from latex on alundum filtration thimbles of medium porosity is found to be of negligible effect relative to the influence of variation in p_H . At p_H 6.1 aggregation of the rubber globules in the latex ensues with consequent marked increase in the rate of filtration and deposition.

D. F. TWISS.

Occurrence of "air-cracking" in stretched rubber. A. VAN ROSSEM and H. W. TALEN (Kautschuk, 1931, 7, 79—86, 115—117; also, in part, Proc. K. Akad. Wetensch. Amsterdam, 1931, 34, 450—453).—For examination of the relative tendency of rubber to develop cracks on exposure under different degrees of stretching it is convenient to use wedge-shaped pieces 1 mm. and 8 mm. thick, respectively, at the two ends, so that the necessary range of degrees of extension is obtained simultaneously in one sample. The largest cracks appear at 10—20% elongation, and occur not only on the side exposed to sunlight, but also on the shaded side; night exposure leads to a similar result. Instead of the evidently inappropriate, although customary term "sun-cracking," the name "air-cracking" is recommended. It is believed that minute proportions of O_3 in the air are responsible. Mere formation of a surface skin of oxidised rubber is not responsible, because the same result is not produced by oxidation with air or O_3 and subsequent stretching, but very dil. O_3 gives the characteristic result with stretched rubber. It is possible that the cracking phenomenon is associated with the crystallisation of rubber in spite of the fact that X-rays reveal orientation only above 70% elongation. With increasing degree of vulcanisation the cracks become smaller and more numerous; compounding ingredients of various types, including accelerators and anti-oxidants, have no important influence, although softeners capable of "blooming" may retard the effect at very low concentrations of O_3 . N oxides, SO_2 , and Cl do not induce air-cracking, and the effect seems to be a characteristic of O_3 and of rubber.

D. F. TWISS.

Effect of storage on milled rubber. C. M. CARSON (Ind. Eng. Chem., 1931, 23, 691—694).—Smoked sheet rubber after mastication and subsequent storage for 9 months shows a decided decrease in modulus, plasticity, and recovery. Masticated rubber "freezes" at below 0° and thaws at 15 — 25° . If placed under slight pressure for several months, "freezing" occurs even at room temp., and thawing results only at about 50° . The stored masticated rubber shows rougher extrusion than newly masticated material; it appears also to have lost some of its natural antioxidant and to contain a reduced proportion of fatty acid and $COMe_2$ -sol. substances, but an increased proportion of constituents sol. in alcoholic KOH.

D. F. TWISS.

Effect on vulcanised rubber compounds of immersion in boiling water. K. J. SOULE (Ind. Eng. Chem., 1931, 23, 654—658).—The swelling of vulcanised rubber in boiling H_2O follows a similar course to that of swelling in a solvent, a rapid initial effect being observed which gradually decreases. In some samples absorption still continues after 10,000 hr. in boiling H_2O . Raw rubber absorbs H_2O to a much greater extent than does vulcanised rubber, but remains intact after 1000 hr. Some fillers reduce the absorptivity and others increase it; of 35 fillers C black was the most marked of the former class and ultramarine of the latter. Swelling in boiling H_2O does not vary in any simple manner with the hardness, but, in general, loss in resistance to cutting varies directly with the amount of H_2O absorbed.

D. F. TWISS.

Recovery of rubber and cotton from unvulcanised tyre-ply scrap. Extraction process. C. S. POWELL (Ind. Eng. Chem., 1931, 23, 701—703).—The acid process for the recovery of rubber from unvulcanised tyre-ply scrap not only destroys the cotton and removes a large proportion of the zinc oxide from the rubber, but also, since the advent of very active acidic accelerators, necessitates a pretreatment with caustic alkali to prevent vulcanisation during the acid treatment. Solvent processes have the advantage of recovering both rubber and cotton. A process is described in which the unvulcanised scrap is treated with C_6H_6 for 2 hr. in a revolving cage lined with 30-mesh monel-wire screen. The solution is then drained away and the residual cotton washed by repeated agitation with fresh additions of solvent. The retained solvent is removed from the cotton by treating under reduced pressure with steam. The recovered cotton is clean and white, and contains $< 1\%$ of rubber. In addition to recovering the cotton, the cost of the solvent process is only 30% of that of the acid process. The rubber solution produced is most economically applied to the impregnation of fabric. It is important to avoid mixing scrap containing different org. accelerators.

D. F. TWISS.

C black.—See II. **Hevea buds.** **Spraying of rubber plants.**—See XVI.

PATENTS.

Manufacture of artificial rubber or rubber-like masses. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 349,499, 24.2.30).—In the polymerisation of emulsified butadiene and its homologues with or without olefinic benzene compounds, the presence of a small proportion of an org. compound containing Cl, e.g., CCl_4 or Na trichloroacetate, leads to an increased yield and a more plastic product.

D. F. TWISS.

Manufacture of uniformly plastic rubber. NAUGATUCK CHEM. CO., Assees. of W. A. GIBBONS (B.P. 349,280, 12.5.30. U.S., 24.5.29).—An artificial aq. dispersion of vulcanised rubber or reclaim is freed from metallic particles and other impurities, sprayed into a drying atm., and the dried material finally compacted in a press to a uniformly plastic mass.

D. F. TWISS.

Dispersion of pigments in rubber dispersions. GOODYEAR TIRE & RUBBER CO., Assees. of C. R. PARK (B.P. 348,174, 4.2.30. U.S., 14.5.29).—Pigments such as channel black or thermatomic black are exposed, during manufacture or subsequently, to the vapours of an oily material, e.g., pine oil, tung oil, or petroleum distillate. The ease of dispersion of the pigments in aq. or other suspensions of rubber, e.g., latex, is thereby enhanced.

D. F. TWISS.

Rubber compounding. BARRETT CO., Assees. of A. B. COWDERY and T. A. BULIFANT (B.P. 348,761, 10.3.30. U.S., 14.3.29).—Coal-tar oil ($d^{38} 1.06$ — 1.15 , b.p. above 200°) substantially free from cryst. material at 25° is used as a softening or dispersing agent in rubber compounding; it imparts high resistance to abrasion, great tensile strength, and good ageing qualities.

D. F. TWISS.

Manufacture of vulcanised rubber. DUNLOP RUBBER Co., LTD., D. F. TWISS, and F. A. JONES (B.P. 349,461, 22.2.30).—The condensation products of mercaptobenzthiazole, dithiocarbamates, and their analogues with reactive aralkyl halides, such as CH_2PhCl or nitrobenzyl chloride are applied as vulcanisation accelerators. D. F. TWISS.

Manufacture of rubber articles. ANODE RUBBER Co., LTD., Assees. of E. B. NEWTON (B.P. 348,537, 12.2.30. U.S., 6.3.29).—Unvulcanised masticated rubber and unmasticated rubber obtained from latex may be caused to adhere firmly to one another, even before vulcanisation, by superposing the two layers after coagulation of the latex, but prior to its drying; the composite product is subsequently dried and vulcanised. A valve-patch of masticated rubber reinforced with fabric may thus be affixed to a coagulated wet motor tube formed by electrodeposition from latex. D. F. TWISS.

Manufacture of latex compositions. GOODYEAR TIRE & RUBBER Co. (B.P. 349,273, 6.5.30. U.S., 27.7.29).—An adhesive cement for the manufacture of rubber articles is made by mixing rubber latex with small amounts of pine tar and of an oxidised pine oil. D. F. TWISS.

Production of goods of rubber or similar material. DUNLOP RUBBER Co., LTD., and (A) W. G. GORHAM and G. W. TROBRIDGE, (B) E. W. MADGE (B.P. 349,062—3, 20.12.29).—Porous or micro-porous articles of vulcanised rubber such as battery separators and filtering diaphragms are produced by coagulating or gelling aq. dispersions of the material (A) in an assembly of moulds built up in nest form, and then vulcanising under such conditions that evaporation of the H_2O is prevented, or (B) upon suitable moulds or backing strata (provided with narrow grooves or reliefs which prevent distortion by syneresis and consequent shrinkage) and thereafter submitting them to heat-treatment. D. F. TWISS.

Production of rubber composition [for electrical insulation]. J. E. POLLAK. From W. B. WIEGAND (B.P. 348,299, 21.3.30).—The insulating properties of materials containing rubber are improved by the presence of up to 6% of C black of high adsorptive properties, introduced as such and not added in the form of reclaimed rubber. The mechanical qualities are also improved. D. F. TWISS.

Coating of solid surfaces with rubber or the like. DUNLOP RUBBER Co., LTD., D. F. TWISS, and F. A. JONES (B.P. 348,303, 24.3. and 5.6.30).—Compositions suitable for bonding rubber to surfaces such as metal are produced by treating rubber, ketones (such as cyclohexanone), or mixtures thereof with CH_2O or its polymerides or derivatives, e.g., methylal, in the presence of a condensing agent such as HCl . The reaction may be effected in a suitable solvent. Gutta-percha or rubber may be introduced into the compositions subsequent to the chemical reaction. D. F. TWISS.

Production of finishes on rubber fabrics and rubber goods. F. THOMPSON (B.P. 348,169, 9.1.30).—A frosted appearance or sheen is imparted to textile

fabrics and rubberised materials by applying globules (diam. > 1 mm.) of light-reflecting or -refracting material, e.g., glass, SiO_2 , or synthetic resin. [Stat. ref.]

D. F. TWISS.

Preservation of rubber. GOODYEAR TIRE & RUBBER Co., Assees. of A. M. CLIFFORD (B.P. 346,079, 4.2.30. U.S., 14.3.29).—Diaminotriarylmethanes, especially 4:4'-diaminotriphenylmethane, or the products obtained by heating these with amines (o-toluidine, m-phenylenediamine), are applied as anti-agers. C. HOLLINS.

Manufacture of rubber [with increased resistance to deterioration]. IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 348,489, 8.9.30. U.S., 9.9.29).—Products of the formula $\text{A}\cdot\text{R}\cdot\text{CO}\cdot\text{R}'\cdot\text{A}'$, where A and A' represent NH_2 groups and R and R' represent aryl radicals, e.g., 4:4'-tetramethyldiaminobenzophenone, are used as anti-oxidants. D. F. TWISS.

Manufacture of rubber. IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 348,985, 12.9.30. U.S., 17.9.29).—Agents for retarding the deterioration of rubber are produced by allowing C_2H_2 to react with amino-compounds such as NH_2Ph ; a catalyst such as Cu_2Cl_2 or HgCl_2 may be used, if desired. D. F. TWISS.

[Anti-ager] for manufacture of rubber and the like. IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 349,371, 25.7.29).—The addition of β -naphthol to a rubber mixture does not affect the rate of vulcanisation, but the vulcanised product has enhanced resistance to deterioration and does not become substantially discoloured even on exposure to direct sunlight. D. F. TWISS.

Bonded abrasives.—See VIII. **Insulating compounds.**—See XI. **Plastic masses.**—See XIII.

XV.—LEATHER; GLUE.

Hydration of animal skin by volume-change method. IV. **Effect of various factors on the hydration of calfskin.** E. R. THEIS and F. T. BENTON (Ind. Eng. Chem., 1931, 23, 367—370; cf. B., 1930, 339).—It was found that the ability of calfskin to hydrate was reduced by post-mortem action, that the bacterial-enzymic lag period was reduced from 12 hr. in a fresh skin to $\frac{3}{4}$ hr. after 48 hr., and that the hydration of calfskin in saturated NaCl solution was progressively diminished by post-mortem action. Hydration tests with different saturated solutions showed the following order of diminishing effect: $\text{Ca}(\text{OH})_2$, H_2O , $\text{Ca}(\text{OH})_2$ + excess CaO , 0.05N- NaOH , NaCl , Na_2SO_4 , K_2SO_4 , NaCl + 5M- CaCl_2 , CaCl_2 , KCl , MgSO_4 , LiCl , NaCl + 5% NaCO_3 . Skins are found to be hydrated (and not dehydrated) by brine curing: it is the loosely-held H_2O in the skin which is diminished. A dry-cured calfskin was soaked in a 2% NaCl solution; max. hydration was attained in 15 hr., after which bacterial enzymic action set in. By soaking cured calfskins in NaCl solutions of concentration $> 5\%$, hydration is slower and degeneration retarded and delayed. Dry-cured calfskins should be soaked in a 10—15% NaCl solution for 24 hr. and then in H_2O for 24 hr., whereby degeneration is delayed until after 45 hr. Bacterial activity was shown to be delayed by all antiseptics except C_{10}H_8 . Greater hydration was obtained by soaking calfskin in larger vols. of H_2O . The hydration of

calfskin was diminished by soaking in H_2O at higher temp. It is suggested that the hydration of skin could be measured by changes in its wt. while suspended in H_2O . D. WOODROFFE.

Action of pancreatin on collagen in presence of lime and ammonium sulphate. A. KÜNTZEL and O. DIETSCH (Collegium, 1931, 155—162).—The proteolytic effect of pancreatin on collagen is repressed by $Ca(OH)_2$. No proteolytic effect was observed after 6 hrs. treatment in saturated lime-water. The proteolytic effect of pancreatin on collagen was increased by increasing the amount of $(NH_4)_2SO_4$ in the solution. The efficiency of pancreatin in bating will be greater, the greater is the amount of free CaO removed from the skins. A greater bating effect with pancreatin will be obtained on pelts which have been delimed than on those not delimed. The bating effect is not affected much by variations of p_H between 6 and 10.

D. WOODROFFE.

Enzyme lime liquors [for hides and skins]. M. BERGMANN, M. LISSITZIN, and G. SCHUCK (Collegium, 1931, 132—136).—Hair-loosening tests were conducted with papain solutions at p_H 5, 7, and 8, respectively. The hair on calfskin was loosened in the shortest time by 4 times its amount of a 0.2% papain solution in a citrate buffer solution at p_H 5.0. Determination of the rates of dissolution of hide substance by phosphate and bisulphite buffers, by papain alone, and by each buffer, respectively, showed that the papain is activated by these buffers. The enzyme was inactivated by Zn salts (0.04%).

D. WOODROFFE.

Sampling of leather for physical investigations. C. H. SPIERS (J. Soc. Leather Trades' Chem., 1931, 15, 153—166, 206—226).—It is suggested that before proper methods for testing leather or studying the relation between various physical properties and other factors can be devised, the peculiarities of the leather as regards the properties under consideration must be systematically studied.

D. WOODROFFE.

Iron and copper in vegetable tan liquors and tanning extracts, and absorption and deposition of iron and copper impurities during tannage. M. P. BALFE and H. PHILLIPS (J. Soc. Leather Trades' Chem., 1931, 15, 226—235).—The amounts of Fe and Cu in tannin extracts are low. More than 0.01% Fe may occur in myrobalans, gambier, and sumac extracts and > 0.015% Cu is usually present in chestnut extracts, the latter due to the use of Cu autoclaves in their manufacture. Fe and Cu impurities in tan liquors are freely absorbed by hides and retained in the grain layers. Evidence was obtained that tan liquors are frequently contaminated by Fe during use. Serious Fe contamination is shown if the total sol. matter in tan liquors contains > 0.010% Fe, and may arise in the limeyard, or from the use of H_2SO_4 . The Yoe colorimetric method of determining Fe and Cu is described and recommended.

D. WOODROFFE.

Evaluation of vegetable tannin extracts. W. VOGEL (Collegium, 1931, 191—200).—Tannin extracts should not be judged merely on their tannin contents, but sugars (because they form acid), proteins as bacterial food, inorganic salts (since they repress swelling), and

starchy, gummy, and resinous substances (which function as protective colloids peptising the tannins) should be determined in the non-tans. The insol. matter, which serves as filler for heavy leathers or may be stabilised for tanning purposes, was 0.6% by the official method of analysis, but 80% in a solution of an extract of d 1.070. It attains a max. at this d with most extracts. The mineral salt content of an extract is indicated by the ash, which varies from 1.0% in an untreated quebracho extract to 5.7% in a sulphited quebracho extract. Tannin extracts can be divided into three groups according to their p_H : synthetic tans and sulphite-cellulose extracts, 2.0—3.4; pyrogallol tans, 3.2—4.0; pyrocatechol tans, 4.3—6.2. Analytical solutions of "Triumph" quebracho extract and valonia extract were not rendered turbid, as were untreated and "Crown" quebracho extracts, pine bark, chestnut, and oakwood extracts, on lowering their p_H by additions of acid. The determination of the flocculation point of more conc. solutions was difficult. The colour of solutions of the extract and that of leathers tanned with them should be measured. The increase in wt. of unchromed hide powder after treatment with different tannin extracts was (%): quebracho (Triumph), 90—98; quebracho (untreated), 85—95; oakwood, 80—90; chestnut, valonia, sulphited quebracho, 70—80.

D. WOODROFFE.

Leather, sanitation, and colloid chemistry. J. A. WILSON (J. Amer. Leather Chem. Assoc., 1931, 26, 297—312).—A lecture.

PATENTS.

Manufacture of [gelatinous] plastic masses for printing rollers, hectographs, etc. A.-G. F. CHEM. PROD. FORM. H. SCHEIDEMANDEL, and W. WACHTEL (B.P. 348,384, 14.5.30. Ger., 14.5.29).—Gelatin, preferably in pearl form, is soaked in cold glycerin previously diluted with the quantity of H_2O desired in the final product. Alternatively, the H_2O is added to the gelatin by soaking or is left in it by incomplete drying during its manufacture.

L. A. COLES.

Preparations for leather.—See VI.

XVI.—AGRICULTURE.

Soils. X. Mode of fixation of ammonia in the soil. J. CLARENS and H. MARGULIS (Bull. Soc. chim., 1931, [iv], 49, 508—514. Cf. B., 1928, 869; 1931, 690).—The fixation of NH_3 by soil is not appreciably affected by $CaCO_3$.

R. CUTHILL.

Sulphur oxidation in Alberta soils. J. D. NEWTON (Sci. Agric., 1931, 11, 612—622).—In soils examined, Common Scab cannot be controlled by applications of S in economic quantities. Lawn grass is injured by amounts of S requisite to kill dandelions. Increased acidity in soil due to S treatment decreased the bacterial, but not the fungal, numbers.

A. G. POLLARD.

Moorland cultivation and the agricultural use of moors in 1925—1929. B. TACKE (Bied. Zentr., 1931, 60A, 129—145).—A comprehensive survey, with bibliography, of recent work concerning the general cultivation, manuring, cropping, etc. of moor soils.

A. G. POLLARD.

Trustworthiness of the quinhydrone method for determining the p_H of soil. G. HATOS (Mezög. Kutat., 1930, 3, 189—190; Chem. Zentr., 1931, i, 1664).—A freshly ignited Pt electrode which has been kept for 1–2 min. in distilled H_2O containing quinhydrone, when immersed in the mixture of soil suspension and quinhydrone, gives within 5 sec. a potential which is const. for at least 10–15 min.

A. A. ELDRIDGE.

Potassium thiocyanate method for determining soil acidity. Y. KAMOSHITA (J. Imp. Agric. Exp. Sta., Japan, 1930, 1, 85—88).—Treatment of soil with an alcoholic solution of KCNS produces a red colour if the soil is more acid than p_H 6.88, and the depth of colour is proportional to the acidity of the soil. At the same p_H the colour increases with exchangeable acidity, since this is accompanied by increase in Al_2O_3 and Fe_2O_3 and decrease in CaO and MgO brought into exchange. Hence the exchangeable Fe^{+++} of soils is considered responsible for part of the exchange acidity.

CHEMICAL ABSTRACTS.

Determination of the nutrient material in soil by electrodialysis. J. DI GLERIA (Mezög. Kutat., 1930, 3, 185—188; Chem. Zentr., 1931, i, 1664).—The P and K values are greater than those obtained by Neubauer's method. Soil- NO_3^- and $-NO_2^-$ can be determined by electrodialysis.

A. A. ELDRIDGE.

Micro-determination of silica in aqueous soil extracts. A. NĚMEC, J. LANÍK, and A. KOPPOVÁ (Z. anal. Chem., 1931, 83, 428—445).—The solution containing 0.05–0.7 mg. SiO_2 per 100 c.c. is treated with 5 c.c. of 1% citric acid solution, 5 c.c. of 5% $(NH_4)_2MoO_4$ solution containing 5% of H_2SO_4 , and after 5 min. with 7 c.c. of 4% H_2SO_4 , 2 c.c. of 1% $NaVO_3$ solution, and 2 c.c. of $Na_2S_2O_3$ solution. After 15 min. the liquid is neutralised with 35 c.c. of 10% Na_2CO_3 solution containing one sixth its vol. of glycerol. Max. intensity of the blue colour develops after 2 hr. H_3PO_4 gives a similar colour which rapidly fades and disappears entirely in 2 hr.; high results are obtained, however, when the solution contains > 0.01 mg. Fe and > 0.1 mg. P_2O_5 per 100 c.c. Exact maintenance of the above conditions in standard and test solutions is necessary for correct results.

A. R. POWELL.

Use and action of phosphates on chernozem. M. A. EGOROV (Pochvoved., 1928, 23, No. 3–4, 5–28).—On the assumption that the Ca humates undergo double decomp. with sol. phosphates, soil was mixed with K, Na, or NH_4 phosphate or hydrogen phosphate solutions and the mixture was filtered. The colour of the filtrate depends on both the cation and the anion. Na^+ is the most active; $H_2PO_4^-$ and HPO_4^{--} give a slight colour, whilst PO_4^{---} produces a deep colour. The intensity of the colour increased with increase in concentration and an increase in the time of shaking. The addition of $CaCO_3$ gives a darker extract, but $CaCO_3$ alone is inactive; $FeCO_3$ behaves similarly. Dialysis experiments are described; a dark liquid was obtained when the soil was treated with NaH_2PO_4 or (more slowly) Na_2HPO_4 , the effect being attributed to formation of $Ca(H_2PO_4)_2$ and $CaHPO_4$, respectively. Addition of $FeSO_4$ or $FeCl_3$ to extracts of Na_2HPO_4 had no effect

on the mobility of the humus. The reactions in all cases depend on the formation of a sol. or insol. phosphate.

CHEMICAL ABSTRACTS.

Calcium arsenate and unproductiveness in certain soils. W. B. ALBERT and W. R. PADEN (Science, 1931, 73, 622).—The addition of large amounts of Ca arsenate to light sandy loam soils eventually interferes to a serious extent with the growth of cowpeas, oats, cotton, and various grasses. The As contents of seedlings grown on soils containing that element in varying amounts are recorded.

L. S. THEOBALD.

Copper as an essential for plant growth. A. L. SOMMER (Plant Physiol., 1931, 6, 339—345).—Tomato, flax, and sunflower plants made poor growth unless the nutrient contained small amounts of Cu.

A. G. POLLARD.

Influence of the nutrient content of seeds on the determination of the nutrient content of soils ("b" in the effect law). W. POHLENZ (Bot. Archiv., 1930, 31, 141—196).—In determining the growth curves of plants by Mitscherlich's method the P content of the seeds is of significance only when a nutrient-free medium (e.g., sand) is used, or in soils when the seeds are unusually large. In such cases the seed-P, being utilisable by the plants, should be included in the initial phosphate content ("b") of the soil. The S-form of the initial portion of plant-growth curves is confirmed. Beyond this initial stage the "effect factor" for P is approx. const. for all plants.

A. G. POLLARD.

Determination of the lime and fertiliser requirement of soil. J. CSIKY (Mezög. Kutat., 1930, 3, 250—261; Chem. Zentr., 1931, i, 1664).—Determinations of the p_H in aq. and in KCl suspension were made on Hungarian soils; in soils free from carbonate the hydrolytic acidity, and in those containing carbonate the CO_3^{--} content, were also determined.

A. A. ELDRIDGE.

Absorption and utilisation of phosphoric acid by plants. KLEBERGER (Ergeb. Agrik.-Chem., 1930, 2, 53—68; Bied. Zentr., 1931, 60A, 156—157).—The intake of P by rye seedlings was affected by top dressings of N, but not of K. In pot cultures the citrate-sol. P of Rhenania phosphate was superior to the citric acid-sol. P of basic slag. Superphosphate did not affect the acidity of acid or neutral soils. Manurial treatment definitely influenced the ash content, and in particular the P contents of the leaves, of potatoes. In field trials P manuring increased the sugar content and root:top ratio of sugar beet and also the starch content and tuber:haulm ratio of potatoes.

A. G. POLLARD.

Effect of drying of soils on solubility of plant nutrients. B. TACKE (Kulturtechniker, 1930, 6, 588—590; Bied. Zentr., 1931, 60A, 145—146).—In a criticism of Zunker's theory, the increased solubility of phosphates consequent on the drying of soils is ascribed to changes in the degree of dispersion, involving a reduction in adsorptive power.

A. G. POLLARD.

Effect of nitrogen, potash, phosphate, and calcium on the tillering and yield of oats. E. JUNG (Ernähr. Pflanze, 1931, 27, 225—228).—Applications of various fertilisers increased the tillering of oats in

comparison with unmanured controls, but differences resulting from the individual fertilisers were not very definite. The uniformity in the number of tillers per plant was greatest where a complete fertiliser or a potash fertiliser alone was used. The total yield of grain in fertilised soils was in the order: complete fertiliser > K only > P only > N only. The average yields of plants producing the same number of tillers followed the same order. A. G. POLLARD.

Comparative growth efficiency of two varieties of oats with increasing applications of nitrogen and varied soil-moisture content. TORNAU and K. MEYER [with W. PRASSLER] (J. Landw., 1931, 79, 155—189).—A xerophytic variety of oats from soil treated with increasing proportions of N, and at varying moisture contents, was less injured by the heavier applications of N than a hygrophytic variety grown under similar conditions. The percentage utilisation of the added N increased with the soil-moisture content, the xerophyte utilising high N applications at low moisture contents better than the hygrophyte. With a sufficiency of moisture the intake and utilisation of N were higher in the hygrophyte. With increasing applications of N both the growth period and the max. yield increased. The dry-matter production of the hygrophyte exceeded that of the xerophyte only where the N supply was small. "Transpiration productivity" (dry matter produced per litre of H_2O transpired) was higher in the xerophyte under all conditions. Application of N fertilisers reduced transpiration. The N intake per unit H_2O absorbed was greater in the xerophyte, especially where the salt concentration was high.

A. G. POLLARD.

Potash manuring of lucerne. A. LOCHNER (Ernähr. Pflanze, 1931, 27, 222—225).—The efficient manuring of crop rotations including lucerne is discussed in the light of the heavy demand of this crop on the soil potash.

A. G. POLLARD.

[Effect of] nitrogen fertilisers on cotton. V. N. MANDRUGIN (Udobr. Urozhai, 1930, 2, 363—369).—The best results during the year of application were from $(NH_4)_2SO_4$, followed by KNO_3 , $CaCN_2$, NH_4NO_3 , and urea; and the best after-effects from NH_4NO_3 , followed by $(NH_4)_2SO_4$, KNO_3 , urea, and $CaCN_2$. The highest total increase in yield for 2 yrs. was given by $(NH_4)_2SO_4$, followed by NH_4NO_3 , KNO_3 , $CaCN_2$, and urea. When the fertilisers were added during boll formation $CaCN_2$ was preferable. Cotton takes up more N in the later than during the early stages of growth.

CHEMICAL ABSTRACTS.

Relation of nitrate-nitrogen and nitrification to the growth of tobacco following timothy. R. P. THOMAS (Wisconsin Agric. Exp. Sta. Res. Bull., 1930, No. 105, 28 pp.).—Poor growth and the prevalence of brown root rot in tobacco are associated with the presence in the soil of much cellulosic matter and a consequent low nitrate content in the early part of the season. Application of nitrate to soil after the appearance of root rot is of little value. For tobacco after timothy, applications of CaO, P, and a high proportion of nitrate or easily nitrifiable material are necessary.

A. G. POLLARD.

Effects of certain fungicides on the viability of *Hevea* buds. R. P. N. NAPPER (Rubber Res. Inst. Malaya, 1931, 2, 192—213).—Several well-known fungicides are examined as to their possible harmful effect on budwood of the *Hevea* rubber tree and the max. intensity of treatment without injury is indicated.

D. F. TWISS.

Test spraying experiments on young rubber plants. F. BEELEY (Rubber Res. Inst. Malaya, 1931, 2, 214—221).—A list of available spray liquids is given together with methods of prep. for such as are not proprietary. A single application of a spray mixture is sufficient to decide within 2 or 3 days whether or not the concentration is so high as to damage the leaves, but in order to ensure adequate control of leaf diseases it is advisable to give 2 or even 3 applications at intervals of 14 days.

D. F. TWISS.

Fruit-tree oil emulsions. S. JENČIČ [with B. BAJEC] (Kolloid-Z., 1931, 55, 212—228).—Analysis of the Jugoslavian fruit-tree products known as "arborin" and "karbokrimp" shows them to consist essentially of tar oils and similar products in resin soaps. The solubility, viscosity, sp. gr., stability, particle size, surface tension, and electrical conductivity of aq. emulsions of these products have been measured.

E. S. HEDGES.

Factors modifying the toxicity of phenol. W. S. EISENMENGER (Plant Physiol., 1931, 6, 325—332).—The toxicity of PhOH to freshly germinated soya-bean seedlings increases with the concentration of PhOH used. Addition of SiO_2 gel to the PhOH solution reduced its toxicity, the effect decreasing proportionally as the concentration of PhOH increased. PhOH was partly adsorbed by the SiO_2 gel. Mixed solutions of PhOH and $Ca(NO_3)_2$ (0.006M total concentration) were more toxic than corresponding solutions of $Ca(NO_3)_2$ alone. When the mol. proportion of $Ca(NO_3)_2$ exceeded that of PhOH the toxic effect was less than that of the corresponding single solution PhOH.

A. G. POLLARD.

Control of cereal rusts by Kolo [sulphur] dust. W. C. BROADFOOT (Phytopath., 1931, 21, 347).—At least two dustings with colloidal S on wheat, one at the flowering period and one 5—9 days later, are necessary. Dusting of the flowers does not affect the setting of the seed. The protein in wheat from dusted plants was slightly lower than that of controls.

A. G. POLLARD.

Nutrients used for maintenance by growing dairy cattle. T. W. GULLICKSON and C. H. ECKLES (J. Agric. Res., 1931, 42, 593—601).—Determinations of the maintenance requirement of immature dairy cattle by the live-wt. method indicate that when the revised net energy of lucerne hay (Eckles *et al.*, J. Dairy Sci., 1927, 10, 431) was used, values obtained were lower than the Armsby standard for weights below 350 lb., and higher for greater weights. Close agreement was obtained by the use of Armsby's earlier method of calculating net energy values. Expression of nutrient values in terms of total digestible nutrients led to less satisfactory agreement.

A. G. POLLARD.

Nutrient requirements for normal growth of dairy cattle. C. H. ECKLES and T. W. GULLICKSON (J. Agric. Res., 1931, 42, 603—616).—An experimental

comparison of the Wolff-Lehmann, Kellner, Armsby, and Morrison feeding standards for heifers is recorded. The Morrison is too low for normal growth up to 1 yr., and too high above that age. A. G. POLLARD.

Animal and plant proteins in pig feeding. PROBST (Deut. landw. Tierz., 1930, 34, 619–625; Bied. Zentr., 1931, 60A, 165).—In a criticism of published data concerning the protein requirement of fattening pigs, it is claimed that animal protein in pig rations may be replaced entirely by plant protein without affecting flesh production and with greater economy in feeding costs. A. G. POLLARD.

Lime and nutrient material content of Hungarian soils. G. DOBY, J. CSIKY, and F. SRASSEL (Mezőg. Kutat., 1930, 3, 497–504; Chem. Zentr., 1931, i, 1661).

Mineral content of pastures. Feeding value of meadow hay etc.—See XIX. **Organo-Hg compounds as bactericides.**—See XXIII.

PATENTS.

Production of fertilisers. A. M. CLARK, W. K. HALL, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 348,184, 8.2.30).—The caking of fertilisers containing $(\text{NH}_4)_2\text{SO}_4$ or NH_4NO_3 is prevented by adding 1–5% of a starchy material, *e.g.*, flour or rice meal, of such a fineness as to pass 100-mesh. W. J. WRIGHT.

Production of fertilisers from phosphate rock and the like. D. TYRER, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 349,224, 8.4.30).—Phosphate rock (etc.) is dissolved in HNO_3 , the clear solution neutralised with aq. NH_3 , and the P_2O_5 precipitated as FePO_4 by adding $\text{Fe}(\text{NO}_3)_3$ and more aq. NH_3 until p_{H} 4.5 is reached. The ppt. is removed, the filtrate evaporated to recover NH_4NO_3 , and the ppt. digested with aq. NH_3 to obtain $(\text{NH}_4)_2\text{HPO}_4$ and $\text{Fe}(\text{OH})_3$, which is reconverted into $\text{Fe}(\text{NO}_3)_3$. A. R. POWELL.

Treating phosphates to obtain an artificial fertiliser. J. KUUSK (B.P. 349,020, 13.2.30).—Phosphate rock is rendered sol. in citric acid by heating it with 18–40% SiO_2 at 1300–1550° to produce the compounds $6\text{Ca}_3\text{P}_2\text{O}_8 \cdot \text{Ca}_2\text{SiO}_4$ or $3\text{Ca}_3\text{P}_2\text{O}_8 \cdot \text{CaSiO}_3$. [Stat. ref.] A. R. POWELL.

Manufacture of fertilisers [from distillery and beet-sugar waste liquors]. I. DUBINBAUM and L. R. CHRISTIE (B.P. 349,178, 11.3.30).—A mixture of the liquor with H_2SO_4 is dried by atomisation, *e.g.*, by a revolving disc, in a current of hot air; the product, which contains N and K, is used direct or after admixture with H_3PO_4 as a fertiliser. L. A. COLES.

Production of artificial [mixed] fertilisers. ARMOUR FERTILIZER WORKS (B.P. 349,066, 14.1.30, U.S., 1.2.29).—A mixture of superphosphate, mineral acid (*e.g.*, H_3PO_4), and H_2O -sol. fertilisers (*e.g.*, "leunasalpete" and KCl) is treated with sufficient liquid anhyd. NH_3 to neutralise the free acid without causing loss of H_2O -solubility of the phosphates and to yield a "dry-to-the-touch" product on curing. L. A. COLES.

Plant fertilisers. G. WANSART and F. SILBERMANN (B.P. 348,056, 27.1.30).—Kieselguhr or other absorbent

material is mixed with granular superphosphate or granular mixtures of superphosphate, $(\text{NH}_4)_2\text{SO}_4$, and a K salt to increase their effectiveness. [Stat. ref.] W. J. WRIGHT.

Granulation of fertilisers. W. K. HALL, F. HEYWOOD, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 349,007, 19.12.29).—A mixture of sol. fertiliser salts, with or without an inert insol. filler, is fed into a tube containing a rapidly rotating agitator and steam is passed into the mass until it contains 4–5% H_2O . *E.g.*, a mixed fertiliser containing 26% KCl, 25.7% $\text{NH}_4\text{H}_2\text{PO}_4$, and 48.3% $(\text{NH}_4)_2\text{SO}_4$ is prepared by feeding the salts, ground to 100-mesh, into the tube with the agitator revolving at 120 r.p.m. and passing steam into the mass until the temp. reaches 60°. A. R. POWELL.

Production of [non-caking] fertilisers. A. M. CLARK, W. K. HALL, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 348,640, 8.2.30).—Up to 5% of Na_2HPO_4 or K_2HPO_4 is added to fertilisers containing NH_4NO_3 . H. ROYAL-DAWSON.

Manufacture of artificial turf. H. KORTLANG, and TURFO CONSTRUCTION CO., LTD. (B.P. 348,814, 4.4.30).—Vegetable matter, *e.g.*, cotton-seed husks or hulls, is successively swelled by heat or saturation with H_2O , hardened by treatment with $\text{Ca}(\text{OH})_2$, drained, and compressed, *e.g.*, by rolling after laying. Dyes and fixing agents to prevent fading may be added. L. A. COLES.

Non-caking salts.—See VII.

XVII.—SUGARS; STARCHES; GUMS.

Alteration of sweet dried [beet] slices during storage. K. ŠANDERA and C. A. RUŽICKA (Z. Zuckerind. Czechoslov., 1931, 55, 299–303).—Samples of beet slices dried by the Oxford process at Eynsham factory were stored for 18 months under various indoor conditions. No deterioration occurred under normal conditions with temp. variations of 10–30°. Access of air tended to lower the invert sugar content. Very drastic deterioration occurred in the warm, moist air of a glasshouse. J. H. LANE.

Acidity of cane juice during grinding. F. S. GOMEZ (Philippine Agriculturalist, 1931, 19, 609–634).—Determinations made as the cane passed from the crusher through the different units of a 14-roller mill grinding Luzon White and Pampanga Red varieties showed the average p_{H} to increase from crusher to 4th mill, though the p_{H} of the mixed juice was little different from that of the crusher juice. But when all the mills were thoroughly washed down once in every shift, and when the juice troughs were kept free from bagasse accumulations, there was no increase in the p_{H} from crusher to mill juice. J. P. OGILVIE.

Detecting inversion in and around the [sugar-cane] factory crushing plant. M. BIRD (Internat. Sugar J., 1931, 33, 293).—If there is any serious inversion taking place at the milling plant, the glucose ratio in the mixed juice must be higher than that of the crusher or first mill. If this is found to be the case, an effective remedy is to allow a small stream of milk-of-lime to flow into the last mill juice, if this is being

returned, or into the maceration water, if this is being applied behind the first mill. J. P. OGILVIE.

Use of lime and sulphurous acid in the defecation of cane juices. N. LÉVY (Bull. Assoc. Chim. Sucr., 1930, 47, 500—503).—The amount of CaO required for defecation is best ascertained by a method previously described (B., 1910, 1401) and now republished. Sulphitation is better before than after liming.

J. H. LANE.

Teatini's [sugar] juice purification process. O. SPENGLER and S. BÖTTGER (Z. Ver. deut. Zucker-Ind., 1931, 81, 233—245).—Laboratory experiments are described demonstrating (a) that the same results are obtained in respect of purity increase and colour decrease when in the Teatini process the addition of liquid SO_2 is omitted; (b) that when the same amount of CaO prescribed in the Teatini process is added in one instead of two fractions the results are inferior to those of that process, with or without the addition of SO_2 ; and (c) that the use of the ordinary carbonatation method of clarification, using 1.8% of CaO (added at one time), gives distinctly superior results to the Teatini process as regards purity and colour. In a raw sugar factory the quality of the product in respect of affinity distinctly deteriorated when the Teatini process was put into operation, whilst in the Offstein factory an inferior white sugar resulted. J. P. OGILVIE.

Gums in raw sugar solutions. H. F. BOMONTI (Proc. Hawaiian Sugar Planters' Assoc., 1930).—Laboratory experiments showed that 65% of gums (org. matter insol. in EtOH) is found in the filtrate obtained by passing solutions of raw sugars through kieselguhr; and further, that 45% of these "gums" actually pass through a semi-permeable membrane of collodion. Apparently the sp. gr. of the solution does not influence the physical state of the gums.

J. P. OGILVIE.

Determination of sugar in carbonatation scums. V. STANĚK and T. NEMES (Z. Zuckerind. Czechoslov., 1931, 55, 451—453).—In place of the $\text{Zn}(\text{NO}_3)_2$ solution employed in Czechoslovakian beet-sugar factories for the decomposition of the Ca saccharate in the determination of sugar in carbonatation scums, a solution of ZnCl_2 , prepared in the following way, is recommended: 1 kg. of dil. (1:1) HCl is poured over 0.5 kg. of Zn scrap and after a few hr. the solution resulting (35—40% ZnCl_2), after dilution with 7—8 pts. of H_2O to d 1.032, is applied in the same way as the $\text{Zn}(\text{NO}_3)_2$ solution officially prescribed; it gives closely corresponding results and costs less.

J. P. OGILVIE.

Sweetening-off carbonatation scums. V. STANĚK (Z. Zuckerind. Czechoslov., 1931, 55, 443—451).—The scum press is filled as rapidly as possible, working from the start with the valve full open. When the rate of filtration has slowed down moderately, the flow of juice is stopped, and the outlet valves of the corresponding plates are closed. Then through the washing-out valve an aq. suspension of scums is pumped in. In this way fissures and voids in the cakes are filled up and washing performed effectively with a min. of H_2O .

J. P. OGILVIE.

Methods of controlling the end-point of the first carbonatation. O. SPENGLER, F. TÖDT, and S. BÖTTGER (Z. Ver. deut. Zucker-Ind., 1931, 81, 246—259).—In $\frac{1}{2}$ -hourly runs with four methods of alkalinity control of the first carbonatation it was possible to keep most closely to the prescribed alkalinity with the use of thymolphthalein paper, the usual titration method showing the greatest variations of all. Lindner's electrical conductivity apparatus and Bruckner's froth-pressure gauge gave about the same results, their place being intermediate between the first two mentioned.

J. P. OGILVIE.

Over-carbonatation [of beet-factory juices]. R. KARGL (Z. Zuckerind. Czechoslov., 1931, 55, 479—493).—On over-carbonatation, the amount of MgO passing into solution will depend on the alkali content and on the conditions of the operation. Presence of NH_3 assists the dissolution, probably with formation of $\text{Mg}(\text{NH}_4)_2(\text{CO}_3)_2$, only about half of which is decomposed during the boiling of the carbonatated juice. Titration of the Ca salts by soap solution is unsuitable for determining the crit. alkalinity for over-saturation.

J. P. OGILVIE.

Solubilities [in sucrose] of some inorganic substances [as related to carbonatation]. E. SAILLARD (Suppl. hebdom. No. 2198).—The solubility of MgO and of MgCO_3 at 20° in an alkaline 10—12% solution of sucrose increases as the alkalinity decreases. The solubility of CaSO_4 at 20° in a 12% solution of sucrose increases if the solution contains CO_2 and remains higher after boiling. MgSO_3 is not more sol. at 20° in pure 10—40% sucrose solution than in distilled H_2O . SiO_2 gel is only slightly sol. at 20° in distilled H_2O and in a 13.5% solution of sucrose, rendered alkaline with 1 g. of CaO per litre, but is more sol. if the same alkalinity is reached with soda. It is more sol. at 40° than at 20° .

J. P. OGILVIE.

Crystallisation of low-purity massecuites. S. J. SAINT (Internat. Sugar J., 1931, 33, 288—292).—Mother-liquor of a cooled massecuite is considerably supersaturated; hence, as means of facilitating curing, its temp. might be raised, e.g., from 32° to 50° , without fear of dissolving grain—a more advantageous procedure than adding H_2O to the crystalliser. Additional sugar is recoverable if while raising the temp. the supersaturation of the mother-liquor be kept constant by the concentration of the massecuite. Hence, instead of discharging the massecuite, boiling would be continued, and the vacuum gradually lowered as the concentration is increased, so that the supersaturation of the mother-liquor remained const. This operation would be controlled with the Zeiss industrial refractometer. A factor of importance which has never been considered in any quant. way in its bearing on supersaturation is the area of the crystal surface exposed to the mother-liquor.

J. P. OGILVIE.

Unification of conductometric methods for determining salts in raw sugars. I, II. K. ŠANDERA (Z. Zuckerind. Czechoslov., 1931, 55, 199—204, 215—226).—I. The problem of unification of methods is discussed generally on the basis of replies to a questionnaire addressed to sugar factories in various countries.

II. The author's conductometer (B., 1927, 312, 920) indicates directly 100 times the ash content (sulphated minus $\frac{1}{10}$) of raw beet sugars when a concentration of 26 g./100 c.c. is employed. A concentration of 5 g./100 c.c. may be used, with a conversion factor which is 0.0264 for Czechoslovakian raw sugars, but apparently somewhat higher for those of Germany and Sweden, viz., 0.028—0.0294. The instrument is applicable to Zerban's methods and formulæ, the calculations for which are simplified by graphs. Sp. conductivities of Czechoslovakian raw sugars at various concentrations are tabulated; Lunden's characteristic consts. (B., 1925, 1003) calc. therefrom do not appear highly significant for these sugars. J. H. LANE.

Applicability of conductometric methods to the official determination of ash in raw sugars. J. PUCHERNA (Z. Zuckerind. Czechoslov., 1931, 55, 205—206).—The ash contents of over 600 samples of first-product raw beet sugar were determined by incineration in the producing factories and by Sandera's conductometer (B., 1927, 312) in the receiving refinery. Differences of more than 0.04% occurred in only 6% of the samples, and of more than 0.6% in only 1% of the samples. J. H. LANE.

Factors influencing the exhaustability of [cane] molasses: value of the "ash per cent. non-sugar" ratio. J. G. THIEME (Internat. Sugar J., 1931, 33, 244).—There is only a slight correlation between the glucose % non-sugar and the exhaustion; the glucose/ash quotient is the more valuable figure. A trustworthy figure is the ash % non-sugar, as is also the alkali % non-sugar, the ash being found from the electrical conductivity. Cultural conditions, soil, and climate can exert a greater influence on the exhaustion of a cane molasses than clarification, a soil high in sol. salts and a dry season resulting in factory molasses of high purity. Comparison of the value of the exhaustion of cane molasses on the basis of the usual purity value is impracticable, it being necessary at the same time to take its ash % non-sugar quotient into account.

J. P. OGILVIE.

Contamination of pure sucrose solutions by containing vessels. J. PELLER (Z. Zuckerind. Czechoslov., 1931, 55, 287—292).—Increases in conductivity of sucrose solutions in glass and other vessels, in 6 hr., indicated that the solubility of glass increases with the concentration of sugar solutions and is rather greater at 100° than at room temp. Under the best conditions about $3\frac{1}{2}$ times as much glass is dissolved by 26% sucrose solutions as by H₂O, and the greater part is dissolved within 1 hr.; a 200-c.c. flask would yield about 0.02 mg. to a 26% sucrose solution. Results with Cu- and Cr-plated vessels were irregular. J. H. LANE.

β -Lactose. H. SANDQVIST and J. GORTON (Svensk farm. Tidskr., 1930, 34, 665—667; Chem. Zentr., 1931, i, 1597).—The preparation of β -lactose is described and its use as a substitute for sucrose discussed.

A. A. ELDRIDGE.

Bagasse utilisation by dry distillation. F. W. FREISE (Internat. Sugar J., 1931, 33, 225—226).—Bagasse on being dry-distilled in the laboratory gave: coke 34.5, condensable gases 8.5, non-condensable gases

31.6, and H₂O 25.4%; the condensable fraction yielded AcOH and homologues 10.55, MeOH 0.62, oily substances 14.22, soft pitch 63.25, H₂O 10.35, gases and losses 1.01%. Retort gases show the following composition: CO₂ 61, CO 29, CH₄ 2.75, H₂ 1.8%. Other data are: 1 ton of bagasse yields 2.3 tons of steam and the pulverised coke evaporates 7.0—7.2 tons of H₂O from and at 100°. It contains C 85, H 3, O 11, N and ash 1%. One ton of bagasse yields 0.3 ton of this coke, which is very brittle and suitable only as powdered fuel in the boiler house. J. P. OGILVIE.

Re-arrangement of Brix and gravity tables. P. F. STOTON (Internat. Sugar J., 1931, 33, 285—287).—Tables are reproduced correlating for sugar solutions: the sp. gr. at 20°/20°, the Brix in 100 g. of solution, the Brix in 100 c.c. of solution (3.881—26.002), and the Brix solute in normal solution (22.42—100).

J. P. OGILVIE.

Filtration experiments with gluten solutions. T. RUEMELE (Z. ges. Getreidew., 1930, 17, 257—261; Chem. Zentr., 1931, i, 1534—1535).—A study of dispersivity in 0.05N-lactic acid solutions. A. A. ELDRIDGE.

Active charcoals etc.—See II. Corrosion of "Silumin."—See X.

PATENTS.

Purification and decolorisation of [sugar] solutions containing colloidal impurities. MAXIMINE (B.P. 348,738, 25.2.30. Belg., 25.2.29).—The solutions are treated with an active charcoal sol prepared by heating cellulosic material with ZnCl₂ and HCl in solution (or with a mixture of H₂SO₄ and KHSO₄ of m.p. about 200°), first at 1 atm. and then in closed vessels at 3—5 atm. to remove H₂O. The product is washed with H₂O and used as a paste containing 80—90% H₂O. L. A. COLES.

Production of caramel. F. ALBRECHT (B.P. 346,136, 19.3.30. Ger., 23.3.29).—Powdered sugar, e.g., dextrose, is liquefied by aq. (25%) NH₃, by stirring and slightly warming if necessary, and then autoclaved at 105—120° for 1 hr. or longer, after which the pressure is released; when atm. pressure is restored, the vessel is again closed and heating is resumed at 105—120° until the desired degree of colour has been attained. Before the product is discharged, undesirable volatile matters may be removed by a current of steam. The process occupies much less time than others. J. H. LANE.

Manufacture of starches swelling in cold water. E. F. HOPPLER and J. W. HAAKE (B.P. 346,224, 13.6.30).—Raw or prepared starches or starchy materials, containing not more than 25% H₂O, are subjected simultaneously to heat and pressure, with or without agents such as thiocyanates which facilitate gelatinisation; e.g., raw starch, in layers 10 mm. thick between surfaces heated to 140—160°, may be subjected for about 5 sec. to 2500 kg./sq. cm. Substances conferring special properties may be added before or after the treatment.

J. H. LANE.

Manufacture of substances [from starch] suitable for use in size. NAAML. VENN. W. A. SCHOLTEN'S CHEM. FABR. (B.P. 346,220, 10.6.30. Ger., 17.6.29).—Dry painters' size which does not deteriorate on storage

is made by incorporating with an alkaline cold-swelling starch, during or after its preparation, a sol. salt of naphthenic acid, e.g., 6–8% of the Na salt.

J. H. LANE.

Manufacture of sugar. DORR Co. (B.P. 349,632, 4.12.29. U.S., 4.12.28).—See U.S.P. 1,755,165; B., 1930, 1085.

Treatment of cellulose materials. Saccharification of carbohydrates.—See V. Fertilisers from waste liquors.—See XVI.

XVIII.—FERMENTATION INDUSTRIES.

Diastatic powers of barley malt and oat malt. W. KILP (Z. Spiritusind., 1931, 54, 149–151).—The starch-saccharifying power of oat amylase, as measured by the Windisch-Kolbach method, is approx. 3% of that of barley amylase. With normal malting, the saccharifying power of barley reaches a max. in 15 days, whereas that of oats increases for at least 20 days, and, when the conditions of germination are the same, the saccharifying power of the green malt from oats is 10–15% of that of malted barley, the higher values being obtained with the longer germination periods. The relatively high starch-conversion power of the green malt from oats in spite of its low saccharifying power is explained by the starch-liquefying power of the malted oats being approx. twice that of the barley malt.

C. RANKEN.

Importance of dehydrating agents in the azeotropic process for manufacture of absolute alcohol. J. L. GENDRE (J. pr. Chem., 1931, [ii], 130, 23–34).—A critical review of the commercial methods of producing abs. EtOH. The use of C_6H_6 alone as the dehydrating agent is not satisfactory.

R. CUTHILL.

Water in power EtOH.—See II. Honey diastase. **Spent-wash from potato-spirit distillery.**—See XIX.

PATENTS.

Applications of moulds [e.g., yeast and bacteria] and apparatus therefor. IMPERIAL CHEM. INDUSTRIES, LTD., and C. H. LILLY (B.P. 349,654, 5.3.30).—Mould "felt" is developed on the outer surface of porous-walled tubes constructed of filter cloth, earthenware, etc., through which nutrient solution (e.g., carbohydrate) circulates at a regulated rate. The tubes are vertically suspended in a suitable tower supplied with sterilised air, if desired. Products such as citric acid, fumaric acid, mannitol, etc. may be obtained by means of the process.

C. RANKEN.

Simultaneous production of butyl alcohol and acetone by fermentation. H. WERTHEIM and W. POLLAK (B.P. 349,490–1, 17.2.30. Austr., 23.2.29).—(A) Strains of *B. amylobacter*, A.M. & Bredemann, are cultivated without neutralisation of the fermentation acids on nutrient media in a series of habituating fermentations between each of which is a sporulating fermentation in which the fermentation acids are neutralised. The initial acidity, the concentration of the carbohydrates, and the amount of buffer substances of the habituating fermentations are increased from one fermentation to another, and the cultures are heated for a short time to destroy vegetative growth

prior to being used to inoculate the next habituating fermentation. (B) The carbohydrate mashings of the main fermentation are acidified from the beginning by addition or fermentative generation of non-volatile org. acids, preferably of lactic acid.

C. RANKEN.

Manufacture of organic acids [by fermentation]. F. J. CAHN (B.P. 348,214, 14.2.30. U.S., 16.2.29).—Acids (citric, malic, succinic, etc.) are manufactured by impregnating plant-tissue material with carbohydrates, and inoculating the mass with a selected strain of *Aspergillus*, *Mucor*, or other fungi. The tissue may be superficially powdered with $CaCO_3$, ZnO , etc.

C. RANKEN.

[Regeneration of sulphites in the] manufacture of glycerin by fermentation. IMPERIAL CHEM. INDUSTRIES, LTD., and G. G. JONES (B.P. 348,787, 21.3.30).—The fermentation residues after removal of glycerin are calcined and the solution from the leached product is treated with SO_2 , H_2SO_3 , or a bisulphite. Carbonaceous matter with or without chalk may be added before or during calcination.

C. RANKEN.

Preventing frothing in vats.—See I. Treatment of cellulosic materials.—See V. Fertilisers from waste liquors.—See XVI.

XIX.—FOODS.

Effect of bleaching on strength and colour of Saskatchewan hard red spring-wheat flour. R. K. LARMOUR and F. D. MACHON (Canad. J. Res., 1931, 4, 399–420; cf. B., 1929, 794).—Apparatus for the rapid bleaching of 600-g. samples of flour with Cl is described. Novadel (benzoyl peroxide) bleaches flour, but has little maturing effect, whilst Cl performs both functions, the maturing being greater the higher is the protein content of the flour. Unbleached flour baked with addition of $KBrO_3$ gives similar results to Cl-bleached flour. Cl-bleached flours are further improved by ageing, but not so much as in other cases. Blending qualities of flours are not improved by bleaching.

A. A. LEVI.

Correlation between baking quality and crude protein content of New Zealand wheat. H. E. WEST (New Zealand J. Sci. Tech., 1931, 12, 273–281).—Although there is a positive correlation between the protein content of flour and its baking quality as represented by loaf vol., the correlation coeffs. are in many cases too small to be of practical significance. A high positive correlation was obtained in New Zealand wheats when the baking quality was measured in terms of the internal and external loaf characteristics specified.

A. G. POLLARD.

Variability in experimental baking. I. Influence of mechanical moulding. W. F. GEDDES, C. H. GOULDEN, S. T. HADLEY, and H. N. BERGSTENSSON (Canad. J. Res., 1931, 4, 421–448).—A comparison of the effects of hand- and machine-moulding on variability of loaf vol. in baking tests, with a view of finding an improved standard procedure.

A. A. LEVI.

Tables for the examination and detection of chemical products used in milling. P. BRUÈRE and M. MOGOS (J. Pharm. Chim., 1931, [viii], 13, 574–577).—The composition and rapid methods for the identification

of commercial chemical products used in milling and baking are described. E. H. SHARPLES.

Calculation of the egg content of pastry. J. FIEBE (Z. Unters. Lebensm., 1931, 61, 428).—Juckenack's tables (1900), which are usually employed to calculate egg content from the % of lecithin phosphate, should be used with caution for amounts of an order corresponding with 70 eggs/100 kg., the lecithin phosphate content of dry egg-free wheat grits (mean val. 0.0228%) being allowed for in the computation. J. GRANT.

Detection of Riegel's "new preservative for pumpnickel" [chloramine-T]. P. WEINSTEIN, J. MUESMANN, and W. BODSCHWINNA (Z. Unters. Lebensm., 1931, 61, 436–442).—"Antibacterin" was identified as chloramine-T, and is detected in 400 g. of crumbed bread by extraction with hot Et₂O containing 0.4% HCl, evaporation, elimination of fat by extraction with hot 50% EtOH, and re-extraction of the residue after evaporation with Et₂O. If the N from the Et₂O extract is >10 mg./kg. and the BaSO₄ ppt. (after fusion with 2NaCO₃ + 1NaNO₃, acidification, and addition of BaCl₂) is >15 mg./kg., addition of antibacterin is indicated. "Mikrobin-P," a suggested alternative preservative, was shown to be BzOH with 10% of chlorobenzoic acid, and is detected in the Et₂O extract in the usual way. J. GRANT.

Rising of fat in milk. G. JØRGENSEN (Analyst, 1931, 56, 380–382).—A criticism of the technique of Stock (cf. B., 1931, 133) and of his results. Jørgensen finds that, on settling, the greatest decrease in the fat content of the milk, at the bottom of the vessel, takes place during the first hr. T. McLACHLAN.

Relation of certain plant processes to flavour development in market milk. P. H. TRACY and H. A. RUEHE (J. Dairy Sci., 1931, 14, 250–267).—Detrimental effects on milk flavour are produced by use of plant made from Fe, Cu, Benedict Ni, and various plant sterilisers. A. G. POLLARD.

Synthetic methods in the examination of milk. Milk as a colloid. Mechanism of action of rennin. C. PORCHER (Lait, 1929, 9, 449–474, 572–612, 681–711, 793–816, 942–970, 1051–1076; 1930, 10, 47–68, 146–175, 291–323, 401–427, 667–683, 794–812, 900–918, 1011–1026, 1123–1137; 1931, 11, 1–11; Chem. Zentr., 1931, i, 1536).—A comprehensive investigation and discussion, for details of which the original must be consulted. A. A. ELDRIDGE.

Detection of milk unstable to heat. G. A. RAMSDALL, W. T. JOHNSON, JUN., and F. R. EVANS (J. Dairy Sci., 1931, 14, 93–106).—Whole-milk samples (2 c.c.) are heated with 0.2 c.c. of 0.5M-KH₂PO₄ in boiling H₂O for 5 min. The formation of curd indicates low heat stability. Composite samples which include low-stability milks are themselves of low stability. The minimum concentration of KH₂PO₄ necessary to produce curdling ("phosphate number") is closely related to the heat stability as determined in a steriliser, but cannot be correlated with pH. A. G. POLLARD.

Effect of dilution on the titratable acidity of cows' milk. H. H. SOMMER and J. MÉNOS (J. Dairy Sci., 1931, 14, 136–155).—Dilution of milk samples

with H₂O lowers their titratable acidity. A precipitation of Ca₃(PO₄)₂ probably occurs during the titration of whole milk. Dilution decreases this precipitation and the titration is proportionally reduced. A similar effect with Ca caseinate is indicated. The lowered pH of diluted milk at the phenolphthalein end-point of the titration is attributed to a "protein effect" and the fading of the end-point with whole milk to the precipitation of Ca₃(PO₄)₂. The higher titratable acidity of conc. milks, as compared with values calc. from those of the original samples, is similarly explained. Treatment of milk or cream with lime-water does not reduce its acidity to the calc. point, since the increased [Ca⁺⁺] causes greater precipitation of Ca₃(PO₄)₂ in subsequent titration. A. G. POLLARD.

Nitrate test for detection of added water in milk.

G. W. MONIER-WILLIAMS (Analyst, 1931, 56, 397–398).—Diphenylbenzidine is an intermediate product in the oxidation of diphenylamine to a quinone-immonium salt, which gives the blue colour. If an excess of diphenylamine is employed, all the nitrate is used in the first stage of the reaction and may not be detected. This may be avoided by using diphenylbenzidine as the reagent, and the test is then so sensitive that amounts of NO₃⁻ ranging from 0.1–1.0 p.p.m. may be detected. T. McLACHLAN.

Helmer test for formaldehyde [in milk]. C. C. FULTON (Ind. Eng. Chem. [Anal.], 1931, 3, 199–200).—The Helmer test can be improved by using Br for the oxidising agent and by diluting the H₂SO₄ before adding the milk to be tested. The colour can be developed in a zone, or uniformly distributed throughout the solution. By the improved test 1 p.p.m. of CH₂O in milk can be detected. E. S. HEDGES.

Soluble soya-bean milk powder and its adaption to infant feeding. K. CHANG and E. TSO (Chinese J. Physiol., 1931, 5, 199–203).—Milk reconstituted from soya-bean milk powder (prepared by a spray process) supplemented with cane sugar, Ca lactate, NaCl, cod-liver oil, and cabbage water has been satisfactorily employed in infant feeding. W. O. KERMACK.

Dependence of the clotting of cream on the external experimental conditions and the specific properties of the milk. A. SCHNECK (Milch. Zentr., 1931, 60, 151–156).—The degree of clotting is defined by the formula $100 - (F/F_1)m\%$, where F and F_1 are the fat contents of the whole milk and whey, respectively, and m is vol.-% whey. At temp. below 37° the degree and the velocity of clotting decrease as the length of the storage increases. Compared with the values given by milk at cow-heat (37°), heating above 37° (up to 61°) causes an increase, and heat treatment below 37° a decrease, in the degree and velocity of clotting. The loss of cream-separating power by stale milk is largely restored by heat treatment. Mechanical stirring has no appreciable influence on the cream-rising process, and no definite relationships could be established between the sp. constants of the milk (viscosity, refraction, etc.) and the cream separation. H. J. DOWDEN.

Dry skim milk in ice cream. W. V. PRICE and R. WHITAKER (Cornell Univ. Agric. Exp. Sta. Bull., 1931, No. 516, 37 pp.).—Dry skim milk produced by

spray-drying methods is a desirable source of solids-not-fat for ice cream. The "atmospheric roll" process produces a dry milk of lower solubility and having a "cooked" flavour. A. G. POLLARD.

Influence of sweetened frozen cream on the development of swell in ice cream. W. V. PRICE (J. Dairy Sci., 1931, 14, 221—228).—The inclusion of sweetened frozen cream as the only source of milk fat in ice-cream mixtures produces better whipping properties than unsweetened cream. Invert syrup and sucrose in concentrations producing the same f.p. depression are equally effective for sweetening. A relation between lecithin content and swell development in mixtures is indicated. A. G. POLLARD.

Standardisation of milk for the manufacture of American cheese. W. V. PRICE and L. GERMAIN (Wisconsin Agric. Exp. Sta. Res. Bull., 1931, No. 108, 11 pp.).—Cheese made from milk the casein:fat ratio of which was adjusted to 0.7 showed a decreased yield, increased moisture and decreased fat contents, and was of slightly poorer quality than that made from normal milk. The total value of the products from unit quantity of milk was, however, increased. The effects of adjusting the composition of milk were greatest when the original fat of the milk was $> 3.5\%$ and were not significant when the fat content was 3.3% . A. G. POLLARD.

Caseinogen and lactic acid. M. E. SCHULZ (Milch-wirt. Forsch., 1930, 11, 294—301; Chem. Zentr., 1931, i, 1690).—Caseinogen swells in lactic acid (up to 2.25%), the increase being less in 2.25 — 5.63% acid; it dissolves on warming and forms a jelly on cooling. Caseinogen is more viscous in acid than in alkaline solution; the viscosity depends on the concentration and quality, good lactic acid caseinogen with small mineral matter content having a lower viscosity than industrial caseinogen. A. A. ELDRIDGE.

Examination of eggs suspected of being "preserved." J. R. NICHOLLS (Analyst, 1931, 56, 383—390).—Unpreserved eggs are porous, whilst those preserved in oil, Na silicate, or lime water are non-porous. Eggs preserved in oil give marked surface effects, but absorb dyes normally; limed or silicated eggs show pronounced differences in reaction towards certain dyes, notably methylene-blue (0.1%) and Congo-red (0.1%). There is no difference in the $[H^+]$ of fresh and preserved eggs. T. McLACHLAN.

Differentiation of fresh, refrigerated, and preserved eggs. J. J. DINGEMANS (Chem. Weekblad, 1931, 28, 350—351).—The egg is digested with H_2O in a metal vessel. If CaO or Ca silicate is present the H_2O becomes alkaline to phenolphthalein; differentiation is effected by evaporation to small vol. and testing for Ca and SiO_2 . On viewing by the quartz Hg lamp refrigerated eggs may be differentiated from fresh eggs by the appearance of fluorescence. H. F. GILLBE.

Evaluation of honey from the diastase content. K. BRAUNSDORF (Z. Unters. Lebensm., 1931, 61, 411—420).—The Fiehe-Kordatzki (B., 1928, 385, 543) and phloroglucinol tests for diastase showed good general agreement for the 62 German honeys examined,

but the latter has a disadvantage in that it fails to distinguish between naturally low or non-diastatic honeys and honeys (particularly of this class) which have been heated so as partly to destroy the diastase and are therefore condemned by the German (1930) regulations. In the former test, however, the production of a pale yellow colour immediately on addition of the reagent is an indication of non-deleterious heating, whilst a golden-yellow colour results from strongly heated samples (e.g., after 1 hr. at 60° the colour from a fairly diastatic honey will match that of $0.1N-K_2Cr_2O_7$). The diastatic values found were 62.5 (1 honey), 50—11 (36), <10 (8); a first-class diastatic honey should therefore give >23.8 , and unheated honeys >17.9 , whilst 10 is the suggested limit for the German regulations (cf. Braunsdorf, B., 1931, 564). J. GRANT.

Honey diastase. J. FIEHE (Z. Unters. Lebensm., 1931, 61, 420—427).—The lower limit of 8.3 for the diastase value determined according to the Fiehe-Kordatzki method (B., 1928, 385, 543) is suggested for heated honeys assessed under the German (1930) regulations (cf. B., 1931, 564, and preceding abstract). The diastase value for honeys heated with stirring at 60° is seldom lowered to any great extent, final values of <8.3 being obtained for only 2 out of 190 German and foreign samples. Californian "orange-blossom" and "belvedere" honeys are often naturally poor in diastase (diastase val. 2.5 and 1.0), but if such low values are not the result of heating, the samples cannot be said to contravene the regulations. The end-point of the Fiehe test may be sensitised by selective adsorption of the blue colour (as distinct from the sol. purple of the iododextrins) produced by addition of washed precipitated $Al(OH)_3$. J. GRANT.

Trigonelline contents of coffees. F. E. NOTTBOHM and F. MAYER (Z. Unters. Lebensm., 1931, 61, 429—435).—The "alkaloid value" of a coffee (caffeine plus trigonelline content; cf. B., 1931, 652) is 4.3—5.5 for all ordinary coffees, but higher (9.7—13.7) for wild African (especially Surinam-Liberian) coffees, which latter are exceptionally low in trigonelline (0.1 — 0.2 instead of 0.23 — 0.25%) and often high in caffeine (1.2 — 2.2%). EtOH extracts of the latter type of coffee give pure yellow instead of orange-red lead ppts. (*loc. cit.*). Treated coffees or those roasted at 250° lose no trigonelline, but the latter give an oily ppt. with I in KI, indicating nitrogenous decomp. products. Aq. infusions of coffee remove about 82% of the caffeine and 70% of the trigonelline present. The orange-red salt $C_7H_7NO_2 \cdot HCl \cdot PtCl_4$ has m.p. 215° . J. GRANT.

Vitamins. III. Vitamin[-C] contents of fruits. F. V. VON HAHN (Z. Unters. Lebensm., 1931, 61, 369—411; cf. B., 1930, 838).—On the basis of animal experiments 40 types of fruits are classified as: (a) very rich in vitamin-C (strawberry, orange, lemon); (b) rich (gooseberry, raspberry, dried or cooked hipberry); (c) containing vitamin-C (red currant, mandarin); (d) poor (freshly-picked apple, cherry, greengage, plum, peach, prune, banana, pineapple, cooked elderberry, heart cherry); (e) being practically free from vitamin-C

(raw or cooked bilberry, old apple, pear, raw or cooked quince, grape, dried fruits). J. GRANT.

Citrus pectin in solid form. U. WEGENER (Chem.-Ztg., 1931, 55, 473—474).—A method of preparation from citrus-fruit residues, which does not involve the use of EtOH, yields a stable, tasteless, odourless pectin in powder form, containing at least 45% of pectin. The powder is readily sol. in H₂O. H. J. DOWDEN.

Determination of soluble solids in jams etc. T. MACARA (Analyst, 1931, 56, 391—396).—The % sugar in a jam may be read directly from a table using either the Abbé or butyro-refractometer. Other tables show corrections to be applied for invert sugar, glucose solids, and citric acid, when the solids have been determined either by the refractometer or from the sp. gr. Methods of calculating results are illustrated.

T. McLACHLAN.

Mineral content of pastures. B. C. ASTON, R. E. R. GRIMMETT, F. J. A. BROGAN, and P. H. SYKES (New Zealand J. Sci. Tech., 1931, 12, 304—320).—The phosphate content of the pastures examined reached a max. in spring, declining steadily to an autumn min. The Ca content was low in winter, rising through the season to a max. in autumn. The max. N content was attained in winter or spring and the min. in autumn. In wet seasons there was an increased proportion of N and P and a decrease in Ca. The P deficiency observed in these pastures is attributed to lack of summer and autumn rain rather than to soil defects. To remedy deficiency diseases in cattle, the immediate use of phosphatic fertilisers or the provision of salt licks containing Nauru phosphate or bone dust is recommended.

A. G. POLLARD.

Determination of the feeding value of meadow hay and aftermath based on botanical and chemical analysis. A. ZAITSCHEK and B. LÜSKE (Kisérlet. Közlemények, 1929, 32, 461—491; Bied. Zentr., 1931, 60A, 171—172).—Feeding values of a number of grasses for various animals are discussed. The digestibility of fibre-free org. matter of hay by horses is 5—13% lower than in the case of ruminants. The N-free extractives, crude fibre, and fat were less easily, and the protein more easily, utilised by horses than by ruminants. The amide content of hay is not characteristic of its quality, but depends on the period of cutting.

A. G. POLLARD.

Quality of lucerne hay in relation to curing practice. T. A. KIESSELBACH and A. ANDERSON (U.S. Dept. Agric. Tech. Bull., 1931, No. 235, 25 pp.).—To maintain a high protein content in the hay, all curing operations should aim at rapid drying with a min. of mechanical injury to leaves.

A. G. POLLARD.

Replacement of oats in rations for working horses by fresh spent wash from potato-spirit distillery. H. G. MÜLLER (Landw. Jahrb., 1931, 73, 169—217).—Warm, fresh spent wash may be substituted for oats at the rate of 8 litres of wash per 1 lb. of oats in rations for working horses without impoverishment of health conditions. The modified ration has a higher proportion of crude protein and a lower starch value.

A. G. POLLARD.

PATENTS.

Treatment of wheat and flour. N. T. BRYAN (B.P. 348,594, 3.2.30).—Wheat containing buckwheat seeds is subjected to a series of impacts by passage through two drums containing rapidly rotating beaters. The impacts break the shells of the buckwheat without damaging the wheat berries, the shells are removed, and the remaining material containing buckwheat kernels is milled into flour. E. B. HUGHES.

Production of wholemeal bread. V. KLOFFER, and DR. V. KLOFFER'S NAHRUNGSMITTEL A.-G. (B.P. 348,029, 1.2.30).—The bran from rye flour is made into a dough with H₂O mixed with grain extracts containing enzymes, lactic acid cultures, and innocuous metal salts or org. acids. The dough is heated and then dried *in vacuo* and the residue ground to fine powder and mixed with the rye flour. E. B. HUGHES.

Prevention of stalk rot in fruit. R. G. TOMKINS and R. M. WOODMAN (B.P. 348,755, 7.3.30).—The cut stalks of fruit and vegetables are rendered resistant or impermeable to micro-organisms by electrical cautery, which may be combined with a coating of animal, vegetable, or mineral oils, fats, waxes, gums, resins, cellulose derivatives, rubber mixtures, metallic soaps, etc., with or without the addition of thymol or other disinfectant.

E. B. HUGHES.

Preservation by coating of fruit and like vegetable materials. BROGDEX Co., Assees. of E. M. BROGDEN and M. L. TROWBRIDGE (B.P. 349,311, 29.5.30. U.S., 5.6.29).—A very thin, highly polished coating of waxy materials is applied. E. B. HUGHES.

Preservation and storage of fruit and vegetables. F. KIDD, R. G. TOMKINS, and S. A. TROUT (B.P. 349,561, 21.11.29).—Fungal rotting is inhibited or prevented on fruit and vegetables during storage by the presence of MeCHO and/or its derivatives, with or without other atm. control. E. B. HUGHES.

Extraction of pectin. CALIFORNIA FRUIT GROWERS' EXCHANGE, Assees. of W. C. PLATT, G. M. COLE, and R. E. COX (B.P. 349,372, 25.7.30. U.S., 29.7.29).—A slow-setting pectin is extracted by means of acid from vegetables, fruits, etc., the *pH* being kept at 1.2—1.9, which results in the extract filtering easily. Jellies made with this pectin set in 5 min. as compared with 11—40 sec. taken by jellies made from pectins extracted at *pH* 3.3—3.5, and the product is better.

E. B. HUGHES.

Manufacture of jellies. J. E. POLLAK. From POMOSIN-WERKE GES.M.B.H. (B.P. 349,374, 28.7.30).—In the preparation in the cold of pectin jellies, a retarding agent such as glucose, starch paste, etc. is added to the pectin-sugar solution and the necessary acid introduced just before pouring out the mixture. E. B. HUGHES.

Making of jellies and the like. A. LEO (B.P. 348,847, 22.4.30).—A dry mixture of sugar, pectin, and mucic acid is employed, the low solubility of the acid in cold H₂O allowing all the pectin to dissolve, thus avoiding premature setting. E. B. HUGHES.

Chilling of beef. W. W. TRIGGS. From SWIFT & Co. (B.P. 349,627, 31.12.29).

Drying or conditioning racks [for tea etc.]. J. A. MAIN (B.P. 349,639, 3.3.30).

Drying and cooling apparatus.—See I. Bleaching of flour.—See VI. Exterminating insect pests.—See XXIII.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Tinctures of cinchona. II. Compound tincture. A. LICHTIN (Amer. J. Pharm., 1931, 103, 279—284; cf. B., 1931, 45).—The most stable compound tincture was prepared from COMe₂-treated red cinchona bark (6% COMe₂ extract) by using a menstruum of 78% EtOH with the addition of glycerin (7.5%) before percolation (Lichtin process). HCl had no influence on the extraction of the alkaloids as above, but helped the extraction of the untreated bark (6.15% alkaloids), which, however, did not give as pure an extract. E. H. SHARPLES.

Podophyllum rhizome—American and Indian. Crude fibre; tests for the resins; adulteration with guaiacum wood. T. E. WALLIS and S. GOLDBERG (Quart. J. Pharm., 1931, 4, 28—32).—Determinations of crude fibre have been made by (a) the "Dutch" process, (b) the Ministry of Agriculture process, and (c) by process (a) after extraction with 90% EtOH. American podophyllum yields (a) 5.35%, (b) 7.5%, (c) 5.3% of crude fibre. Indian podophyllum yields (a) 7.2%, (b) 10.5%, (c) 6.7%. The addition of a 5% aq. solution of Cu(OAc)₂ to the alcoholic extract gives a bright green coloration with American and a brown ppt. with Indian podophyllum. A sample of American podophyllum was found to contain Indian podophyllum and guaiacum wood. R. K. CALLOW.

Buffering subjects in ergot. F. WOKES and G. K. ELPICK (Quart. J. Pharm., 1931, 4, 101).—A criticism (*ibid.*, 1930, 3, 599) of Thompson (B., 1930, 965) is withdrawn. R. K. CALLOW.

Tobacco.—See XVI. Organo-Hg compounds as bactericides.—See XXIII.

PATENTS.

Adhesive plasters. JOHNSON & JOHNSON (GT. BRITAIN), LTD. From JOHNSON & JOHNSON (B.P. 348,694, 15.2.30).—The tendency of adhesive plaster to stick when rolled upon itself, and to become soiled when handled, is obviated by singeing the exposed fabric backing and applying thereto a coating of cellulose ester or viscose. D. J. NORMAN.

Manufacture of perfumes. I. G. FARBERIND. A.-G. (B.P. 347,052, 18.6.30. Ger., 18.6.29).— γ -cyclo-Hexyl- α -alkylbutaldehydes, especially the 2:2:6-trimethyl homologues, have a bitter odour resembling nuts and leaves, and are valuable for blending in perfumes. C. HOLLINS.

Manufacture of therapeutic agents. SOC. CHEM. IND. IN BASLE (B.P. 346,180, 17.4.30. Switz., 17.4.29. Addn. to B.P. 270,339; B., 1928, 730).—A 2-halogenoquinolinecarboxylamide is condensed with an amino-alcohol (2- β -diethylaminoethoxyquinoline-4-carboxyldiethylamide is excluded). The following are described: 2- β -N-piperidinoethoxyquinoline-4-carboxylanilide, m.p.

172°; 2- β -diethylaminoethoxyquinoline-4-carboxyl-ethylanilide (oil), -methylanilide (m.p. 142°), -diisoamylamide (oil), -benzyanilide (oil), -benzylamide (m.p. 106°), -benzylethylamide (m.p. 110°), - β -phenylethylamide (m.p. 87°), di-(β -phenylethyl)amide (oil), -ac-tetrahydro- β -naphthylamide (m.p. 113°); 2- β -dimethylaminoethoxyquinoline-4-carboxylanilide (m.p. 147°); 2- β -aminoethoxyquinoline-4-carboxylanilide (m.p. 215°); 2- β -diethylaminoethoxyquinoline-3-carboxylanilide (m.p. 69°). The ethylanilide (m.p. 126°), methylanilide (m.p. 142°), diisoamylamide (b.p. 185°/0.015 mm.), benzylamide (m.p. 217°), benzylethylamide (m.p. 110°), β -phenylethylamide (m.p. 161°), di-(β -phenylethyl)amide (m.p. 105°), and ac-tetrahydro- β -naphthylamide (m.p. 182°) of 2-chloroquinoline-4-carboxylic acid, and the anilide (m.p. 184°) of the 3-carboxylic acid are mentioned. C. HOLLINS.

Preparation of physiologically active quinazoline derivatives. SOC. ANON. LEDOGA PRODOTTI CHIMICI E FARMACEUTICI (B.P. 346,118, 5.3.30. Ger., 30.5.29).—3:4-Dihydroquinazolines, carrying in position 6 either no substituent or an alkyl or alkoxyl group, and in position 3 either phenyl or *p*-alkyl- or *p*-alkoxyphenyl, yield quaternary bases valuable as local anaesthetics (alkoxy-compounds) or for lowering blood-pressure (alkyl and hydroxyalkyl compounds); if 6-substituent is absent the *N*-alkyl of the quaternary base should be at least C₂. 6-Nitro-3-ethoxybenzaldehyde, m.p. 62°, is condensed with *p*-phenetidine to a Schiff's base, m.p. 92°, which is reduced to the amine, m.p. 156°, and further to 2-amino-5-ethoxybenzyl-*p*-phenetidine, m.p. 81°, from which by the action of formic acid there is obtained 6-ethoxy-3-*p*-phenetyl-3:4-dihydroquinazoline, m.p. 140°; the methiodide is converted by NaOH into the base, m.p. 114°. 3-*p*-Tolyl-6-methyl-3:4-dihydroquinazoline is treated with allyl bromide (base, m.p. 110°), or with ethylene chlorohydrin (hydrochloride, m.p. 214—215°). C. HOLLINS.

Manufacture of aromatic arsinic acids. I. G. FARBERIND. A.-G. (B.P. 347,083, 4.9.30. Ger., 4.9.29).—The halogen in halogenoacylaminoarsinic acids is exchanged for an acyloxy-group by interaction with an organic Na salt. The esters produced from chloroacetylarsanilic acid and AcONa or Na isovalerate or crotonate, and from 3-chloroacetamidotoluene-6-arsinic acid and Na isovalerate or crotonate have low toxicity and are good trypanocides. C. HOLLINS.

Treatment of tobacco [with ultra-violet rays]. AMER. TOBACCO Co., Assess. of A. L. CHESLEY (B.P. 349,174, 10.3.30. U.S., 21.2.30).—Crude or aged tobacco (8—18% H₂O) is subjected to the action of ultra-violet and infra-red rays at above 70° while being continuously agitated or tumbled during its passage through a specified apparatus. E. H. SHARPLES.

Rendering non-poisonous the tobacco smoke during smoking. BONICOT WARENVERTRIEBSGES. M.B.H. (B.P. 348,974, 18.8.30. Austr., 15.2.30).—The tobacco, in the form of cigarette, cigar, or in the pipe, is injected at specified points with a solution containing a Fe⁺⁺⁺ salt or a mixture of tartaric and citric acids, NaCl, Fe(NH₄)₂(SO₄)₂, coumarin, and, if desired, scents. E. H. SHARPLES.

Manufacture of therapeutic substances. SCHERING-KAHLBAUM A.-G. (B.P. 349,257, 25.4.30. Ger., 7.6.29).—Aq. or aq. salt-solution extracts of the central nervous organs of vertebrate animals are mixed with org. liquids to give a ppt. which has an exciting action on the central nerve system. E. H. SHARPLES.

Manufacture of the hormone of the anterior lobe of the hypophysis. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 349,592, 31.1.30).—The hormone is obtained by salting out the urine of pregnant women or an aq. solution of the hormone prepared therefrom with any of the following salts either alone or in admixture: NH_4 , Zn, and Al sulphates; Zn, Ba, and Ca chlorides; K_2CO_3 ; Na and K acetates; $\text{Ca}(\text{NO}_3)_2$; or a mixture of Na and Mg sulphates. The quantities used should be such that the concentration of anhyd. salt in the liquid is 20% or above. Fractional precipitation and/or ice-cooling may be employed. E. H. SHARPLES.

Odoriferous substances.—See III. Al salts.—See VII.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Developers and development. I. Quinol. V. O. DZISKO, M. V. BONDAREVA, and E. N. GAPON. II. Velocity of development and developing power in relation to temperature. III. Dependence of developing power on addition of sulphite. V. O. DZISKO and E. N. GAPON (Ukrain. Chem. J., 1930, 5, [Sci.], 295—307, 309—312, 313—315).—I. The velocity of development of AgBr by quinol has been determined at 25° and 35°. Development consists of a heterogeneous unimol. reaction between at. or mol. Ag and AgBr, catalysed by quinol, whereby crystals of Ag form and Br is liberated.

II. The developing effect of quinol and Na_2SO_3 is a linear function of the temp. The velocity const. varies in accordance with the Arrhenius law over the interval 0—25°, whilst from 25° to 45° it is independent of temp. The percentage development (x) is given by $x = 41.9(1 + 0.006T)(1 - e^{-0.212/T})$, where t is time in min. and T is the temp. (25—45°).

III. The developing power of quinol is only slightly affected by variation in the concentration of the Na_2SO_3 (0—1M), although it is considerably smaller in the absence of Na_2SO_3 . The action of quinol does not depend exclusively on the formation of quinonesulphonic acid. R. TRUSZKOWSKI.

Sensitising with desensitisers. LÜPPO-CRAMER (Z. wiss. Phot., 1931, 30, 1—7; cf. Phot. Korr., 1931, 1).—Special emulsions (unripened), having large grains without sensitive nuclei, are sensitised by very dil. solutions of dyes which desensitise the ripened emulsion or normal plates. Plates of the ripened emulsion, treated with CrO_3 to remove Ag nuclei, though not restored to as low sensitivity as the unripened emulsion, are similarly sensitisable. Hence desensitisation is dependent on the presence of Ag nuclei. The addition of the dyes at emulsification has no effect on these emulsions. J. LEWKOWITSCH.

Solarisation phenomena in the negative blue-print process. E. STENGER (Z. wiss. Phot., 1931, 30, 45—48).—The solarisation was quantitatively examined by bathing gelatin-coated plates in Fe^{+++} oxalate solution (A), exposing, and then developing with $\text{K}_3\text{Fe}(\text{CN})_6$ solution (B). For a given exposure the degree of solarisation was directly proportional to the concentration of A, and inversely to that of B. The effect is removed by 1% H_2SO_4 , and retarded by washing before the development. Solarisation is due to reduction of ferrous ferricyanide to ferrous ferrocyanide (a pale blue), which is oxidisable to Prussian blue. Prolonged exposure produces a second reversal due to a grey deposit in the film. J. LEWKOWITSCH.

Lustre in fabrics.—See VI.

PATENTS.

Manufacture of light-sensitive layers. KALLE & Co. A.-G. (B.P. 347,430, 28.3.30. Ger., 30.3.29).—Diazotised arylamines having an acylamino- or thioacylamino-substituent are used as light-sensitive compounds. Examples are: diazotised 2-amino-5-benzamidoquinol diethyl ether with 8-hydroxy- β -naphthylidiguandine (blue), phloroglucinol (red-brown), 1:7-aminonaphthol (blue-grey), 2:7-dihydroxynaphthalene (red-violet), or phenyl-8-hydroxy- β -naphthylidiguandine (blue); tetrazotised diaminodiphenylthiocarbamide with phloroglucinol (brown-yellow); tetrazotised diaminotetramethoxydiphenylcarbamide with phloroglucinol (dark brown), 2:7-dihydroxynaphthalene (violet-blue), 1:7-aminonaphthol (green-blue), or 7-hydroxy- α -naphthylidiguandine (green-blue). C. HOLLINS.

Production of films in colour. A. F. DEGENHARDT (B.P. 348,507, 12.11.29).—In the two-colour process on double-coated film, the second bleaching and dyeing by the floating process is replaced by an immersion process; $\text{Fe}(\text{NH}_4)_2(\text{SO}_4)_2$ is added to the first ferricyanide bleacher (for the blue-green dyed side), which hardens that film and protects it from the action of the I bleacher, and orange-red dye used for the other side of the film.

J. LEWKOWITSCH.

XXII.—EXPLOSIVES; MATCHES.

Solvent recovery in the explosives industry, and the Bayer active-charcoal process. E. REISEMANN (Z. ges. Schiess- u. Sprengstoffw., 1931, 26, 145—149).—The characteristic feature of the Bayer process (G.P. 310,092; B., 1921, 204 A) is the use of highly adsorbent charcoal, so that even with very low concentrations of solvent vapour there is complete adsorption. The resultant possibility of drawing off large vols. of solvent vapour-air mixtures from the powder plant ensures the avoidance of pockets of solvent vapour or of concentrations between the explosive limits. During adsorption, the temp. of the charcoal does not rise more than 10°, and recovery of the vapours can be effected at not above 110°. The charcoal can be rapidly dried at a low temp. Loss of solvent from the vapour mixture delivered to the adsorbers does not exceed 2%. A brief description is given of the application of the process in the recovery of

Et₂O and EtOH in a Chinese nitrocellulose powder factory. W. J. WRIGHT.

PATENTS.

Heating compositions for blasting cartridges. D. HODGE and W. ESCHBACH (B.P. 348,657, 11.11.29. Cf. B.P. 345,284; B., 1931, 566).—In cartridges of the type containing solid or liquid CO₂, the heating composition, *e.g.*, KClO₄ and Al, is rendered insensitive to shock or friction by adding about 5% of a phlegmatising agent, *e.g.*, paraffin wax. W. J. WRIGHT.

Nitro-compounds of decreased inflammability.—See III.

XXIII.—SANITATION; WATER PURIFICATION.

Properties of sewage colloids. E. C. C. BALY (Trans. Faraday Soc., 1931, 27, 193–201).—The sign of the charge on sewage colloids has been determined by their behaviour when mixed with inorg. suspensions. Their isoelectric point, which ordinarily is at about *p*_H 4.6, is displaced by 3% NaCl to *p*_H 8.3. Gelatin behaves similarly. The amount of precipitable colloid decreases rapidly when fresh sewage is kept. The co-ppt. obtained by mixing with fine silt is bacterially active or inactive according to whether the silt or the sewage colloid is in excess. In presence of 3% NaCl under aerobic conditions spontaneous precipitation of bacteria-colloid complexes occurs after about 90 hr. F. L. USHER.

Bacteriological evaluation of some new water-soluble organo-mercury compounds. J. H. WALDO, H. A. SHONLE, and H. M. POWELL (J. Bact., 1931, 21, 323–329).—Among numerous organo-Hg compounds examined, ethyl mercurithiosalicylate possessed particularly valuable germicidal properties. A. G. POLLARD.

Occurrence of hydrogen phosphide in spring waters. O. LÜNING and K. BROHM (Z. Unters. Lebensm., 1931, 61, 443–446).—In Aug., 1928, a pronounced odour of PH₃ was observed from the waters of two neighbouring springs in the diluvial sands of Borstfeld (W. Brunswick), the AgNO₃ test giving a positive reaction. One water was slightly alkaline and hazy, with a flocculent deposit, and contained 6.9 mg. P₂O₅ and 20 mg. Fe per litre; it had the high KMnO₄ absorption of 41–45 mg. per litre and a carbonate hardness of 28.3–42.6°. The water was undrinkable, and its condition may be due to reduction of P compounds by org. material or Fe²⁺ during stagnation. J. GRANT.

Water purification by precipitation and coagulation. H. A. J. PIETERS and W. J. DE KOK (Chem. Weekblad, 1931, 28, 365–368).—The relative influence of alum, Ca(OH)₂, BaCl₂, and a number of other salts on the rate of clearing of H₂O-loam suspensions has been determined, and is in the order stated. The rate of clearing is not influenced by the quantity of precipitant added above a definite limit. Similar results are obtained with clay suspensions and with the effluents from coal-washing plants; if Ca(OH)₂ is used as the precipitant, addition of starch greatly accelerates the settling. By filtration through weathered spent oxide, effluents may readily be clarified, as a result of the action of electrolytes produced during the weathering. H. F. GILLBE.

Preventing boiler-scale formation.—See I. **Germicidal soaps.**—See XII. **Sanitation.**—See XV.

PATENTS.

Testing air for impurities such as carbon monoxide. W. H. PRITCHARD (B.P. 349,514, 26.2.30).—The presence of certain impurities can be shown by means of the effect they produce on the character of the light transmitted or reflected by substances or solutions with which they react, *e.g.*, CO on NH₃-Ag₂O solution (transmitted) or Cl on a mixture of I₂O₅ and starch (reflected light). The change produced is indicated by a light-sensitive cell, and by means of suitable electrical devices a warning mechanism may be operated. C. JEPSON.

Disinfectant compositions. A. SCIVER and E. L. JACKSON (B.P. 349,479, 20.12.29).—A disinfectant to be used also as a sealing liquid for a chemical closet consists of an emulsion of fuel oil, neutral tar oils, cresols, or similar tar acids insol. in H₂O, and an aq. dispersion of a protein, *e.g.*, glue. W. G. CAREY.

Combating or exterminating animal or insect pests. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 346,685, 7.11.29).—Grain weevils are destroyed by vapour of alkyl sulphites at a dilution of 2–10 mg./litre; sulphites of ethyl (b.p. 158°), propyl (b.p. 194°), isopropyl (b.p. 70°/15 mm.), isobutyl (b.p. 96°/15 mm.), β-chloroethyl (b.p. 137°/15 mm.), and glycol (b.p. 66°/16 mm.) are mentioned. C. HOLLINS.

Dechlorination of chlorinated water. J. MUCHKA (B.P. 349,781, 30.5.30. Austr., 14.8.29).—C used for dechlorination is circulated in the apparatus by a nozzle action caused by the entry of the chlorinated H₂O and is sterilised by this H₂O, an excess of Cl being used for sterilisation, and an excess of C for dechlorination. W. G. CAREY.

Treatment of water. F. D. C. ALLEN (B.P. 348,654, 15.2. and 10.11.30).—Water which has been chlorinated is mixed with an indicator and flows continuously through a glass-walled tank through which light passes before falling on to a photoelectric cell; the change in current thereby produced actuates a dosing valve and controls the rate at which the reagent is supplied to the bulk of the water. The current through the cell is amplified by a thermionic valve, and the dosing valve is provided with devices retarding its opening and closing. W. G. CAREY.

Plant for treatment of sewage. T. B. SIMS (B.P. 349,605, 27.2.30).—See U.S.P. 1,757,262; B., 1930, 1094.

[Apparatus for] controlling atmospheric conditions in rooms etc. HALL & KAY, LTD., P. KAY, and S. HALL (B.P. 349,429, 23.11.29).

Respiration apparatus with automatic nutrient gas supply controlled by the lungs. O. H. DRÄGER, Assec. of E. DRÄGER (B.P. 349,752, 6.5.30. Ger., 25.5.29).

Liquid heating and storage. Filtration of liquids. Purification of feed water. Air filters and conditioning.—See I.