

BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

JAN. 3 and 10, 1930.*

I.—GENERAL; PLANT; MACHINERY.

Improving the performance of rectifying columns and evaporators. E. MISHKIN (Azerbeid. Neft. Choz., 1929, No. 3, 72—74).—The lower part of the column carries, immersed in the distillate, an open vertical cylinder, at the bottom of which steam is injected. The condensate discharge tube is attached at the upper level of the condensate and has a U-bend to ensure a constant level and prevent the escape of gases and vapours.

New methods of gas washing. VI. Viscosity of the absorbent. L. PIATTI (Z. angew. Chem., 1929, 42, 1035—1036; cf. Weissenberger and co-workers, B., 1926, 111).—In continuation of the experiments on the use of tetralin as a "protector" of cresol for preventing the formation of molecular complexes, the viscosity-temperature relationships over the range 50° to —15° have been determined. With tetralin there is a small increase in viscosity as temperature falls, whereas with cresol (mixture of three isomerides) the increase is relatively small from 50° to 15°, but changes rapidly from 15° to 5°, and below 5° the viscosity-temperature curve becomes a straight line with a very steep slope. Experiments with mixtures of cresol and tetralin yielded curves intermediate between those of the pure constituents. By plotting viscosity against composition at the fixed temperatures of —5°, 0°, 20°, and 50°, it is shown that the curves do not follow the law of mixtures. At —5° the curve falls considerably below the line joining the values for the pure components; thus with a 4:1 mixture of cresol and tetralin the measured viscosity is only about one half the calculated value. The calculated and observed values approach more closely at the higher temperatures, and at 50° the two curves are coincident. It appears, therefore, that tetralin is efficacious in inhibiting the association of cresol molecules only at comparatively low temperatures. The washing is more efficient if a low temperature is used and the internal friction of the absorbent reduced by addition of a material such as tetralin, than when the temperature is raised by blowing steam into the wash-tower.

H. J. DOWDEN.

Vacuum measurements in chemical works. I. MÖLLER (Chem. Fabr., 1929, 503—504).—The disadvantages of the usual types of manometer for works' purposes are recounted. An improved form of vacuum gauge is described in which the usual U-shaped tube is replaced by one of nearly circular form, fixed in a frame which turns on a central pivot. On connecting one limb to a vacuum pump the tube turns on its axis, and the degree of vacuum is indicated directly by an attached pointer. A self-recording type of the above apparatus is also described.

H. F. HARWOOD.

See also A., Dec., 1377, **Lyosorption** (OSTWALD and HALLER). 1399, **Particle formation and particle action** (VOLMER). 1409, **Segregation of analysed samples** (SMITH and others). 1415, **Circulation of liquids and vapours** (HUGHESDON and others). 1416, **Device for constant leaching** (SULLIVAN).

PATENTS.

Furnace. W. E. RYNIKER (U.S.P. 1,730,298, 1.10.29. Appl., 5.5.28).—A furnace for air heating is constructed with a complicated series of passages for the products of combustion, which latter do not mix with the heated air.

B. M. VENABLES.

Apparatus for drying materials. CARRIER ENG. Co., LTD., A. FOWLER, and K. J. R. ROBERTSON (B.P. 320,644, 18.6.28).—An oven is heated by a furnace below, but the heat is also transferred to the oven by means of the drying air, which before entering the oven passes through passages adjacent to the flue from the furnace, countercurrent to the gases of combustion. Recirculation of part of the air used for drying is provided for. One end of the oven is preferably permanently closed; the other is open but protected by a hood.

B. M. VENABLES.

Electrical heating and mixing apparatus. DRYSDALE & Co., LTD., and J. YOUNG (B.P. 321,006, 10.9.28).—An annular stator with vertical axis is supplied with polyphase current, thus producing a rotating magnetic field within the stator. The material is contained in a pot within the stator and within the pot is a stirrer of magnetic material which is dragged round by the field. The heating is effected by hysteresis in the walls of the pot, if it is made of magnetic material, and by eddy currents in the pot and/or contents if either are conducting.

B. M. VENABLES.

Preheater. A. R. MCARTHUR, Assr. to AMER. SHEET & TIN PLATE Co. (U.S.P. 1,730,739, 8.10.29. Appl., 14.1.28).—A furnace has an outlet port, which is preferably wide and shallow, that serves for exit of both goods and hot gases. Immediately above the port outside the furnace is a preheater for fluid comprising a number of cross-tubes extending horizontally between inlet and outlet manifolds on either side (when facing the port) through which the hot gases rise to a flue and stack. Since cold air is also inevitably drawn in, a space (nearer the spectator) without tubes is partitioned off inside the preheater casing, which is intended to pass the cold air and a small portion of the hot gases.

B. M. VENABLES.

Heat exchangers. HEENAN & FROUDE, LTD., and G. H. WALKER (B.P. 320,279, 11.12.28).—A heat exchanger of which the heat-transmitting member is formed from deeply-corrugated sheet metal is arranged

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

so that the fluids, which are each confined to one side of the metal sheet, pass through the corrugations lengthways in series. B. M. VENABLES.

Heat exchanger. H. BERGQUIST and P. T. KEEBLER, Assrs. to ELLIOTT CO. (U.S.P. 1,726,943, 3.9.29. Appl., 16.2.28).—In a multi-tubular heat exchanger the tube plates are secured to a stiff skeleton, obviating the use of stay bolts. B. M. VENABLES.

Heat-exchange device. A. B. MODINE (U.S.P. 1,726,361, 27.8.29. Appl., 26.3.26).—The apparatus comprises a fan in front of a steam-heated radiator. B. M. VENABLES.

Heat-exchange apparatus. E. N. SIEDER, Assr. to FOSTER WHEELER CORP. (U.S.P. 1,726,995, 3.9.29. Appl., 26.10.28).—In a multi-tubular heat exchanger the smaller tube-plate is divided into two to permit removal of the bundle of tubes and large tube-plate without disturbing the longitudinal baffle attached to the shell. B. M. VENABLES.

Heat-transfer means. F. W. GAY (U.S.P. 1,725,906, 27.8.29. Appl., 5.7.27).—Heat is transferred from a lower conduit carrying hot products of combustion to an adjacent upper conduit carrying air for combustion, by means of a number of vertical, hermetically-sealed tubes containing a volatile liquid. The tubes are inserted about half-way through a plate which forms the horizontal dividing wall of the two gas conduits. B. M. VENABLES.

Heat exchanger. [Jet condenser.] J. P. RATHBUN, Assr. to WESTINGHOUSE ELECTRIC & MANUF. CO. (U.S.P. 1,730,242, 1.10.29. Appl., 28.10.27).—For every pair or small group of nozzles of a jet condenser or similar apparatus is provided an auxiliary movable jet supplied with high-pressure fluid adapted to clean the main jets. B. M. VENABLES.

Cooling apparatus. G. E. COX, Assr. to AMER. CYANAMID CO. (U.S.P. 1,733,582, 29.10.29. Appl., 25.4.25).—A joist is arranged with the web horizontal, and a plate is welded to the lower edges of the flanges, forming a closed passage for the cooling agent; a pair of plates form extensions of the upper flanges and constitute an open trough through which the substance to be cooled is conveyed. B. M. VENABLES.

Cooling apparatus for pulverulent or granular material. VICKERS-ARMSTRONG, LTD., and L. D. PARKER (B.P. 321,036, 3.10.28).—A tube mill, particularly for the fine grinding of rapid-hardening cement, is surrounded by a number of water-jacketed tubular bodies (rotating with it) through which the cement is caused to travel either by helical blades or by making the tubes slightly conical. Part of the cooling water may be sprayed on to the shell of the grinding mill. B. M. VENABLES.

Drying of materials. W. J. HARSHAW and C. S. PARKE, Assrs. to HARSHAW CHEM. CO. (U.S.P. 1,729,424, 24.9.29. Appl., 9.2.24).—There are two grinding-drying circuits each comprising an air heater, grinding mill, cyclone separator, and fan in a closed circuit, with a feeder for material leading into the grinding mill and an outlet for ground dry material from the cyclone. The air current is maintained at a pressure sufficient

to remove dried particles from the mill, and the air is used mainly over and over again. The partly-ground dry material from circuit A is the sole feed to circuit B, raw material being fed only to A and finished material withdrawn only from separator B. The air in circuit B is gradually replaced by fresh air, but the air in circuit A is replenished only by air taken from B. B. M. VENABLES.

Cooling and condensing tower. E. BURHORN (U.S.P. 1,732,963, 22.10.29. Appl., 20.6.27).—In the upper part of the tower are means for distributing the water in descending streams through a natural air current; then follow deflectors which guide the water in a few transversely elongated streams upon a corresponding number of rows of superposed condenser pipes from which the water falls to a collecting vessel below. B. M. VENABLES.

Refrigerant. J. G. TANDBERG, Assr. to ELECTROLUX SERVEL (U.S.P. 1,734,278, 5.11.29. Appl., 1.10.25. Swed., 7.7.25).—A solution of a methylamine and a salt, e.g., a chromate, in an alcohol is used. F. G. CLARKE.

Grinding mill. W. A. SEYMOUR, Assr. to HESSE MANUF. CO. (U.S.P. 1,730,300, 1.10.29. Appl., 3.11.27).—A mill of the disintegrator type has a screen (in the lower part) curved to a greater radius than that of the rotor, the lowest point being closest to the rotor. The screen is continued upwards each way by grinding plates, one being tangential to, the other concentric with, the rotor. The inlet for material is above the grinding plates. B. M. VENABLES.

Pulveriser. G. E. BEAR (U.S.P. 1,729,471, 24.9.29. Appl., 10.5.26).—A grinding cone with helicoidal screw on the small end rotates inside a conical grinding die; a fan chamber is situated at the base of the cones, the feed for material being at the apex. Means for adjustment are described. B. M. VENABLES.

Dual-feed pulverising apparatus. F. H. DANIELS, Assr. to RILEY STOKER CORP. (U.S.P. 1,731,649, 15.10.29. Appl., 6.11.26).—Air is caused to flow through a pulveriser from an air inlet at one side to an outlet at the other side. The machine is provided with two independently regulable feeding devices for different materials which are mixed while being ground. B. M. VENABLES.

Separation of intermixed divided materials. R. PEALE, W. S. DAVIES, and W. S. WALLACE (B.P. 290,276 and 292,495, 12.4.28. U.S., [A] 12.5.27, [B] 20.6.27).—Forms of pneumatic shaking tables for the separation of materials varying greatly in size but not much in sp. gr. are described. B. M. VENABLES.

Mixer. O. O. HOWARD (U.S.P. 1,728,411, 17.9.29. Appl., 6.9.27).—A tank is formed with a cylindrical upper and long conical lower part, and a screw conveyor extends from the bottom (apex) of the tank to a point above the base of the cone; the material lifted by the screw is spread by a deflector plate extending downwards and outwards to the level of the base (top) of the cone. B. M. VENABLES.

Mixer. G. S. P. DE BÉTHUNE (U.S.P. 1,727,753, 10.9.29. Appl., 24.6.27).—The material passes through a number of chambers in succession; the chambers are

symmetrical about the axis of the stirrer shaft, and each chamber is provided with radial stirrers.

B. M. VENABLES.

Mixing of powders with liquids in flow. W. EVANS (B.P. 320,710, 10.8.28).—The liquid is admitted to the interior of a bowl, over which it spreads in a thin sheet. The solid matter is fed (*e.g.*, by a table feeder) into the whirling sheet of liquid, and the mixture leaves the bowl by a bottom outlet.

B. M. VENABLES.

Apparatus for emulsifying, homogenising, and mixing liquids with fats, soluble and insoluble powders, etc. R. J. ELLINGHOUSE (B.P. 321,130, 20.2.29).—In an apparatus comprising a propeller rotating inside a perforated screen, the screen is made dome-shaped or ribbed-conical, and more than one may be provided with a common axis.

B. M. VENABLES.

Defecation of liquid. A. U. WETHERBEE, Assr. to GILCHRIST & Co. (U.S.P. 1,733,324, 29.10.29. Appl., 16.2.25).—The liquid is supplied through an upper horn-shaped portion to a cylindrical portion which is continued downwards as a conical portion with bottom outlet for the heavier constituent. The cylindrical portion is provided with annular baffles, and from each annulus is an outlet for clear liquid.

B. M. VENABLES.

Rotary filter. S. P. MILLER, Assr. to BARRETT Co. (U.S.P. 1,730,159, 1.10.29. Appl., 25.2.24).—A rotary filter has the internal filtering surface built up of porous blocks which are provided with ribs projecting from three edges of the blocks. The ribs serve the double purpose of forming passages for filtrate and of acting as keys so that the blocks hold themselves in position.

B. M. VENABLES.

Centrifuges for separation of solid matter from liquids. BERGEDORFER EISENWERK A.-G. (B.P. 307,065, 20.2.29. Ger., 2.3.28).—The solid matter is deposited on the wall (preferably coned or vaulted) of the bowl and is moved by helical scrapers to an enlarged zone which is also provided with scrapers and with outlets which expand outwardly. The viscosity of the solid matter being discharged may be reduced by the supply of an additional liquid in close proximity to the outlets.

B. M. VENABLES.

Press for the extraction of liquids. E. T. MEAKIN (U.S.P. 1,733,381, 29.10.29. Appl., 12.7.21).—An Archimedean conveyer press has the casing constructed of longitudinal grooved bars held by clamping rings. The annular outlet (for solids) is obstructed by a spring-controlled plug ring.

B. M. VENABLES.

Apparatus for separating liquids of different densities. F. PINK (B.P. 320,986, 17.8.28).—In an apparatus such as a gravity oil-water separator, the separating vessel has a top which is closed except for a series of outlets for lighter liquid, but the normal liquid level is well below the top. A float is provided which will float in the heavier but sink in the lighter liquid, so that when lighter liquid accumulates the float falls and eventually closes the normal outlet, allowing pressure to generate within the vessel, with the result that lighter liquid will be expelled through the top outlets, which are individually guarded by valves which will float (and close the orifices) when the heavier liquid arrives.

B. M. VENABLES.

Apparatus for vaporising liquids by means of accumulated heat. A. BREISIG (U.S.P. 1,733,292, 29.10.29. Appl., 21.4.24. Ger., 22.5.23).—A number of A-shaped metal bars are arranged horizontally in staggered rows within a heatproof chamber which is subjected alternately to hot gases (upwards) and liquid to be vaporised (downwards).

B. M. VENABLES.

Evaporation, distillation, or the like apparatus. W. VOGELBUSCH (U.S.P. 1,733,476, 29.10.29. Appl., 17.2.27. Holl., 14.4.26).—The vertical part of the apparatus comprises only a vapour space above and liquor space below. From the latter one or more tubes of large diameter extend sideways to the bottom of an inclined bundle of smaller tubes, the upper ends of which discharge into the vapour space. Both sets of tubes are jacketed for the heating medium, which enters at the top of the bundle and flows counter-current to the circulating liquor and vapour.

B. M. VENABLES.

Film evaporators. K. W. PFEFFERKORN (B.P. 300,655, 16.11.28. Switz., 17.11.27).—The liquid is supplied in a thin film to the outer surface of the steeply inclined upward run of a belt conveyer travelling in a triangular course. Heat is applied to the interior of the belt and air is drawn over the outer surface. The dried material is scraped off at the bottom of the downward vertical run of the conveyer. The warm, moist air leaves through a pipe concentric with one in which fresh air arrives, thus preheating the latter.

B. M. VENABLES.

Treatment of gases with liquids. CARRIER ENG. Co., LTD. (B.P. 309,403, 11.9.28. U.S., 9.4.28).—Liquid is ejected rearwardly from the ends of the arms of a rotating sprinkler, the velocity of issue being about equal to the rotative velocity of the arms, so that the issuing liquid has no substantial momentum. The jets are so shaped as to cause the spray to whirl about axes tangential to the circle described by the sprayer. The gas current is drawn through the mist produced.

B. M. VENABLES.

Separation of gas mixtures. GES. F. LINDE'S EISMASCHINEN A.-G. (B.P. 294,611, 26.7.28. Ger., 27.7.27).—An impure gaseous remainder of low b.p. is scrubbed at a low temperature with liquid obtained earlier in the series of condensations (which are effected in heat interchangers) with the object of removing impurities from the residual gas by dissolution, rather than by difference of b.p. In the preparation of, *e.g.*, hydrogen from coke-oven gas, the hydrogen containing carbon monoxide and nitrogen is scrubbed with liquid rich in methane while being cooled by nitrogen boiling in a pipe coil; this cooling, besides reducing the impurities in the hydrogen to a low figure, is utilised to make up the cold losses of the system.

B. M. VENABLES.

Fume-treating device. W. ZITELLA (U.S.P. 1,733,710, 29.10.29. Appl., 30.12.25).—Air is blown from a fan through one horizontal pipe and is distributed at right angles (by means of baffles), through a series of hoods over the furnace from which fume is to be collected, to another horizontal pipe provided with water sprays. The hoods are elongated and their undersides

are open but provided with inclined baffles so that the currents of air suck in the fumes. B. M. VENABLES.

Means for separating solid particles from combustion gases. A. R. V. KEARSLEY (B.P. 321,050, 22.10.28).—The delivery part of the casing of a centrifugal induced-draught fan is shaped so as to collect the solid particles which are flung out of the gases by centrifugal force. B. M. VENABLES.

Air cleaner. A. C. BENNETT (U.S.P. 1,734,030, 5.11.29. Appl., 6.11.26).—Air enters one end of a tubular casing and assumes a whirling motion due to the action of deflecting blades arranged round an inner axial tube, which forms an outlet, the other end of the casing being closed and provided with a dust chamber. A second set of deflecting blades are arranged round the inner end of the outlet tube, which is perforated between the two sets of blades to enable some of the air to enter the outlet directly after passing the first set. F. G. CLARKE.

Apparatus for determining the sp. gr. of solid substances or bodies. W. & T. AVERY, LTD., and W. A. BENTON (B.P. 320,416, 14.7.28).—The apparatus comprises a stand supporting a spring balance, or other device, of which the deflection is proportional to the load. Three vertical, adjustable sliders which can be set by hand to the positions of zero, weight in air, and weight in water, carry knife-edges or pivots that determine the position of a parallel-rule linkwork and of an inclined computing bar, upon the last of which the sp. gr. is read off without any calculation, for any weight of substance within the range of the spring balance. B. M. VENABLES.

[Recuperators for] heating furnaces. W. H. FITCH (U.S.P. 1,735,605—8, 12.11.29. Appl., 18.12.26).—See B.P. 282,443; B., 1929, 495.

Production of flame or smoke for signalling. C. W. BONNIKEN and S. BARRATT (U.S.P. 1,735,373, 12.11.29. Appl., 22.11.26. U.K., 30.11.25).—See B.P. 268,004; B., 1927, 719.

Crushing and grinding machine. S. BRAMLEY-MOORE (B.P. 309,159, 11.10.28. U.S., 6.4.28).—See U.S.P. 1,692,884; B., 1929, 154.

[Supplying air to marine-type boiler] furnaces. J. REID (B.P. 321,207, 1.8.28).

Refrigerating apparatus. M. H. ACKERMANN and L. C. SICKEL (B.P. 321,590, 21.12.28).

[Absorption] refrigerating apparatus. H. D. FITZPATRICK (B.P. 321,488, 31.8.28).

II.—FUEL; GAS; TAR; MINERAL OILS.

Combustible matter in brown coal. W. EISENSCHMIDT and H. KOOP (Chem.-Ztg., 1929, 53, 858—859).—A simple analysis of a coal is no absolute indication as to its calorific value, since the character of the carbon compounds is an important factor. Hence two coals of the same elementary analysis may have different calorific values. G. E. WENTWORTH.

Colloidal and chemical properties of peat. I. I. SHUKOV, E. A. KREMLEVA, and A. V. TIKHOMIROV (J. Appl. Chem., Russia, 1929, 2, 257—266).—When

examined by Ostwald's method of filtration analysis, peat of a high degree of decomposition shows rapid filtration. The rate increases with rise of temperature and with increase of valency of the coagulating agent; it also increases, and then falls, with increase in concentration of the agent. CHEMICAL ABSTRACTS.

Fuels yielding power gas. P. LEBEAU (Ann. Off. Nat. Combust. liq., 1929, 4, 19—64; Chem. Zentr., 1929, ii, 114).—The thermal fractionation of pyrolygneous gases and its relation to the degree of carbonisation of the product are shown graphically. A. A. ELDRIDGE.

Low-temperature carbonisation of fuel, and its combination with the production of electricity. E. H. SMYTHE and E. G. WEEKS (Inst. Elect. Eng., 1929. Advance copy. 10 pp.).—The Babcock coal distillation plant, as operated at the Dunstan power station of the Newcastle-upon-Tyne Electric Supply Co., consists of two retorts, working in conjunction with a Babcock boiler of 30,000 lb. of steam per hour evaporative capacity. The coal used is screened, the fines being utilised in a pulverised fuel boiler, whilst the larger coal is dried and preheated (to 120°) by passing through a chamber in contact with waste flue gases. The coal is then fed into the retort, in which the fuel bed is 3 ft. deep, and is carried on six slowly-rotating rollers which act as a supporting grate and coke extractor; the lower portion of the retort forms a chamber for the reception of the heating gases and serves as a coke hopper. The distillation of the coal is effected by passing a mixture of superheated steam and combustion products at 600—700° through the fuel bed. The distilling medium is obtained by burning suitable fuel such as producer or coke-oven gas in a small combustion chamber located below the retort, and when combustion is complete sufficient steam is added to produce distilling gases of the required composition and temperature; part of the steam required is obtained from the quenching of the coke, and the additional amount necessary is supplied by bleeding the turbine casings in the main power station. The coke produced is crushed and used under an adjacent boiler equipped with a chain-grate stoker. The rich retort gas and oil vapours from the coal, mixed with the distilling medium, are drawn off from the retort and passed through dust extractors, condensers, tar extractors, and a rotary gas washer; the remaining gas is burned in the combustion chambers of a boiler. The by-products are worked up by usual distillation and purification methods. By this process the following yields per ton of coal are obtained: coke 15 cwt., motor spirit 1 gal., steam-distilled creosote 6 gals., heavy creosote 2.4 gals., pitch 5 gals., and air-blown low-boiling tar acids 0.4 gal. C. B. MARSON.

Economics of coke-oven gas utilisation in industry. E. C. EVANS (J. Inst. Fuel, 1929, 3, 90—99).—Attention is drawn to the necessity for a re-organisation of the coking industry, which will be rapidly accelerated if a reasonable price could be obtained for the coke-oven gas that would be rendered available if existing coking plants were replaced by modern ovens. The chief uses of coke-oven gas are for steam raising, power production in gas engines, and for heating metallurgical furnaces in the iron and steel industry, of which the last-

named is the largest potential consumer. Examination of economic conditions shows that the price which the iron and steel industry can afford to pay for coke-oven gas, purified, delivered, and purchased in large quantities, is approx. 1.2—2d. per therm, based on existing costs for equivalent service. C. B. MARSON.

Determination of carbon monoxide [in gases]. P. SCHLÄPFER and E. HOFMANN (Monats. Bull. Schweiz. Ver. Gas-Wasserfachmännern, 1927, 7, 293—303, 349—372; Chem. Zentr., 1929, i, 3013—3014).—The iodine pentoxide, palladous chloride, silver nitrate, and the Damiens methods have been critically examined. (1) The iodine pentoxide must be dehydrated at 190—200°, and the reaction temperature should be 130—135°. The gas velocity, up to 0.5% CO, may be 50 c.c. per min. for 50 g. of reactive material, 200 c.c. of gas being used. The iodine is removed in 6—8 min. from the tube with 600—800 c.c. of air or nitrogen free from carbon monoxide. The gas under test must be dry and free from unsaturated hydrocarbons, aldehydes, hydrogen sulphide, etc.; pure hydrogen attacks iodine pentoxide only above 150°. Two forms of apparatus are described; the iodine may be determined colorimetrically. (2) The palladous chloride method is approximate only. (3) The silver nitrate method is approximate, but rapidly indicates the presence of small quantities of carbon monoxide. Quantities less than 0.05% are difficult to detect. For the determination of quantities greater than 0.2% in the usual gas-analysis apparatus, iodine pentoxide suspended in 10% oleum at the ordinary temperature is preferable to Damiens' reagent; it is unattacked by hydrogen, oxygen, or methane, but heavy hydrocarbons must be removed. A. A. ELDRIDGE.

Installation and operation of gas producers for metallurgical furnaces. J. S. ATKINSON (J. Inst. Fuel, 1929, 3, 71—89).—The preparation and use of fuels such as bituminous coal, lignite, coke, anthracite, etc., and the factors governing choice of producers are discussed. Various types of producers, methods for their efficient operation, and the use of mechanical equipment are described. C. B. MARSON.

Anthracene from oil tar. I. BESPOLOV (Azerbeid. Neft. Choz., 1929, No. 5, 72—78).—The pitch (b.p. above 280°) was distilled and the crystalline distillate repeatedly refractionated; 0.6% of anthracene was obtained from a tar (d 1.062) of which 30.8% boils below 300° and 40.2% above 300°. The purity of the anthracene, recrystallised from the xylene fraction of a light oil, was 80%. CHEMICAL ABSTRACTS.

Hydrolysis of naphthenic acids at elevated temperatures and cracking under pressure of hydrogen. V. N. IPATIEV and A. D. PETROV (J. Appl. Chem., Russia, 1929, 2, 327—335).—The acids (100 g., b.p. 260—360°, acid value 233, average mol. wt. 240) were heated with water (50 c.c.) and alumina (10 g.) for 5 hrs. at 440—460° and 210 atm., affording an oil (80 c.c.) having acid value 131.4, the fractional composition of which is indicated. Tetralin, similarly treated, afforded an oil containing only a little benzene, but large amounts of aromatic hydrocarbons of high b.p. Experiments with hexahydrotoluene and paraffins are de-

scribed. The fatty acids of the paraffin series are stable. When cracked in presence of water (alumina, and hydrogen) naphthenic acids afford more oxygen compounds than in absence of water, and the amount of compounds of low b.p. is lower. CHEMICAL ABSTRACTS.

Kuban crude oils. M. A. BESTUZHEV (Neft. Choz., 1928, 15, 339—342).—The characteristics of light and heavy Ilski crude oils and their fractions are described. CHEMICAL ABSTRACTS.

Refractometric analysis of paraffin products. W. J. PIOTROWSKI and J. WINKLER (Przemysl Chem., 1929, 13, 381—387).—Diggs and Buchler's refractometric method for the analysis of paraffin wax (B., 1927, 625) is modified for application to Galician conditions. Blue oil, obtained by cooling the oil pressed out of paraffin wax to —6°, is mixed with infusorial earth, cooled to —21°, and filtered under reduced pressure. The mean refractive index (n_D) of a number of filtrates of Boryslaw oil is 1.4887, and this value is taken as being the refractive index of 100% oil present as impurity in the wax. Pure paraffin wax is obtained by filtering 10 g. of wax at 80° through 5 g. of Terran, an adsorptive powder which removes only the oily constituents, and the refractive index, n_D , of the first drop of filtrate is determined (1.4370). These indices, which are determined at 60°, are taken as being constant for paraffin wax derived from a given region, and the paraffin content p of a given specimen, the refractive index of which is n_x , is given by the formula $p = 100 \times (n_0 - n_x) / (n_0 - n_p)$. The values given by this method are 1.1—2.6% lower than those obtained by Holde's method, and are in very close agreement with the actual values in artificially prepared mixtures of pure paraffin and oil. The same method is applicable to the determination of the paraffin content of blue oil. R. TRUSZKOWSKI.

Determination of the ageing tendency of insulation and turbine oils. A. BAADER (Petroleum, 1929, 25, 235—243, 279—282).—Existing tests are vitiated because they are carried out under one set of conditions only, which may not correspond with those of actual use, and also the refining process that has been employed is not considered. The apparatus now used consists of an electrically heated thermostat in which the outer jacket contains water that is boiled and refluxed by condensers on either side; the inner vessel is filled with oil and in it are immersed the test vessels. These are four in number, have Liebig condensers, and contain stirrers which are constructed of different metals, glass, bakelite, etc., so that an oil can be treated simultaneously under four sets of conditions at the same temperature. After heating for a suitable time the saponification value of the sample is determined and gives a direct measure of the sensitiveness of the oil to any particular treatment. The useful limits which may be reached for this factor are defined for different types of oil, and results are given for a wide range of samples; these are compared with the figures provided by older methods of testing. It is found that temperature affects some oils much more than others; steel is usually inert, but iron often promotes change, whilst copper and lead are particularly active. The behaviour of individual oils is discussed in detail, and the general influence of temperature on their changes is described. R. H. GRIFFITH.

[Use of] sodium peroxide in ascertaining the condition of used insulation oils. G. SCHWITTAY (Petroleum, 1929, 25; Motorenbetrieb, 2, No. 10, 6—8).—Samples of oil after use in transformers etc. have been treated with aqueous sodium peroxide; two solutions were found to be equally useful: (i) a mixture of equal parts of 0.1N-sodium carbonate and 0.1N-sodium hydroxide treated with 2 g. of sodium peroxide for each 100 c.c., and (ii) a solution of 4 g. of peroxide in 100 c.c. of water. The oil (5 c.c.) is mixed with an equal volume of one of these solutions and of benzine, warmed to about 90°, and allowed to separate. A layer of a dark tarry substance generally settles out, the amount of which is a measure of the ageing of the oil. If more than 2% is thus changed, the sample is considered unfit for further use. The results given by this method are compared with those obtained by other tests.

R. H. GRIFFITH.

Making "viscosines" from lubricating oil bottoms. P. MONTAG (Azerbeid. Neft. Choz., 1929, No. 3, 52—55).—A mixture of Balakhany lubricating oil bottoms with a black gas oil was agitated by air with sulphuric acid. After settling, the oil was blown with air and steam at 300°. The properties of various fractions are recorded.

CHEMICAL ABSTRACTS.

Physical basis of lubrication, especially in the explosion motor. S. KYROPOULOS (Z. tech. Phys., 1929, 10, 2—18; Chem. Zentr., 1929, ii, 115—116).—True lubrication and lubrication under the working conditions of the explosion motor are differentiated. Various physical properties of oil were determined and discussed.

A. A. ELDRIDGE.

Recovery of paraffin wax absorbed by fuller's earth. L. SELSKI (Azerbeid. Neft. Choz., 1929, No. 3, 84—85).—The wax is extracted (thrice) with a naphtha, b.p. 90—130°, and the earth is heated to redness to regenerate its absorptive power. CHEMICAL ABSTRACTS.

Prevention of explosion danger in an oil tanker. Physical analysis of a very weak mixture of petroleum vapour. Z. TUZI and O. KADITA (Bull. Inst. Phys. Chem. Res., Tokyo, 1929, 8, 851—882).—A petroleum content of 10^{-4} pt. by vol. in air can be detected refractometrically.

C. W. GIBBY.

Apparatus for determining the degree of refining of petrol. M. R. CORELLI (Annali Chim. Appl., 1929, 19, 453—458).—A special burette is described which gives far more accurate results than the usual Kraemer and Böttcher graduated receiver in the determination of the degree of refining of various petrols by measuring the diminution in volume on shaking with concentrated sulphuric acid. The burette serves well also for determining the reciprocal solubility of two liquids, the extraction of one or more components from a liquid mixture, emulsification tests, etc.

T. H. POPE.

Benzinometer. W. VAUBEL (Chem.-Ztg., 1929, 53, 859—860).—An apparatus is described which permits comparative measurement of the vapour pressure of motor fuels and the effect thereon of anti-knocks and other adulterants. The apparatus consists simply of a thermostated flask fitted with a bung through which

passes an inverted burette tube. The method is to introduce 100 c.c. of the spirit into the flask, and place the bung in position so that the mouth of the burette is close to the bottom of the flask; by this means some of the liquid will be forced up into the burette, due to exertion of its partial pressure in the air space of the flask. Two readings are taken: (a) 1 hr., (b) 2 hrs. after closure, from which, using fuels of different composition, a comparison of the vapour pressures is made. Results are given for mixtures of, e.g., pure benzene and benzine, commercial benzene and benzine, benzine and water, benzine and carbon tetrachloride.

G. E. WENTWORTH.

Lubricant friction and flow orientation. S. KYROPOULOS (Z. tech. Phys., 1929, 10, 46—52; Chem. Zentr., 1929, ii, 116—117).

Mathematical determination of the calorific value of gaseous saturated hydrocarbons and their mixtures. J. HOŠEK (Chem. Obzor, 1929, 4, 105—107; Chem. Zentr., 1929, ii, 196).

Gas washing. PIATTI.—See I. Coke-oven refractories. RICHARDS.—See VIII.

See also A., Dec., 1376, Mixed absorbents (SCHILOV and others). 1397, Chemical equilibrium in autoxidation (GILLET and GUIRCHFELD). 1401, Gaseous combustion in electric discharges (FINCH and HODGE). 1423, New petroleum by-product (BALDESCHWIELDER and CASSAR). 1472, Lead diaryldialkyl compounds (GILMAN and BALASSA).

PATENTS.

Distillation of coal in vertical retorts. H. SHEWING (B.P. 320,788, 3.11.28).—In order to lessen the production of dust during the discharge of coke from vertical retorts, the coke chambers are flooded with water and drained again prior to discharging the coke. For this purpose the chambers are connected to a water tank which can be alternately raised and lowered; or two separate tanks may be provided, the upper one for flooding the chambers and the lower one for draining them.

A. B. MANNING.

Apparatus to control the behaviour of coal or other material while being carbonised in a retort, in order to facilitate the discharging of it. W. FRASER and W. DAVIDSON (B.P. 320,780, 31.10.28).—A tapered vertical retort is provided with a movable bottom, operated by hydraulic cylinders or similar device and capable of being lowered during the period of carbonisation so that additional space is provided to accommodate any swelling that may occur. A "dip ring" attached to the retort fits into a water compartment in the movable bottom, forming a seal which prevents air from entering the retort during the process.

A. B. MANNING.

Distillation of coal, lignite, etc. having high contents of volatiles. SOC. DE RECHERCHES ET DE PERFECTIONNEMENTS INDUSTRIELS (B.P. 294,568, 18.6.28. Ger., 26.7.27).—Finely-divided coal, lignite, etc. (volatile matter 26—38%) is agglomerated with a hydrocarbon binding medium, e.g., anthracene oil, and distilled rapidly in a current of superheated steam at 500°. The binding medium must be of such a character that it

forms no pitch at any stage of the process, but decomposes with the production of a substantial quantity of coke. The compact product obtained may, if desired, be converted into a metallurgical coke by further distillation at 700–1000°.

A. B. MANNING.

Treatment of carbonaceous materials to obtain distillation products such as hydrocarbons, metalised coke, etc. FABR. NAT. DE PROD. CHIM. ET D'EXPLOSIFS SOC. ANON. (B.P. 296,443, 29.8.28. Belg., 2.9.27).—Carbonaceous materials are mixed with about 15% of an inorganic oxidising agent, *e.g.*, iron or manganese oxide, alkali or alkaline-earth nitrates, and are then carbonised. A high yield of tar having qualities similar to those of crude petroleum, and a coherent coke suitable for metallurgical purposes, are produced.

A. B. MANNING.

Forming smokeless fuel briquettes. W. E. TRENT (B.P. 320,814, 22.12.28).—The process is carried out in two stages; in the first the agglomerated masses of finely-divided coal and oil (cf. B.P. 228,862; B., 1926, 263) are heated at 260–315° in an atmosphere almost free from oxygen until the water and lighter constituents of the oil are removed; and in the second the heating is continued in an oxidising atmosphere in order to harden and coke the oil residuum. The lighter oil constituents evolved in the first stage are condensed and recovered.

A. B. MANNING.

Manufacture of vegetable char. C. E. COATES, ASSR. to O. L. BARNEBEY (U.S.P. 1,729,162, 24.9.29. Appl., 22.4.21).—Vegetable matter is destructively distilled, the resultant char is heated above 550° in air, the amount of which is regulated to burn out most of the hydrogen and a limited amount of carbon, and the char is then cooled in the absence of air, treated with mineral acids, *e.g.*, hydrofluoric acid, to remove silica, and dried.

W. G. CAREY.

Distillation of tar and recovery of products therefrom. BARRETT CO., ASSEES. of S. P. MILLER (B.P. 289,023, 10.4.28. U.S., 20.4.27).—Tar or light pitch is distilled by bringing it into intimate contact with hot coal-distillation gases (cf. B.P. 288,270; B., 1929, 1006), and the enriched gases are scrubbed while still at a high temperature with tar or light pitch in order to give relatively clean oils on condensation, and to produce a heavier pitch residue in the scrubber.

A. B. MANNING.

Manufacture of pitch composition. BARRETT CO., ASSEES. of S. P. MILLER (B.P. 295,687, 10.8.28. U.S., 17.8.27).—Tar is distilled by being brought into intimate contact with hot coal-distillation gases in order to produce a pitch residue of high m.p. (150–200°) and low free carbon content (cf. B., 1929, 633, 803). This is blended while hot with tar to form a homogeneous mixture which can be used as a fuel, for road treating, etc. The oils condensed from the enriched gases are blended with other tarry oils to form a composition suitable for creosoting purposes.

A. B. MANNING.

Removing oil from mineral oil sulphonic bodies. C. FISCHER, JUN., and W. T. REDDISH, ASSR. to TWITCHELL PROCESS CO. (U.S.P. 1,731,716, 15.10.29. Appl., 29.6.26).—By treating crude lubricating oil from petroleum refining with fuming sulphuric acid, separating the acid

layer, and treating it with sodium hydroxide and dilute alcohol, an aqueous solution of the sodium salts of various sulphonic acids is obtained. This is freed from oil by evaporation to dryness, dehydration at 110–120°, and treatment of the dry residue with superheated steam.

A. R. POWELL.

Sulphonic body [from mineral oil sludge]. C. FISCHER, JUN., and W. T. REDDISH, ASSR. to TWITCHELL PROCESS CO. (U.S.P. 1,734,369, 5.11.29. Appl., 2.9.26).—The sludge, comprising aluminium sulphonates, is neutralised with caustic soda, using phenolphthalein as an indicator.

F. G. CLARKE.

Manufacture of active carbons. E. URBAIN, ASSR. to URBAIN CORP. (U.S.P. 1,735,096, 12.11.29. Appl., 24.4.25. Fr., 24.12.24).—See F.P. 603,806; B., 1926, 732.

Retort [for distillation of oil shale]. I. B. NEWBERRY, ASSR. to LIGNITE PRODUCTS CORP. OF AMERICA (U.S.P. 1,734,774, 5.11.29. Appl., 12.6.22. Renewed 22.10.25).—See B.P. 261,575; B., 1927, 63.

Powdered-fuel burners. H. NIELSEN and B. LAING (B.P. 321,172, 1.5.28).

Plant for generating, storing, and supplying acetylene gas. O. SIMONIS, and LIQUID AIR, LTD. (B.P. 321,234, 7.8.28).

Separation of gas mixtures (B.P. 294,611).—See I. **Heating bituminous materials** (B.P. 319,298 and 319,391).—See XI.

III.—ORGANIC INTERMEDIATES.

Catalytic oxidation of alcohol. L. Y. KARPOV (J. Appl. Chem., Russia, 1928, 1, 121–126).—Ferric oxide, trimanganese tetroxide, cupric oxide, and chromic oxide are preferred as catalysts for the oxidation of ethyl alcohol to acetaldehyde; with nickel or cobalt monoxide carbon is formed. The use of twice the calculated quantity of air is recommended. Optimal temperatures are: nickel sesquioxide 170–190°, chromium dioxide 170–220°; further oxidation to acetic acid takes place.

CHEMICAL ABSTRACTS.

Continuously-operating benzene-washing plant for recovery of aniline from aqueous salt solutions. O. KREBS (Chem. Fabr., 1929, 407–408, 417–419).—In certain dye works large quantities of an alkaline solution of glycine containing about 30% of aniline are continuously produced. After cooling and settling, an aqueous layer containing 12% of aniline is obtained. Recovery of this aniline by steam-distillation is impractical owing to the large amount of steam required and the necessity of reconcentrating the glycine solution. A continuous extraction process by which the aniline liquor is passed downwards in thin streams through a rising column of benzene affords a means whereby the glycine solution may be freed almost completely from aniline at a small cost. The aqueous liquor (*d* 1.175) is allowed to flow downwards through a column divided by perforated plates into a number of superimposed shallow chambers up which the benzene is caused to flow by hydrostatic pressure from a container situated well above the column. The perforated plates ensure thorough mixing of the liquids

and prevent the almost saturated aniline-benzene solution in the upper part of the column from sinking through the less saturated benzene in the lower parts. The purified glycine solution passes to a heat interchanger, where it is warmed to 80° by hot glycine solution which has been steamed to remove benzene, and then passes into the steam-distillation vessel where the dissolved benzene is recovered. A similar procedure is used to separate the aniline and benzene, the former being finally purified by distillation under reduced pressure. A sketch of the necessary apparatus is included and the economics of the process are discussed.

A. R. POWELL.

Wolffenstein and Boeters' process for the preparation of picric acid from benzene. L. DESVERGNES (Chim. et Ind., 1929, 22, 451—461; cf. Wolffenstein and Boeters, B.P. 17,521 of 1907 and G.P. 214,045; B., 1907, 1194, and 1909, 1167. Also cf. A., 1913, 279).—The process consists in heating a mixture of benzene, mercuric nitrate, and nitric acid at 50—60° (cf. Vignon, B., 1920, 567 A; Brewster, U.S.P. 1,380,185; B., 1921, 538 A). Excess benzene is distilled off in steam, and the washings of the filtered product are added to subsequent batches. The acid filtrate may be brought up to strength with fresh acid and used again indefinitely, no loss of mercury occurring. A pure picric acid is obtainable by heating with a further quantity of nitric acid after removal of the benzene, but the yields are reduced. The mercuric nitrate cannot be replaced by nitrates of manganese, copper, aluminium, or zinc.

C. HOLLINS.

Anthracene from oil tar. BESPOLOV. **Hydrolysis of naphthenic acids.** IPATIEV and PETROV.—See II. **Glycerin from molasses.** GOLOVIN.—See XVII.

See also A., Dec., 1397, **Autoxidation of quinol** (DUBRISAY and SAINT-MAXEN). 1403, **Electrolytic chlorination of benzene** (JAYLES). 1436, **meso-Derivatives of anthracene and of 9:9'-dianthranyl** (MINEAEV and FEDOROV). 1453, **Perylene and its derivatives** (ZINKE and KOLMAYR). **Linear pentacene series** (HERNLER and BRUNS; MACHEK). 1463, **Naphthoisoindigotins** (WAHL and LOBECK).

PATENTS.

Partial oxidation of gaseous hydrocarbons. H. R. CURME, Assr. to CARBIDE & CARBON CHEM. CORP. (U.S.P. 1,729,711, 1.10.29. Appl., 26.4.22).—A mixture of normally gaseous homologues of methane with an oxidising gas, the former being in excess, is heated above 600° in contact with vitreous material with formation of formaldehyde. After separation of the formaldehyde the mixture is reheated with an additional quantity of the oxidising gas. D. F. TWISS.

Dehydration of aqueous formic acid. SOC. ANON. DES DISTILLERIES DES DEUX-SÈVRES (B.P. 303,742, 27.11.28. Belg., 7.1.28).—Aqueous formic acid, preferably concentrated to constant b.p., is continuously added, with an entraining liquid (e.g., isobutyl formate, isoamyl formate, benzene), to a diluent (e.g., *n*-amyl formate, isoamyl formate, butyl ether), which may be identical with the entraining liquid, in a distilling column. Water is removed as azeotropic mixture

with the entraining liquid, whilst a mixture of anhydrous formic acid and diluent is drawn off from the bottom of the column and rectified in a separate still, the heat of the formic acid vapour being utilised in the main column. Three variations are figured. C. HOLLINS.

Manufacture of aliphatic anhydrides. H. DREYFUS (B.P. 318,662—4, 7.6.28).—As catalysts in the anhydridisation of acetic and other aliphatic acids at 300—700° there are used: (A) chloroacetic acid, chlorinated or brominated acetic or propionic acids, sulphoacetic acid, or acetylphosphoric acids; (B) phenol, cresols, xlenols, or their acetates; or (C) glycerol, other polyhydric alcohols or their acetates. The amount of catalyst is 4—7% of the acid. C. HOLLINS.

Production of benzoic acid. G. BARSKY and I. V. GILES, Assrs. to AMER. CYANAMID CO. (U.S.P. 1,734,029, 5.11.29. Appl., 8.3.26).—Equimolecular quantities of benzene, cyanuric chloride, and aluminium chloride are mixed and boiled. F. G. CLARKE.

Manufacture of condensation products of the benzodiazine series. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 310,076, 16.1.28. Addn. to B.P. 309,102; B., 1929, 935).—The process of the prior patent is applied to monochloroquinazolines. 4-Chloroquinazoline is condensed with H-acid or α -aminoanthraquinone; 4-chloro-6-methylquinazoline with 1-*p*-aminophenylpyrazolone-3-carboxylic acid; 2- or 4-chloroquinazoline with *p*-phenylenediamine-sulphonic acid; 4-chloro-6-nitroquinazoline with J-acid, β -naphthylamine, 5-aminosalicylic acid, 2:6-dichloro-*p*-phenylenediamine, ammonia, *p*-phenylenediamine (0.5 mol.), 5-sulphinosalicylic acid, or 4-nitro- α -naphthol-5-sulphonic acid; 4-chloro- $\beta\beta$ -naphthaquinazoline with H-acid; 4:4'-dichloro-6:6'-diquinazoly, m.p. 270°, with *N*-*p*-aminobenzoyl-H-acid (2 mols.).

C. HOLLINS.

Manufacture of emulsions from organic iso-colloids which have undergone a modifying treatment, and of new materials therefrom. L. AUER (B.P. 318,562, 4.5.28. Cf. B.P. 287,943; B., 1928, 398).—The "modified" oils of the prior patent are emulsified with water in presence or absence of emulsifying agents etc., by which process further "modification" is effected at once or on keeping. The emulsions may subsequently be treated with "modifying agents," or may be vulcanised. The aqueous medium may be removed by the usual methods and a rubber-like mass obtained. C. HOLLINS.

Production of carbon disulphide. M. PIER and K. WINKLER, Assrs. to I. G. FARBENIND. A.-G. (U.S.P. 1,735,409, 12.11.29. Appl., 5.1.28. Ger., 12.1.27).—See B.P. 293,172; B., 1928, 634.

Producing simultaneously formates and gaseous mixtures rich in hydrogen. G. CLAUDE and A. H. GOSSELIN, Assrs. to SOC. CHIM. DE LA GRANDE PAROISSE, AZOTE & PROD. CHIM. (U.S.P. 1,735,107, 12.11.29. Appl., 9.1.26. Fr., 17.1.25).—See B.P. 246,168; B., 1927, 796.

Vaporisation of formamide. E. MÜNCH, Assr. to I. G. FARBENIND. A.-G. (U.S.P. 1,735,407, 12.11.29.

Appl., 17.1.28. Ger., 27.1.27).—See B.P. 301,974; B., 1929, 163.

Manufacture of acetic anhydride from acetic acid. F. A. HENGLEIN and F. SCHLEICHER, Assrs. to I. G. FARBENIND. A.-G. (U.S.P. 1,735,433, 12.11.29. Appl., 12.9.27. Ger., 22.9.26).—See B.P. 301,562; B., 1929, 122.

Catalytic oxidation of organic compounds. A. O. JAEGER, Assr. to SELDEN Co. (U.S.P. 1,735,763, 12.11.29. Appl., 8.8.27).—See B.P. 295,270; B., 1929, 806.

Polymerisation of diolefines (B.P. 320,960).—See XIV. **Anaglyphs** (B.P. 301,490).—See XXI.

IV.—DYESTUFFS.

See A., Dec., 1439, **Cleavage of azo dyes by sulphites** (ENGEL). 1460, **Sulphur dyes** (POLLAK and RIESZ). 1469, **Prodigiosin** (WREDE and HETTICHE). **Thiazole derivatives** (RIESZ and HÜBSCH). 1473, **Reaction between proteins and diazotised arylamines** (HEIDELBERGER and KENDALL).

Aniline recovery plant. KREBS.—See III. **Red pigments.** RASQUIN.—See XIII.

PATENTS.

Dyes and dyeing [sulphuric leuco-ester of anthraquinone-1:2-naphthacridone]. R. S. BARNES, J. E. G. HARRIS, B. WYLAN, J. THOMAS, and SCOTTISH DYES, LTD. (B.P. 318,090, 22.5.28).—Caledon-red BN or its leuco-compound is treated with pyridine-sulphuric anhydride (etc.) and copper in presence of pyridine at relatively high temperatures, e.g., at 90°.

C. HOLLINS.

Manufacture of [vat] dyes [of the dibenzanthrone series]. SOC. CHEM. IND. IN BASLE (B.P. 294,486, 23.7.28. Switz., 21.7.27. Addn. to B.P. 262,774; B., 1928, 517).—Blue vat dyes, fast to water, are obtained by chlorinating dibenzanthrone with more than 5 pts. of ferric chloride, e.g., in trichlorobenzene at 140–150°.

C. HOLLINS.

Vat dyes by condensation of 1-(4-benzanthronyl-amino)anthraquinones. H. WOLFF, Assr. to GRASSELLI DYESTUFF CORP. (U.S.P. 1,711,710, 7.5.29. Appl., 2.7.27. Ger., 1.7.26).—The condensation products of 4-halogenobenzanthrones with 1-aminoanthraquinones are treated with acid condensing agents (sulphuric acid, aluminium chloride). Examples are the treated products from 4-chlorobenzanthrone and 1-aminoanthraquinone (orange-red), 4:9-dichlorobenzanthrone and 2 mols. of 1-aminoanthraquinone (brown) or 1 mol. of 1-amino-4-methoxyanthraquinone (brown), 4-chlorobenzanthraquinone and 6-chloro-1-aminoanthraquinone (red-brown) or 1:6-diaminoanthraquinone (0.5 mol.: violet-brown).

C. HOLLINS.

Green vat dyes [of the dibenzanthrone series]. B. STEIN, W. TRAUTNER, and R. BERLINER, Assrs. to GRASSELLI DYESTUFF CORP. (U.S.P. 1,713,680, 21.5.29. Appl., 16.9.26. Ger., 20.10.25).—2-Phenylbenzanthrone, m.p. 199–200°, obtained by the action of aluminium chloride at 100–150° on the 3-isomeride, is fused with alkali to give a diphenyldibenzanthrone, which is a bluish-green vat dye.

C. HOLLINS.

Vat dyes [halogenated *ms*-benzodianthrones]. M. A. KUNZ and K. KÖBERLE, Assrs. to GRASSELLI DYESTUFF CORP. (U.S.P. 1,714,427, 21.5.29. Appl., 16.6.27. Ger., 15.3.26).—8:9-Dimethyl-*ms*-benzodianthrene or its 5:10-dichloro-derivative is treated with sulphuryl chloride in nitrobenzene, whereby three or four chlorine atoms are introduced, to give bright orange vat dyes.

C. HOLLINS.

Vat dyes of the isodibenzanthrone series. A. LÜTTRINGHAUS, H. NERESHEIMER, and H. WOLFF, Assrs. to GRASSELLI DYESTUFF CORP. (U.S.P. 1,704,983, 12.3.29. Appl., 9.12.26. Ger., 25.10.24).—Monohalogenated isodibenzanthrones, giving reddish-violet to violet-blue shades, are obtained by condensing a monohalogenated 3:4-dibenzanthronyl, having positions 4 and 3' free, in presence of alkali.

C. HOLLINS.

Azo dyes. L. LASKA, F. KRECKE, and F. WEBER, Assrs. to GRASSELLI DYESTUFF CORPORATION (U.S.P. 1,709,989, 23.4.29. Appl., 29.9.27. Ger., 5.10.26).—2:6-Hydroxynaphthoic acid is coupled with diazo compounds, especially with diazotised *p*-chloroaniline-*o*-sulphonic acid (yellow-red on wool). Other diazo components mentioned are aniline (yellow-red), 5-nitro-*o*-aminophenol (brown, black-brown on chroming), 6-nitro-*o*-aminophenol-4-sulphonic acid (after-chromed violet on wool), benzidine-2:2'-disulphonic acid (red-brown chrome printed on cotton), *p*-toluidine-3-sulphonic acid (red barium lake).

C. HOLLINS.

Azo dyes [for wool] from hydroxynaphthazine derivatives. W. HERSBERG and H. OHLENDORF, Assrs. to GRASSELLI DYESTUFF CORP. (U.S.P. 1,705,974, 19.3.29. Appl., 4.10.26. Ger., 9.6.25).—Diazo compounds are coupled with the hydroxynaphthazines obtained by alkaline fusion from sulphonaphthazines. Examples are: 1:5-dihydroxy- α -naphthazine coupled with diazotised sulphanilic acid (yellow), naphthionic acid (red), 4-chloro-*o*-aminophenol-5-sulphonic acid (orange-brown, violet on chroming); 1:5-dihydroxy- $\alpha\beta$ -dinaphthazine with naphthionic acid (red), 4-aminoazobenzene-4'-sulphonic acid (salmon-red), *p*-sulphobenzeneazo-Cleve acid (red-brown), β -naphthylamine-1-sulphonic acid (bordeaux-red). The 4-chloro-*o*-aminophenol-5-sulphonic acid coupling is specially claimed.

C. HOLLINS.

Monoazo dyes of the pyrazolone series. L. W. GELLER, Assr. to NAT. ANILINE AND CHEM. Co., INC. (U.S.P. 1,711,639, 7.5.29. Appl., 9.10.25).—An *o*-aminonaphtholsulphonic acid is diazotised and coupled with a 1-sulphoarylpyrazolone carrying a methyl or carboxyl group in position 3; e.g., 1:2:4-aminonaphtholsulphonic acid \rightarrow 1-*p*-sulphophenyl-3-methyl-5-pyrazolone (orange-brown on wool, bluish-red after chroming; silk not stained) or 1-(2-chloro-4-sulphophenyl)-3-methyl-5-pyrazolone (yellow-red).

C. HOLLINS.

Manufacture of azo dyes [pigments and ice colours]. I. G. FARBENIND. A.-G. (B.P. 299,332, 22.10.28. Ger., 21.10.27).—An ester of 2:3-aminonaphthoic acid is diazotised and coupled in substance or on the fibre with β -naphthol or a 2:3-hydroxynaphthoic arylamide. Examples are: methyl or ethyl 2:3-aminonaphthoate with 2:3-hydroxynaphthoic *p*-aniside (bluish-red), β -naphthylamide (bluish-red), or 4-chloro-*o*-aniside (bluish-red).

C. HOLLINS.

Vat dyes [of the thioindigoid series]. K. THIESS, C. J. MÜLLER, K. SCHIRMACHER, and K. ZAHN, Assrs. to GRASSELLI DYESTUFF CORP. (U.S.P. 1,712,721, 14.5.29. Appl., 20.12.23. Ger., 27.12.22).— $\beta\beta$ -Naphthathioindoxyl is condensed with 5:7-dibromoisatin and the product (violet-red vat dye) is brominated in nitrobenzene for a bluish-claret (bromine enters position 9 of the naphthathioindoxyl residue). Similar dyes are obtained by brominating the product from $\beta\beta$ -naphthathioindoxyl and isatin, 5-bromo-7-methylisatin, or 6-chloro-7-methylisatin or by chlorinating the product from $\beta\beta$ -naphthathioindoxyl and 5:7-dichloroisatin. C. HOLLINS.

Dyes of the thioindigo series. E. HOFFA and H. HEYNA, Assrs. to GRASSELLI DYESTUFF CORP. (U.S.P. 1,709,982, 23.4.29. Appl., 16.12.26. Ger., 19.12.25).—*O*-Acylated thioindoxyls are condensed with isatins etc., the acyl group being lost during the reaction. Examples are $\beta\beta$ -naphthathioindoxyl *O*-acetate with 5:7-dichloroisatin chloride (blue), 5:7-dichloroisatin (brown-red), 6-chloro-4-methylthioisatin (greyish-blue), acenaphthaquinone (red). C. HOLLINS.

Manufacture of substitution products of sulphur dyes. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 317,776, 22.5.28).—The brown sulphide dyes of B.P. 315,910 (B., 1929, 809) and 317,139 (B., 1929, 896) are converted into orange or bright red dyes by alkylation or aralkylation in substance or on the fibre, particularly by means of phenylbenzyl-dimethylammonium chloride. The dyes obtained in substance can no longer be vatted. C. HOLLINS.

Manufacture of organic salts of dyes [lakes etc.]. I. G. FARBENIND. A.-G., G. KRÄNZLEIN, C. HARTMANN, and A. HARDT (B.P. 316,370, 22.5.28. Addn. to B.P. 277,371).—A non-nitrogenous (e.g., iodonium, phosphonium, sulphonium) base is combined with a dye acid to give insoluble pigments. Examples are: the diphenyliodonium salt of 1-amino-4-anilino-anthraquinone-2-sulphonic acid (blue) or of *m*-toluidino-1-benzamido-8-naphthol-4:6-disulphonic acid (red); di-*o*-tolylmethylsulphonium 1:4-di-*p*-toluidino-5:8-dihydroxyanthraquinonedisulphonate (green); *p*-tolyltriethylphosphonium salt of aminoazobenzene- β -naphthol-8-sulphonic acid. C. HOLLINS.

Dianthraquinonylaminesulphonic acid dye. W. MIEG and H. RAEDER, Assrs. to GEN. ANILINE WORKS, INC. (U.S.P. 1,735,123, 12.11.29. Appl., 17.8.25. Ger., 27.9.24).—See B.P. 240,492; B., 1926, 973.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Resistance of various celluloses to saccharification. P. LEONE (Annali Chim. Appl., 1929, 19, 432—443).—Hydrate celluloses exhibit lowered resistance to saccharification and greater capacity for reaction in other ways. The most readily saccharified are those precipitated from solutions in which the celluloses were dissolved as esters, then come those precipitated from indifferent solutions, and finally mercerised celluloses, which yield, on the average, one half as much dextrose as the natural celluloses. The action of sodium hydroxide solution becomes appreciable at concentrations above 10%, increasing rapidly to 16—18% and slowly after-

wards. Hydrate celluloses prepared with salt (potassium iodide, zinc chloride) solutions behave, as regards saccharification, like natural celluloses, and the salt solutions do not enhance the action of the soda in mercerisation. The hydrocelluloses exhibit about the same resistance to saccharification as the natural celluloses, with appreciable differences for different types. Use of high pressure increases slightly the yield of dextrose if the saccharifying medium is sulphuric acid, but with hydrochloric acid the influence of high temperature and pressure is scarcely appreciable, and in some cases leads to marked diminution in the amount of dextrose formed. The oxycelluloses are hydrolysed rather more readily than natural celluloses, but their behaviour confirms the non-homogeneity of their constitution; they are partly soluble in alkalis, and the part precipitated from alkaline solution is hydrolysed more readily than the insoluble part, but always less easily than hydrate celluloses precipitated from their solutions. The action of zinc chloride on the saccharification of cellulose is always considerable, even on mercerised cellulose, and greatly exceeds that of the mercerising action itself. The insoluble matter obtained on saccharification of cellulose with sulphuric acid under pressure consists largely of partially hydrolysed products of reducing character. T. H. POPE.

Developments in nitrocellulose production. E. P. PARTRIDGE (Ind. Eng. Chem., 1929, 21, 1044—1047).—Improvements in the methods in operation at the Union plant of the Hercules Powder Co. for handling raw materials and products etc. are described. A notable development is the use of chrome iron for the construction of equipment which comes in contact with strong acid, whereby its life is lengthened and contamination of the product is prevented. F. R. ENNOS.

[Cellulose from] lemon residues. MELIS.—See XIX.

See also A., Dec., 1427, **Fractional precipitation of cellulose acetate** (McNALLY and GODBOUT). 1428, **Acetylation and degradation products of lignin** (FRIESE). 1429, **Acetylated wood** (SUIDA and TITSCH). 1473, **Structure of silk fibroin** (ABDERHALDEN and BROCKMANN). 1498, **Determination of lignin by acid hydrolysis** (PALOHEIMO).

PATENTS.

Degreasing of animal fibres. DR. A. WACKER GES. F. ELEKTROCHEM. IND. G.M.B.H. (B.P. 311,394, 7.2.29. Ger., 11.5.28).—After saturation with water or an aqueous solution, the wet material is extracted by means of chlorinated hydrocarbons. F. R. ENNOS.

Treatment of jute fibre and analogous fibres. TEXTILES (NEW PROCESS), LTD. (B.P. 321,140, 18.4.29. Fr., 8.10.28).—The fibre is treated in a bath at 30—33° containing a culture of bacteria obtained from the fermentation of flax and/or hemp, together with potassium phosphate. After removal from this bath it is dried until it contains about 30% of water, passed through the breaker carding machine, mercerised, bleached, treated with an emulsifiable oil, and dried. F. R. ENNOS.

Manufacture of artificial silk. O. FREIHERR VON KOHORN (O. KOHORN & Co.), and A. PERL (B.P. 312,029, 26.7.28. Austr., 18.5.28).—In the cuprammonium stretch-spinning process, the formation of air bubbles in the precipitating liquid may be avoided if the latter is partly freed from its contained gases by keeping it before use at 10–15° above the spinning temperature, and by preventing the production of under-pressure in the spinning apparatus. F. R. ENNOS.

Preparation of artificial silk threads and fabrics. F. J. GAHLERT (B.P. 320,869, 19.5.28).—To produce crêpe yarns, an already prepared and twisted artificial silk thread is softened, sized under tension, dried, and rewound with additional twist. F. R. ENNOS.

Manufacture of cellulose from vegetable fibre. A. G. POLLARD and J. R. WHINCOP (B.P. 321,282, 25.9.28).—Soaked or moistened cellulose material is suitably teased or loosened, treated with chlorine gas, subsequently steeped in an alkali solution of less than 3% concentration, beaten, and washed. Surplus water is removed from the pulp and the chlorine treatment repeated, after which the pulp is washed successively in a slightly alkaline bath (0.1%), in water, in a dilute acid solution, and finally in water till neutral. The process is substantially cold throughout, and the pulp has a high α -cellulose content and is readily esterified. A. G. POLLARD.

Treatment of cellulose-containing materials with mineral acids. INTERNAT. SUGAR & ALCOHOL Co., LTD. (B.P. 299,844, 24.10.28. Ger., 2.11.27).—For the saccharification of cellulose-containing material with hydrochloric acid on the diffusion principle, the material is premashed with a portion of the total acid required and, after transferring the mixture to the diffuser, the treatment is continued with the balance of the acid. The proportions of acid used are such that the temperature reached in the diffuser is below 50°, preferably 25–30°. Premashing for 4 hrs. with half of the total acid or with the acid solution of partially hydrolysed cellulose from a previous diffuser treatment is suggested. A. G. POLLARD.

Production of a liquid- and moisture-proof transparent and flexible material. WOLFF & Co., KOMMANDIT-GES. AUF AKT., R. WEINGAND, and F. W. SPIECKER (B.P. 309,017, 27.7.28. Ger., 3.4.28).—Transparent foils of regenerated cellulose are coated with a cellulose ester lacquer, with which is incorporated a solution of a solid wax, a liquid wax or grease, and a natural or an artificial resin in a solvent miscible with the cellulose ester lacquer, the applied film being exposed for a time to a temperature above the softening point of the waxes. F. R. ENNOS.

[Treatment of] textile materials. R. P. FOULDS, J. T. MARSH, and F. C. WOOD, ASSRS. to TOOTAL BROADHURST LEE Co., LTD. (U.S.P. 1,734,516, 5.11.29. Appl., 2.11.28. Swed., 7.11.27).—See B.P. 291,474; B., 1928, 636.

Electrical insulator (B.P. 297,749).—See XI.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Aniline recovery plant. KREBS.—See III.

PATENTS.

Treatment of felt and felt-hat bodies. E. BÖHM

(U.S.P. 1,729,474, 24.9.29. Appl., 2.9.26. Austr., 1.6.26).—The lustre of felt is increased by treatment with an aqueous solution of a complex compound of a heavy metal of the chromium group. W. G. CAREY.

Preparation of moth-proof articles. W. LOMMEL, H. MÜNZEL, H. STÖTTER, and B. WENK, ASSRS. to I. G. FARBENIND. A.-G. (U.S.P. 1,734,682, 5.11.29. Appl., 2.7.27. Ger., 13.7.26).—See B.P. 274,425; B., 1928, 743.

[Apparatus for] printing textile fabrics. F. ADLER (B.P. 321,603, 18.1.29. Addn. to B.P. 317,122).

Treatment of textile materials in roll form with liquids. G. P. and G. R. ROBERTS (B.P. 321,183, 31.7.28).

Dyeing (B.P. 318,090).—See IV.

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

[Bromocresol-green as] indicator for ammonia titrations. L. H. BAILEY (Cereal Chem., 1929, 6, 454–456).—The various indicators for use in the Kjeldahl distillation of ammonia are briefly reviewed and their limitations described. The neutral points of ammonium chloride and ammonium sulphate are at p_H 5.1 and 5.7, respectively, and the indicator the colour change of which most nearly approaches these values is bromocresol-green. This indicator has a colour range of p_H 4.0–5.6, being yellow in acid solution and blue in excess alkali, passing through an intermediate green at about p_H 5.0. H. J. DOWDEN.

Investigations [of the Shanks system for lixiviation and crystallisation of caliche etc.]. R. GUILIER (Caliche, 1929, 11, 241–247).—Details are given of the technical application of the system. H. F. GILLBE.

Basic processes of manufacturing alumina. G. G. URAZOV and Y. E. VILYANSKI (J. Appl. Chem., Russia, 1928, 1, 271–283).—Sodium chloride has no appreciable effect on the reaction between alumina and sodium carbonate at 500–1050°; the rate of reaction increases with increase in the amount of sodium carbonate present, and depends on the nature of the raw material. Bauxite is preferably fused with sodium carbonate at 980° for 2 hrs. Quick leaching with water leaves 25% of the alumina insoluble; the yield of alumina is largely increased by addition of sodium hydroxide.

CHEMICAL ABSTRACTS.

Soda-lime process of manufacturing alumina from bauxite and aluminium silicates rich in silica. G. G. URAZOV, Y. E. VILYANSKI, and Y. A. MORACHEVSKI (J. Appl. Chem., Russia, 1928, 1, 77–96).—Fusion of aluminium silicates with sodium carbonate affords principally the compounds 1–1.5Na₂O, Al₂O₃, 2–2.5SiO₂ and Na₂O, Al₂O₃. The insoluble residue has a composition corresponding approximately with Na₂O, Al₂O₃, 2SiO₂. The optimum fusion temperature is 850–950°. When nepheline was fused with lime and the mass leached with water the insoluble residue contained all four oxides. When clay was fused with sodium and calcium carbonates more water-soluble soda and alumina were formed than with nepheline. Conditions under which all of the alumina but no silica is extracted were not found. CHEMICAL ABSTRACTS.

Barium process of manufacturing alumina from bauxites and aluminium silicates rich in silica. G. G. URAZOV and A. V. CHITAIEV (J. Appl. Chem., Russia, 1928, 1, 96—109).—By fusion at 1000° or 1200° with barium carbonate 55 or 88—98%, respectively, of alumina becomes soluble. In presence of sodium chloride 93% is so converted at 1000°. Maximum solubility (at 60°) corresponds with the ratio $\text{Al}_2\text{O}_3 : 2\text{BaCO}_3$; no compounds are formed in the system $\text{BaO}-\text{Al}_2\text{O}_3-\text{H}_2\text{O}$. In the system $\text{Ba}(\text{OH})_2-\text{NaCl}-\text{H}_2\text{O}$ (at 60°) no compounds are formed; the highest solubility corresponds with a molecular ratio $\text{BaO} : \text{NaCl} = 1.17 : 1$. In the system $\text{BaO}-\text{Al}_2\text{O}_3-\text{NaCl}-\text{H}_2\text{O}$ (at 60°) the presence of sodium chloride has no effect on solubility. As compared with the fusion of bauxites with sodium carbonate, fusion with barium carbonate converts less alumina into a soluble form, but the product contains less silica.

CHEMICAL ABSTRACTS.

Analysis of lead peroxide. A. V. PAMFILOV (J. Russ. Phys. Chem. Soc., 1929, 61, 1131—1143).—A number of methods which have been suggested for the analysis of lead peroxide are reviewed. A modification of Figg's method (B., 1925, 215) is proposed, in which dissolution is accelerated by triturating 1 g. of lead peroxide with 40 c.c. of saturated sodium acetate in 5% acetic acid solution and adding 10 c.c. of 10% potassium iodide solution. Results obtained agree closely with those obtained by the iodometric methods of Glasstone (B., 1922, 98 A) and of Milbauer and Pivnička (B., 1914, 591), and the thiosulphate method of Liebig (B., 1901, 1027).

R. TRUSZKOWSKI.

See also A., Dec., 1376, **Mixed absorbers** (SCHILOV and others). 1388, **System water-carbon dioxide-ammonia** (JÄNECKE). **Equilibrium between water and the nitrates, chlorides, etc. of sodium and potassium** (CORNEC and KROMBACH). **System $\text{AlCl}_3-\text{FeCl}_3-\text{KCl}-\text{HCl}-\text{H}_2\text{O}$ at 25°** (MALQUORI). 1400, **Oxidation of ammonia to calcium nitrate** (LESCHIEWSKI and others). 1401, **Active oxygen** (COPELAND). 1402, **Electrolytic production of fluorine** (FREDENHAGEN and KREFFT). 1411, **Potentiometric determination of sulphuric acid** (LINDA and ETTINGER). 1498, **Iodine from Black Sea weeds** (AVERKIEV). **Iodine content of marine algae from Galician coasts** (PONDAL).

Preservation of hydrogen peroxide. TELLERA.—See XX.

PATENTS.

Sodium cyanide compound and its production. K. F. COOPER (U.S.P. 1,734,562, 5.11.29. Appl., 1.11.22).—To produce sodium cyanide from the crude compound derived from crude cyanamide, the last-named is dissolved in water and soluble calcium salts are precipitated therefrom by adding a suitable sodium salt; the liquor is then filtered, sodium chloride added, and the solution concentrated and cooled to separate sodium cyanide dihydrate, which is dried under reduced pressure.

W. G. CAREY.

Alkali metal [sodium] compound of a suboxide of titanium and derivatives therefrom. F. VON BICHOWSKY (U.S.P. 1,731,364, 15.10.29. Appl., 4.6.23).—Titanium cyanonitride or carbide is heated at 800° with sodium carbonate whereby a mixture of sodium cyanide

and the blue compound, $2\text{Na}_2\text{O} \cdot \text{Ti}_2\text{O}_5$, is obtained. This compound is decomposed by water yielding the compound, $\text{Na}_2\text{O} \cdot 2\text{Ti}_2\text{O}_5$, as a lavender-coloured powder which on roasting in air affords a voluminous white mass of sodium hexatitanate ($\text{Na}_2\text{Ti}_6\text{O}_{13}$) of value as a pigment.

A. R. POWELL.

Mercuric cyanide tartrate and its manufacture. M. MIYAHARA (U.S.P. 1,732,106, 15.10.29. Appl., 4.6.28. Jap., 9.3.28).—A solution of 1 mol. of mercuric oxycyanide and 1 mol. of tartaric acid is dissolved in alcohol and the solution is evaporated. On cooling, needles of the compound $\frac{\text{CH}(\text{OH})\text{CO}_2}{\text{CH}(\text{OH})\text{CO}_2} > \text{Hg}, \text{Hg}(\text{CN})_2, \text{H}_2\text{O}$

separate. The same substance may be prepared from aqueous solution if a small quantity of sodium tartrate or aluminium borate is added to prevent hydrolysis during evaporation.

A. R. POWELL.

Manufacture of dispersions containing copper. DR. A. WACKER GES. F. ELEKTROCHEM. IND. G.M.B.H., F. KAUFER, and F. X. SCHWABEL (B.P. 321,260, 28.8.28).—Suspensions of copper oxochloride are prepared by treating cupric chloride solution in contact with copper with air or other gases containing oxygen in the presence, if desired, of dispersion-promoting colloids, e.g., dextrin, sulphite-cellulose waste liquor. Such dispersions find application as plant-spraying materials.

L. A. COLES.

Manufacture of lead compounds [oxides]. C. H. BRASELTON (U.S.P. 1,734,285, 5.11.29. Appl., 20.12.20).—A mixture of air and ozone is passed through molten lead maintained at a high temperature, the degree of oxidation being controlled by the quantities and temperature of the mixed gases.

W. G. CAREY.

Manufacture of iron carbonyl. M. MÜLLER-CUNRADI, ASST. to I. G. FARBENIND. A.-G. (U.S.P. 1,725,619, 20.8.29. Appl., 19.10.25. Ger., 5.1.25).—Carbon monoxide under pressure is passed downwards through a heated mass of coarse-grained iron.

A. R. POWELL.

Manufacture of aluminium chlorosulphate. H. BLUMENBERG, JUN. (U.S.P. 1,734,196, 5.11.29. Appl., 18.5.27).—A dehydrated mixture of aluminium oxide and aluminium sulphate is treated with hydrogen chloride fumes.

H. ROYAL-DAWSON.

Preparation of thorium hydride. H. S. COOPER, ASST. to KEMET LABS. CO., INC. (U.S.P. 1,730,723, 8.10.29. Appl., 3.10.25).—Pure thorium powder is heated at 300—375° in an atmosphere of hydrogen.

A. R. POWELL.

Treating [refining] sulphur. E. F. WHITE (U.S.P. 1,734,006, 5.11.29. Appl., 7.4.26).—Sulphur is vaporised and the vapour subjected to mechanical shock to cause partial condensation, the remainder being then cooled.

H. ROYAL-DAWSON.

Production of phosphorus [penta]chloride from phosphate rock. C. G. MINER (U.S.P. 1,730,521, 8.10.29. Appl., 6.7.26).—Briquettes made of phosphate rock, silica, and carbon are heated at a white heat in a reducing atmosphere in the presence of excess chlorine, and the issuing gases are cooled below 160°, whereby

the trichloride combines with the excess chlorine to form the pentachloride. A. R. POWELL.

Production of alkaline or alkaline-earth salts of oxalic acid and saturated monobasic fatty acids. KEMIKAL, INC., Assees. of I. S. MELLANOFF (B.P. 307,784, 1.8.28. U.S., 13.3.28).—See U.S.P. 1,681,156; B., 1928, 857.

Halogen-resistant refractories (B.P. 304,694).—See VIII. **Electrolytic production of oxygen and hydrogen** (B.P. 320,388). **Cells for production of gases** (B.P. 318,734). **Cells for electrolysis of water** (B.P. 292,131).—See XI.

VIII.—GLASS; CERAMICS.

Fuel utilisation in the ceramic industries. A. T. GREEN and A. J. DALE (J. Inst. Fuel, 1929, 3, 102—122).—The influence of the firing operation on clay goods, the thermal reactions involved, the firing of refractory products and of glazed and decorated pottery wares are discussed. Various types of intermittent and continuous kilns and improved methods for their better thermal insulation are described.

C. B. MARSON.

Plasticity of clay. L. E. JENKS (J. Physical Chem., 1929, 33, 1733—1757).—The relative plasticities of different commercial clays and ceramic materials have been measured by a method which depends on the time taken for a ball of the clay to disintegrate when immersed in water, and the effects of the amount of water used in moulding the ball and the time of drying on the relative plasticity have been investigated. The plasticity of kaolin is noticeably increased by the chlorides of the alkalis and alkaline-earths only after a critical concentration, specific for each salt, has been reached, but with the exception of lithium salts the high plasticity does not survive subsequent treatments of the kaolin. The carbonates of the alkalis and alkaline-earths also confer increased plasticity and at lower concentrations than the corresponding chlorides. The addition of lithium chloride to dialysed gelatinous alumina appears to confer a plasticity similar to that of a clay, but this is not the case with gelatinous silica. The effect of the addition of mixtures of electrolytes on the plasticity of kaolin may be additive in certain cases, but, in general, it is greater or less than the sum of the individual effects. The action of flocculating agents in peptising solutions on various clays has also been examined. Criteria of plasticity are discussed, and from the above results it is concluded that the cause of plasticity is the formation in the moistened clay of a continuous, gelatinous, external phase through the action of water on the material forming an enveloping surface around the non-gelatinous particles and aggregates present in clay. The presence of organic matter, carbon dioxide, or electrolytes in the supernatant water or in the clay itself is not the cause of plasticity; these are agents forming the necessary gelatinous material.

L. S. THEOBALD.

Silica refractories for coke ovens. R. RICHARDS (Proc. South Wales Inst. Eng., 1929, 45, 419—461).—The advantages of silica over fireclay refractories

are: greater refractoriness under load, resistance to effect of salty coals, higher heat conductivity, and less tendency to spalling. Each stage of manufacture is considered, particular attention being given to "crushing," as this determines the porosity of the finished product. Correct mixing of particle sizes produces a material of low porosity (22—24%), with a consequently higher conductivity and lower impermeability to gases. The constitution of various raw materials and the changes occurring during the "burning" process are illustrated by photomicrographs. The specifications and methods of test applied by a Continental firm include refractoriness (with and without load), sp. gr., porosity, and thermal expansion.

J. A. SUGDEN.

See also A., Dec., 1407, **Effect of heat on crystalline aluminium hydroxide** (ROOKSBY).

PATENTS.

Manufacture of compound glass. J. H. ROBERTSON (B.P. 321,157, 27.7.28).—A coating of gelatin in phenol on the glass sheets is allowed to set, and its surface is then softened in a bath of ethyl or propyl alcohol. A celluloid sheet is then sandwiched between the sheets of glass and the whole placed in a heated press. Alternatively, the phenol-gelatin layer may be coated with a thin layer of a solution of celluloid in amyl acetate, or the celluloid replaced by cellulose acetate coated with gelatin or celluloid. A. COUSEN.

Non-splintering glass. C. H. FIELD and D. HASLETT (B.P. 321,178 and 321,189, 27.7.28).—(A) Adhesion between glass and cellulose ester sheets is secured by means of phenol-formaldehyde, phenol-formaldehyde-acetone, phenol-formaldehyde-glycerin, phenol-urea-formaldehyde, or glycerin-polybasic acid condensation products, or mixtures of these. The resins may be applied alone or with other materials such as Canada balsam, euphorbium resin, or cellulose ester solutions. (B) The composite sheet, as formed, is submitted simultaneously to pressure, in order to force the sheets together, and to a vacuum, to draw the air and solvent vapours from between the sheets. A. COUSEN.

Bonded refractory. J. D. MORGAN, Assr. to DOHERTY RES. Co. (U.S.P. 1,734,595, 5.11.29. Appl., 17.2.27).—A mixture of zircon and monazite sand is treated with a mineral acid and the mixture is fired. W. G. CAREY.

Manufacture of [halogen-resistant] refractory vessels etc. N.V. ELECTROCHEM. IND. (B.P. 304,694, 23.1.29. Holl., 24.1.28).—Apparatus for the treatment of compounds containing oxygen simultaneously with reducing agents and chlorine is lined with or constructed of insoluble halides, e.g., calcium fluoride, silver chloride. L. A. COLES.

Grinding or abrading means. ARTIFEX CHEM. FABR. G.M.B.H. (B.P. 309,441, 12.2.29. Ger., 10.4.28).—Friable abrasive blocks comprising a caoutchouc substitute (factice) as binder are prepared by adding a liquid which does not react with sulphur or sulphur chloride, e.g., hydrocarbons, their halogen substitution products, hydrogenated naphthalene, to a mixture of

a fatty oil, *e.g.*, rape-seed oil, with sulphur or sulphur chloride and an abrasive powder. L. A. COLES.

Refractory product. I. HARTER and A. M. KOHLER (U.S.P. 1,734,726, 5.11.29. Appl., 25.5.23).—See B.P. 216,514; B., 1925, 718.

Apparatus for feeding of molten glass. T. F. PEARSON (B.P. 321,195, 4.5.28).

IX.—BUILDING MATERIALS.

Reactions in burning cement. A. C. DAVIS (Cement, 1929, 2, 303—314).—Existing knowledge of the heat changes in the dehydration of clay and the formation of cement clinker is reviewed. The latter has been investigated (*a*) by determination of the heat of formation of the component silicates and aluminates, (*b*) by direct reaction in a bomb calorimeter, (*c*) by use of heating curves, and (*d*) by measuring the heat of dissolution of the raw materials and of clinker in acids. The latest determinations (Coghlan, Nacken; by methods *a* and *d*, respectively) give the values 99.16 and 100 kg.-cal. evolved per kg. of clinker formed. R. WENTWORTH.

Spray process of slurry feed. S. J. M. AULD (Cement, 1929, 2, 291—296).—In the Rigby spray-feed for rotary kilns a slurry containing 40% of water is sprayed in counterflow to the hot gases, sufficient evaporation taking place before the spray touches the walls to avoid adherence. Dried slurry is removed from the kiln gases by a lute in the smoke chamber. A decrease of 15—20% in fuel consumption per unit weight of cement is reported, and an increase in output of 20—30% per kiln. R. WENTWORTH.

Manganese in cement clinker. Constitution of cement. A. GUTTMANN and F. GILLE (Zement, 1929, 18, 500—505, 537—541, 570—574; Chem. Zentr., 1929, ii, 206).—In ordinary Portland cement clinker the manganese is present as Mn_2O_3 ; more than 3.3% is undesirable. In high-lime clinker the manganese is contained in the celite. In cements rich in manganese but abnormally poor in alumina quadrivalent manganese is present. A. A. ELDRIDGE.

Physico-chemical principles underlying methods of testing the constancy of volume of Portland cement. I. A. ALEKSANDROV (J. Appl. Chem., Russia, 1929, 2, 303—316).—Faija's method is not sufficiently severe; Heinzl's method is misleading. Le Chatelier's method is acceptable. Drying at 120° followed by treatment with steam affords promise of a practical method. Storage under water for 28 days yields valuable results. CHEMICAL ABSTRACTS.

PATENTS.

Waterproofing of stone. S. S. SADTLER, ASST. to AMESITE ASPHALT CO. OF AMERICA (U.S.P. 1,730,245, 1.10.29. Appl., 24.3.27).—See B.P. 309,634; B., 1929, 520.

[Grooved rock-asphalt] road pavements and the like. HIGHWAYS CONSTRUCTION, LTD., and C. W. RHODES (B.P. 321,544, 6.11.28).

Concrete building blocks [lined with sugar-cane fibre] and their manufacture. H. S. PALMER (B.P. 321,435, 7.7.28).

Cooling apparatus (B.P. 321,036).—See I. Pitch composition (B.P. 295,687).—See II.

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

Corrosion of metals and its prevention. H. E. YERBURY (Proc. Inst. Mech. Eng., 1929, 545—558).—A review of known facts as to the causes of corrosion, with especial reference to engineering materials, and an account of modern methods of preventing corrosion by the development of materials more highly resistant to corrosive media and by the use of suitable protective coatings. A. R. POWELL.

Pickling [of iron and steel]. K. TAUSSIG (Arch. Eisenhüttenw., 1929—30, 3, 253—266; Stahl u. Eisen, 1929, 49, 1655—1656).—The rate of scale removal from iron and steel by sulphuric acid of concentrations between 2 and 20% with and without the addition of inhibitors has been determined at temperatures between 10° and 80°. Ferrous sulphate retards the dissolution of iron in the pickling liquor only when the acid concentration is less than 10%. Feebly acid liquors at low temperatures remove scale only slowly, so that it is preferable to work with hot acid of medium concentration (*e.g.*, 20%) until the concentration falls to 10%. The liquor is then cooled to allow ferrous sulphate crystals to separate and the mother-liquor is used again in making up a fresh bath. A. R. POWELL.

Volume change of cast iron during solidification. K. HONDA, T. KASE, and Y. MATUYAMA (Bull. Inst. Phys. Chem. Res. Tokyo, 1929, 8, 527—538).—The results of Honda and Endo (A., 1926, 897) have been verified. F. J. WILKINS.

Nature of the fracture of steel and the significance of the transition region in the notched-bar impact test. F. FETTWIS (Stahl u. Eisen, 1929, 49, 1621—1627).—As a result of a review of the earlier work of himself and others on the variation of the impact strength of notched steel bars with the conditions of testing, the author concludes that the transition zone in the impact-test curves, in spite of its varying shapes, always conforms to the same laws; thus, if in the curve showing the relation between impact strength and width of the test piece this zone is broad and irregular, it will similarly appear in the temperature-impact strength curve. The change from fibrous to granular fracture is always irregular even when the impact strength shows a gradual transition. The fibrous fracture is not connected with any definite crystal plane, but granular fracture takes place along crystallographically defined cleavage planes. The nature of the fracture depends entirely on the state of strain set up inside the metal in opposition to the breaking force. A. R. POWELL.

Volumetric determination of carbon in difficultly combustible iron and steel alloys. E. ZINDEL (Chem. Ztg., 1929, 53, 891).—As a catalyst in the combustion of ferro-alloys and complex alloy steels the addition of soft iron or mild steel turnings of known carbon content is recommended in place of the usual bismuth oxide. Complete combustion of all the carbon is effected in a short time at the temperature required

for a plain carbon steel, and there is no action on the walls of the tubes such as is obtained when using bismuth oxide.

A. R. POWELL.

Determination of manganese and iron by successive titration with permanganate. I. S. TELETOV and N. N. ANDRONNIKOVA (*J. Appl. Chem., Russia*, 1929, 2, 289—292).—The solution, containing ferric and manganous ions, is treated with sodium hydroxide and hydrogen peroxide, the precipitate being washed with water and dissolved in 0.1*N*-oxalic acid solution containing sulphuric acid. For the determination of iron the solution is filtered through reduced cadmium and again titrated with permanganate. CHEMICAL ABSTRACTS.

Smelting in the lead blast furnace. I. Approximation of the form of the lead in slag and other products. II. Gases from the top of the furnace. G. L. OLDRIGHT and V. MILLER (*U.S. Bur. Mines, Rep. Invest.*, 1929, No. 2954, 8 pp.; 2957, 18 pp.).—I. The sample (0.5–5 g.) is dissolved in ammonium acetate solution, diluted to 100 c.c., and boiled for 10 min.; the solution is filtered and the residue washed. The filtrate contains lead originally present as oxide, sulphate, or basic sulphate. The residue is treated for 1 hr. at the ordinary temperature with 10% silver nitrate solution (10–20 c.c.), the mixture being then filtered and the residue washed. The filtrate contains the lead originally present as metal. The residue is treated at 25–28° for 12 hrs. with 25–30 c.c. of saturated aqueous sodium chloride containing ferric chloride (60 g. of hexahydrate per litre). The filtrate contains lead originally present as sulphide, and the residue that as silicate.

II. The furnace gases contain very little sulphur. The carbon monoxide content is similar to that of iron blast-furnace gas. Analyses of samples from different positions are recorded.

CHEMICAL ABSTRACTS.

Double [metal] as a constructional material for apparatus. G. DURST (*Chem.-Ztg.*, 1929, 53, 837–838).—For the construction of large vessels with an acid-resisting inner surface, double metal, consisting of silver or 18-carat gold on a backing of copper or bronze, provides a material having a long life. In order to prevent diffusion of the silver or gold into the base metal a thin layer of nickel or a nickel-iron alloy is interposed between the precious and base metals during the welding operation, which is effected by a pressure of 100 atm. at 700–800°. After rolling into sheet the latter may be fabricated into apparatus in the usual way; joints may be made by welding the inner surface with the appropriate precious metal, after which the outside of the joint is filled in with silver solder or simply brazed.

A. R. POWELL.

Electrolytic preparation of zinc. G. EGER (*Chem.-Ztg.*, 1929, 53, 857–858, 878–879).—Technical practice in the preparation of electrolytic zinc in Europe and America is briefly reviewed. The two methods which have been tried, using soluble anodes, as in copper refining, and inert anodes, are discussed. In modern operations the latter only is used. The electrolyte may be either of zinc chloride or sulphate, but difficulties encountered when employing the former, such as utilisation of the anodic chlorine and the need of diaphragms,

have resulted in the adoption of the sulphate method only. Modern practice, employing a zinc sulphate solution, lead anodes, and aluminium cathodes, is considered under the headings: (a) the roasting of the ore, (b) the leaching of the roasted ores and purification of the liquors, (c) the electrolysis and production of metallic zinc, (d) the melting of the zinc cathode, and casting in bars. For the production of a good zinc deposit the heavy-metal impurities should not exceed (mg. per litre of electrolyte): copper 10, arsenic 1, iron 30, cadmium 12, cobalt 1. A current density of 340 amp. per m.² of cathode with a current efficiency of 90% is desirable, the zinc deposit being stripped from the cathodes every 24–48 hrs. A current strength of 8000–11,000 amp. at 500 volts (total) is applied across all the cells in series, giving a potential drop across each cell of 3.2–3.6 volts. Flow sheets are given for this and for the Tainton processes. In this latter process more concentrated (30%) sulphuric acid is used for leaching the roasted ores and a current density of 1000–1100 amp. per m.² is employed. The cells are not in cascade, but on the same level, whilst the solution flows in and out of each one separately, the energy consumption being 4–4.5 kw.-hrs. per kg. of zinc. The anodes in this case consist of lead-silver alloy; addition of certain organic and inorganic substances to the solution is found to prevent the anodic evolution of gases containing acid.

G. E. WENTWORTH.

Cadmium plating. I. T. WATANABE and C. TSUCHIMOTO (*J. Min. Met. Japan*, 1929, 7, 3–10, 34–40).—When cadmium is deposited on iron from cyanide solutions the cathode current efficiency scarcely changes up to the point of gas evolution (1.75 amp. per dm.²). If the current density is too low the deposit is crystalline. The concentration has little effect on current efficiency, but the current density necessary to produce a good deposit tends to increase with concentration. The character of the deposit is good when the potassium cyanide concentration is above 1.5*N*. The effect on the deposit of the addition of various substances has been studied. Cadmium is more effective than zinc in protecting iron.

CHEMICAL ABSTRACTS.

[Treatment of] manganese ore by the Bradley process. C. ZAPFFE (*Min. and Met.*, 1929, 10, 428–429).—The separation of manganese and iron in mixed ores of varying composition is effected by roasting the ore and leaching out manganese oxide by means of a solution of ammonium sulphate. Iron oxide and silica are present in the residue, from which iron oxide is separated by magnetic wet concentration. Manganese hydroxide is precipitated from the solution by means of ammonia, evolved and collected from the leaching process, re-forming ammonium sulphate in solution, which after concentration is used again for leaching; the process thus becomes cyclic. In practice the extraction is made in two stages, freshly roasted ore being treated with liquor already heavily charged with manganese sulphate and later with a fresher solution of ammonium sulphate to complete the extraction, which is of the order of 90%. Excess of ammonium sulphate in solution covers possible variation in the composition of the ore. A plant of commercial size is proposed.

C. A. KING.

Lime process for coating aluminium. L. McCULLOCH (Amer. Electrochem. Soc., Sept., 1929. Advance copy. 3 pp.).—A dead-white coating can be produced on aluminium by boiling in an aqueous suspension of lime and calcium sulphate. The coating appears to consist mainly of hydrated aluminium oxide with a certain proportion of calcium sulphate. It is extremely fine-grained and adherent, but not so hard or resistant to corrosion as that produced by anodic treatment of aluminium. Some advantages of the process are pointed out.

H. J. T. ELLINGHAM.

Inverse segregation in duralumin. S. M. VORONOV (Z. Metallk., 1929, 21, 310—316).—Commercial aluminium, even that containing 99—99.5% Al, and all solid-solution aluminium alloys exhibit the phenomenon of inverse segregation on casting into ingots. With aluminium containing 0.4—0.5% Fe and 0.3% Si the outer skin of the ingot frequently contains 1.3—1.7% Fe and 0.75% Si. Small exudations which appear on solid-solution alloys of aluminium with copper, magnesium, or nickel may contain 3—4 times as much of the alloying element as does the remainder of the ingot. Some tests on duralumin showed a gradually decreasing copper content from 5.05% at the outside of the ingot to 3.65% in the middle when cast under normal conditions; after casting from 750° the difference between outside layer and core amounted to 0.28% Cu only. Casting in a mould preheated at 200° still further reduced the segregation owing to the slower rate of cooling permitting diffusion to take place. The occurrence of inverse segregation in a duralumin ingot leads to defects in the finished material after rolling and heat treatment; to avoid segregation the metal should be somewhat overheated and cast into preheated moulds as rapidly as possible. In any case removal of the casting skin by planing is to be recommended before rolling.

A. R. POWELL.

Non-porous aluminium alloy for vacuum-chamber castings. E. C. NICHOLS (J. Opt. Soc. Amer., 1929, 19, 164—165).—The alloy consists of 95% Al and 5% Si. It has an ultimate strength of 20,000 lb./in.², elongation 4.6%, Brinell hardness 40. It should be cast at 677°, and is rendered closer grained by annealing at 400°. A vessel made thereof maintained a vacuum of 0.008 mm. of mercury practically unchanged for a week.

C. A. SILBERRAD.

Chemical resistance of aluminium coated with anodic films. S. SETOH and A. MIYATA (Bull. Inst. Phys. Chem. Res. Tokyo, 1929, 8, 900—916).—Aluminium may be oxidised anodically in a dilute solution of oxalic acid. Corrosion and pitting may be prevented by superposing an alternating current on the direct current. If the film-coated aluminium is treated with high-pressure steam for a few minutes, it is waterproofed and its chemical resistance is increased. The chemical resistance is limited by the porosity of the film, and perfect protection can be obtained only with pure aluminium.

C. W. GIBBY.

Centrifugal casting. H. SIMON (Z. Metallk., 1929, 21, 302—304).—Some examples are given of the value of the centrifugal casting process in producing high-

strength castings of relatively small size. For example, sand castings of red brass with 84.8% Cu, 5.1% Sn, 3.9% Pb, and 6.2% Zn have tensile strength 12 kg./mm.² and elongation 9%; centrifugal castings of the same alloy have tensile strength 35 kg./mm.², elongation 27%. The corresponding figures for aluminium are: (a) sand-cast, 13 kg./mm.², 10%; (b) centrifugal cast, 21 kg./mm.², 18%; for copper: chill-cast, 25 kg./mm.², 30%; (b) 32 kg./mm.², 32%; and for 63:37-brass: (a) 32 kg./mm.², 24%; (b) 46 kg./mm.², 34%.

A. R. POWELL.

Casting texture of metals and alloys. F. C. NIX and E. SCHMID (Z. Metallk., 1929, 21, 286—292).—From X-ray examination of the casting structure of various metals, it is shown that, except in the case of the hexagonal metals zinc and cadmium, most metals have a fibre structure with a simple crystallographic direction parallel to the longitudinal axis of the radial crystals which spread inwards from the cooling surface. In metals with a cubic structure this direction is the (100), in tetragonal metals the (110), and in rhombohedral metals the (111). In hexagonal metals the basal plane is parallel to the axis of the radial crystals and the metals have a ring-fibrous structure. In the aluminium-silicon eutectic, only the aluminium has the characteristic casting structure, the silicon being irregularly oriented, but in the cadmium-zinc eutectic both metals have their characteristic casting structure.

A. R. POWELL.

Segregation in certain non-ferrous alloys. R. LAW (J. Soc. Chem. Ind. Victoria, 1927, 27, 1414—1431).—The only alloy of copper and silver which is homogeneous after cooling is the eutectic mixture containing 71.8% Ag. When the silver content is greater, more copper is found at the exterior of the ingot than the known average content, and if the silver content is less than 71.8%, the surfaces are found to be enriched in silver. Examples of segregation of gold and lead and of gold and arsenic are given, and the present theories of segregation are summarised.

C. A. KING.

Coke-oven gas in industry. EVANS. Gas producers for metallurgical furnaces. ATKINSON.—See II. Physico-chemical properties of fatty acids. LEDERER.—See XII.

See also A., Dec., 1369, Vanadium-carbon system (OYA and OSAWA). Thermomagnetic analysis of oxides and minerals (HUGGETT). 1370, Effect of iron on magnetic susceptibility of aluminium (MASON). 1373, Volume changes during solidification of metals and alloys (GOODRICH). 1374, Eutectic and eutectoid alloys in binary systems (SALDAU). 1375, Solubility of copper in ferro-nickels (CHEVENARD). 1402, Separation of chromium from solutions (LIEBREICH and DUFFEK). Electrodeposition of molybdenum (MERRILL and RUSSELL). Electrodeposition of tungsten (JACKSON and others). Electrolysis of molten ternary alloys (KREMAN and others). 1408, Preparation of rhenium (NODDACK and NODDACK). 1413, Potentiometric determination of chromate (MAYR and BURGER). 1414, Volumetric determination of manganese (KOLTHOFF and SANDELL). 1416, Determination of lead (HOLMES and MORGAN).

PATENTS.

[Open-hearth] furnace. A. SIMONET (U.S.P. 1,733,829, 29.10.29. Appl., 14.2.27).—The furnace is provided with a trough embedded in the walls at the height of the normal melting level. The bottom of the trough is inclined downwardly to the wall of the furnace through which cooling pipes pass. An auxiliary longitudinal pipe discharges a cooling liquid against the outer walls of the furnace. C. A. KING.

Operating a hearth-type furnace [for lead ores]. H. R. MACMICHAEL, Assr. to AMER. SMELTING & REFINING Co. (U.S.P. 1,730,582, 8.10.29. Appl., 3.6.27).—The charge of ore and fuel is fed into a reverberatory furnace with a well-shaped hearth terminating in an inclined portion on which a mechanical shovel operates to throw back continuously that portion of the charge which rolls on to it from the back of the well.

A. R. POWELL.

Smelting furnace and method of smelting. R. A. WAGSTAFF, Assr. to AMER. SMELTING & REFINING Co. (U.S.P. 1,729,408, 24.9.29. Appl., 27.6.25).—A reverberatory furnace for matte smelting comprises a shelf composed of fired lumps of chromite on to which the charge is fed against a water-cooled back wall. The flames from an oil- or powdered coal-fired burner play on to the front of the charge in such a manner that the molten material runs forward into a settling chamber indirectly heated by the hot gases in the melting zone.

A. R. POWELL.

Furnaces [for heating billets etc.]. G. and D. M. NAISMITH (U.S.P. 1,732,137—8, 15.10.29. Appl., [A] 12.12.27, [B] 19.12.27).—The furnace described in (A) is regenerative and that in (B) is recuperative. In (A) all the gases pass from one set of regenerators through an immediately adjoining goods chamber, and most pass to the other set of regenerators; some of the gases, however, are taken from the goods chamber, through a preheating chamber (which is in an extension of it), and pass directly to the stack. In (B) both gas and air pass horizontally through the recuperator, mix in a vertical passage, then pass through a lower inlet port (or ports) to the goods chamber, through which they circulate upwardly and leave by an upper outlet port, thence downwardly through the recuperator.

B. M. VENABLES.

[Blast-furnace] tuyère. G. G. CRAWFORD (U.S.P. 1,727,337, 10.9.29. Appl., 1.2.26).—A copper casting having a chamber for circulation of a cooling medium is joined to a cover by a fused-metal joint. The walls of such casting are uniformly thick, and their interior surfaces are polished in order to reduce the deposit of sediment.

J. S. G. THOMAS.

Apparatus for treating [iron] ores. C. A. BRACKELSBURG, Assr. to MAGUIRE, INC. (U.S.P. 1,729,534, 24.9.29. Appl., 17.6.27).—The ore mixed with sodium carbonate and a small proportion of sodium hydroxide is formed into small spheres, which are fed into the upper part of a blast-heating device through which is blown a current of hot, compressed air; thus the ore is roasted under pressure and the alumina and chromic oxide contents are converted into sodium aluminate

and chromate. Means are provided for charging and discharging the roasting chamber while maintaining a high pressure therein and for returning the waste gases to a regenerative heating unit.

A. R. POWELL.

Treatment of ores and metallurgical products. H. G. HEINE, Assr. to F. KRUPP GRUSONWERK A.-G. (U.S.P. 1,731,898, 15.10.29. Appl., 23.4.27. Ger., 28.4.26).—The material is heated in a kiln in which zones of uniform reaction temperature are formed by locally reducing the cross-section of the kiln so that the height of the material is varied, e.g., by the introduction of steps.

A. R. POWELL.

Reduction of [iron] ores. B. CHRISTIANSEN (U.S.P. 1,728,784, 17.9.29. Appl., 19.12.28. Swed., 23.12.27).—The ore is passed successively through (A) preheating, (B) pre-reduction, and (C) final reduction zones in a long tunnel kiln. In A the ore is heated by waste gases from C, which then pass through a glowing mass of carbon at 1500° in a carbonising furnace until the temperature falls to 1200°, the carbon monoxide being passed through zone C of the reduction furnace. Steam is passed into the carbonising furnace until the temperature falls to 800°, and the resulting water-gas is used for the pre-reduction in B. Finally, air is blown through the carbonising furnace to reheat it to 1500°. Three carbonising furnaces are used for one reducing kiln, the furnaces being used in such a manner that one is being reheated while the next supplies carbon monoxide and the third water-gas.

A. R. POWELL.

Roasting and reducing [iron] ores. B. CHRISTIANSEN (U.S.P. 1,732,672, 22.10.29. Appl., 6.1.28. Norw., 29.1.27).—The ore is roasted by means of the heat generated by the combustion of the waste gases from the pre-reduction zone of the three-stage furnace described in U.S.P. 1,728,784 (preceding). Both the pre-reduction and complete reduction of the ore are effected by means of producer gas from recarbonising furnaces fed with part of the waste gases from the reducing furnace.

A. R. POWELL.

Puddling of iron. J. B. SCHLOSSBERG, Assr. to AMER. CHAIN Co., INC. (U.S.P. 1,730,044, 1.10.29. Appl., 26.4.27).—Mixed iron and steel scrap in quantity sufficient for several puddling furnaces is melted, samples are analysed from time to time for phosphorus, silicon, manganese, and carbon, and the requisite quantity of these elements is added to the molten metal to give it the desired composition. As required, quantities of iron are withdrawn into a rotary or an oscillating puddling furnace and the stock is made up by addition of more scrap etc., so that a continuous supply of metal of regular composition is available for the puddling furnaces.

A. R. POWELL.

Treatment of moulds. H. C. BUGBIRD, Assr. to S. D. WARREN Co. (U.S.P. 1,730,801, 8.10.29. Appl., 1.11.27).—A mould dressing comprises an unctuous powder prepared by boiling precipitated calcium carbonate with oleic acid until the particles become coated with calcium oleate, filtering, and drying.

A. R. POWELL.

Treatment [quenching] of metals. D. M. TILLER and W. W. FERREE (U.S.P. 1,731,641, 15.10.29. Appl.,

16.8.26).—The tensile strength of copper, aluminium, silver, gold, and steel is claimed to be materially increased by quenching the metal from 250–500° in a solution of sodium chloride and mercuric iodide in dilute acetic acid or in a mixture of fish oil and mercuric chloride.

A. R. POWELL.

Treatment of malleable [iron] castings. I. R. VALENTINE, Assr. to GEN. ELECTRIC CO. (U.S.P. 1,734,928, 5.11.29. Appl., 20.5.26).—The casting is coated successively with copper and with zinc, and aged at a temperature above 100° but below that which would cause the zinc to peel off.

F. G. CROSSE.

Making composite [steel-cast iron] castings. C. M. WALKER, Assr. to R. L. McELROY and J. E. SHEPHERD (U.S.P. 1,729,848, 1.10.29. Appl., 10.11.26).—A steel reinforcing rod is coated electrolytically with a thin deposit of copper, immersed in borax solution, dried, and placed in the mould, which is then filled with cast iron. The copper coating acts as a solder between the two metals and ensures a sound union between steel and cast iron.

A. R. POWELL.

Cast-iron alloys [containing molybdenum]. MOLYBDENUM CORP. OF AMERICA, Assees. of H. L. GREENE and C. TAYLOR (B.P. 289,075, 21.4.28. U.S., 21.4.27).—The alloys contain 1–4% Ni, 0–1% Mo, 0–2.5% Si, and 2–4% C. The preferred composition is 1.5% Ni, 0.25% Mo, 2.5% Si, and 2–4% C. [Stat. ref.]

A. R. POWELL.

[Chromium] alloy steel. F. F. McINTOSH, Assr. to CRUCIBLE STEEL CO. OF AMERICA (U.S.P. 1,730,780, 8.10.29. Appl., 12.1.28).—The steel contains 0.1–1.0% C, 8–18% Cr, 0.9–1.3% Mn, 0.08–0.15% P, and 0.05–0.15% S.

A. R. POWELL.

Removal of foreign substances from metal [steel] surfaces. C. F. DINLEY (U.S.P. 1,729,765–7, 1.10.29. Appl., [A] 11.2.25, [B] 14.8.26, and [C] 30.11.27. Renewed [B] 7.12.27).—(A) Rust and oil are removed from steel surfaces by spraying them with a mixture of a solvent for the rust, an organic solvent for grease, an absorbent mineral powder, and iron phosphate to act as a suspending agent to keep the mass in the form of a smooth paste. The paste is allowed to dry on the surface and then brushed off. The mixture comprises (B) phosphoric acid 120 g., methyl ethyl ketone 81 g., raw sienna 135 g., powdered charcoal 45 g., and water 230 g.; or (C) ferric phosphate 32 g., 75% phosphoric acid 45 c.c., fuller's earth 125 g., kaolin 75 g., alcohol 250 c.c., and water 250 c.c.

A. R. POWELL.

Production of a hard surface on [cutting] tools etc. F. L. SCOTT, Assr. to HUGHES TOOL CO. (U.S.P. 1,733,241, 29.10.29. Appl., 6.8.28).—Particles of tungsten carbide are sintered on to the cutting edges of the tool.

C. A. KING.

Case-hardening process. G. W. SCHWAB and F. J. SCHWEIZER, JUN. (U.S.P. 1,730,247, 1.10.29. Appl., 12.1.26).—Hydrocarbon gas is passed through a cracking chamber provided with baffles to collect the carbon deposited, and the issuing hot gases are passed into the carbonising vessel over a nickel-iron alloy, which is claimed to act as a catalyst in the case-hardening operation.

A. R. POWELL.

Manufacture of finely-divided metals [iron]. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 321,336, 19.11.28).—Ferric chloride vapour mixed with hydrogen in large excess is passed downwards through a vertical tube, heated at 1000° by means of a stream of nitrogen, in such a manner that the ferric chloride is reduced to iron in the central part of the tube without coming into contact with the walls. The ratio $H_2 : HCl$ in the issuing gases should exceed 10 : 1.

A. R. POWELL.

Recovery of copper from ores etc. H. LAVERS and B. TAPLIN (B.P. 321,213, 2.8.28).—The coarsely ground ore is heated to redness in the presence of a small quantity of a carbonaceous material and a chloridising agent, e.g., sodium chloride, and the cooled mass is subjected without further grinding to a flotation treatment. The process is especially suitable for the concentration of mixed oxide-sulphide ores.

A. R. POWELL.

Winning of metals from metal-bearing materials. R. RODRIAN (U.S.P. 1,728,735, 17.9.29. Appl., 22.6.27).—The finely-ground ore is treated with a hot, concentrated, alkaline sulphide solution which dissolves any sulpho-acids and converts the sulpho-bases into finely-divided sulphides which remain in suspension. The thick suspension is separated from the sediment of non-metallic substances and diluted to allow the suspended sulphides to settle; the clear liquor is electrolysed for the recovery of soluble metals and the sulphide precipitate is smelted.

A. R. POWELL.

Recovery of tin and similar functioning metals from materials containing them. H. V. WELCH, Assr. to INTERNAT. PRECIPITATION CO. (U.S.P. 1,729,196, 24.9.29. Appl., 20.4.27).—Slag containing tin is blown in a converter with a blast containing sufficient carbonaceous material to maintain the temperature and small quantities of powdered sodium or calcium chloride, whereby the tin is volatilised as stannous chloride. Addition of lime to the slag assists in the liberation of the tin.

A. R. POWELL.

Removal of certain constituents from metal-bearing materials. H. V. WELCH, Assr. to INTERNAT. PRECIPITATION CO. (U.S.P. 1,730,548, 8.10.29. Appl., 20.4.27. Cf. U.S.P. 1,729,196, preceding).—Copper, lead, zinc, silver, and gold are recovered from molten materials containing them by blowing the material in a converter with a blast containing powdered fuel and a halidising agent, e.g., sodium chloride, whereby the metal is volatilised as the corresponding halide.

A. R. POWELL.

Extraction of copper-nickel matte. W. J. HARSHAW and G. L. HOMER, Assrs. to HARSHAW CHEM. CO. (U.S.P. 1,729,423, 24.9.29. Appl., 28.4.26).—Bessemerised nickel-copper matte is ground to about 10-mesh and boiled with dilute sulphuric acid until no more nickel dissolves. The residue is dried, roasted at 300–500°, and leached first with very dilute sulphuric acid to dissolve copper sulphate and then with more concentrated acid to dissolve nickel sulphate and more of the undecomposed nickel sulphide. The process is repeated until no further copper and nickel are extracted.

A. R. POWELL.

Freeing copper from copper oxide. H. S. LUKENS and R. P. HEUER (U.S.P. 1,730,775, 8.10.29. Appl., 29.12.24).—The copper is melted in an electric furnace under a layer of slag which acts as a solvent for the copper oxide. As the slag becomes saturated with copper oxide it is removed, treated with a reducing agent in a second furnace to recover the copper, and returned to the first furnace for use again. A. R. POWELL.

Treatment of ores etc. containing acid oxide-forming metals, e.g., chromium, manganese, molybdenum, titanium, uranium, for the formation of salts thereof and useful by-products. R. W. STIMSON (B.P. 320,845, 21.4.28).—The ore is roasted at 700° with an alkali nitrate under about 2 atm. pressure, the nitric oxide evolved is cooled and mixed with air to form nitrogen peroxide, and this is passed into a second reaction vessel containing further quantities of ore and a base forming a soluble compound with the acidic oxide of the ore. The roasted products are leached with water and the solution is evaporated for the recovery of the soluble salts; the iron oxide residue from leaching is in a porous form suitable for smelting in an iron blast furnace after briquetting. A. R. POWELL.

Treating ores [by chloridising roasting]. R. F. MEYER, ASST. to MEYER MINERAL SEPARATION CO. (U.S.P. 1,730,584, 8.10.29. Appl., 16.4.26).—Sulphide ores are roasted, at a temperature below that at which the sulphate of the contained metal decomposes, in a furnace provided with means for advancing the charge through its entire length. During its progress sodium chloride is added in small portions and the charge is subjected at 450° alternately to the action of hot moist air and of air, steam, and sulphur dioxide. The product is subsequently leached for the recovery of the valuable metal as chloride and sulphate. A. R. POWELL.

Treatment of arsenious ore. A. R. LINDBLAD (U.S.P. 1,729,351, 24.9.29. Appl., 2.12.27. Swed., 7.7.27).—Arsenic trioxide obtained by roasting ores containing arsenic is converted into calcium arsenate by roasting with lime in excess, and the product is then smelted with a basic slag which converts the arsenic into an insoluble compound. A. R. POWELL.

Flotation process [for oxidised lead-silver ore]. H. R. WILSON (U.S.P. 1,733,570, 29.10.29. Appl., 3.4.28).—Oxidised ores containing silver associated with lead and the mineral argentorjarosite are floated first with amyl xanthate to obtain a rich silver concentrate, then with amyl xanthate and sodium sulphide to recover the remainder of the silver together with the lead. A. R. POWELL.

Manufacture of bearing metals. INTERNAT. GEN. ELECTRIC CO., INC., ASSEES. of ALLGEM. ELEKTRICITÄTS-GES. (B.P. 308,983, 2.4.29. Ger., 2.4.28).—Bearing metal capable of absorbing lubricant is produced by sintering into a porous mass metal, such as iron or steel, in the form of small particles or powder. F. G. CROSSE.

[Non-corrodible copper] alloys. BARBER ASPHALT CO., ASSEES. of A. B. DAVIS (B.P. 294,233, 30.5.28. U.S., 21.7.27).—The alloy comprises 80–90% Cu, 2–10% Ni, and 1–8% Sn, together with silicon in an amount

sufficient to saturate the alloy. The toughness and hardness are increased by the addition of 0.1–2.0% Cr and/or 0.2–5% Mn. Sharp castings are produced by adding 0.5–2% Sb. A. R. POWELL.

Apparatus for refining metals [lead]. H. W. YORK, ASST. to AMER. SMELTING & REFINING CO. (U.S.P. 1,733,522, 29.10.29. Appl., 9.2.27).—In the apparatus described in U.S.P. 1,706,722 (B., 1929, 687) the revolving table on which the reaction between the sulphur and the lead takes place is replaced by a series of sloping baffles arranged in a vertical direction alternately on either side of the reaction vessel. A. R. POWELL.

Refining of lead. J. P. WALKER (U.S.P. 1,731,365, 15.10.29. Appl., 25.8.28).—Molten lead is agitated with dried slaked lime and air whereby zinc, arsenic, and antimony are rapidly oxidised. A. R. POWELL.

Cleaning [tinned] metal surface. H. ADLER, ASST. to DIVERSEY MANUF. CO. (U.S.P. 1,734,706, 5.11.29. Appl., 29.3.26).—The surfaces are treated with a solution of trisodium phosphate in the presence of sodium dichromate; corrosion is thereby inhibited. H. ROYAL-DAWSON.

Manufacture of metallic substances with a fibrous structure. KAISER-WILHELM-INST. F. EISENFORSCHUNG (B.P. 296,986, 27.8.28. Ger., 10.9.27).—Wood, bone, asbestos, etc. is treated in any suitable manner for the extraction of non-fibrous substance, heated at 240°, and immersed in a bath of molten tin under 50 atm. pressure for a few seconds. The product is capable of taking a high polish, may be split and grained, and does not bend or kink in thin sections. A. R. POWELL.

Extrusion of metal. BRIT. INSULATED CABLES, LTD., and J. G. LAUDER (B.P. 320,928, 24.7.28).—Metal rod, tube, or wire is coated with aluminium or an analogous metal by passing the wire etc. through aluminium in a plastic condition under pressure and extruding the plastic metal around the wire through a die. The wire is protected from contact with the aluminium until almost entering the die, by means of a straight tubular sheathing passing through the wall of the metal container and extending nearly to the die aperture. C. A. KING.

Manufacture of chromium articles. ELECTRICAL RESEARCH PRODUCTS, INC., ASSEES. of S. R. MASON (B.P. 309,539, 28.3.29. U.S., 12.4.28).—Tubular articles or dies for drawing wire are made by depositing chromium on a core which is afterwards removed. The core may be of a highly polished metal of low m.p. C. A. KING.

Storage of alkali and other readily oxidisable metals. BRIT. THOMSON-HOUSTON CO., LTD., ASSEES. of D. H. BROPHY and W. A. RUGGLES (B.P. 296,347, 22.8.28. U.S., 29.8.27).—Cesium is obtained by distillation of a mixture of cesium chloride and calcium *in vacuo* in a nickel container heated in an induction furnace. The distillate is collected in a glass bulb and transferred to a narrow tube-still in a vacuum. The still is filled with a dry hydrocarbon oil and the vacuum broken. The metal is melted below the oil and transferred to numerous small capillary tubes by placing the capillary in a closed tube below the surface of the molten metal, breaking the end of the outer

tube, and drawing the metal into the capillary by suction. The latter is removed from the liquid and sealed.

A. R. POWELL.

Reclamation of scrap metals. T. D. STAY, Assr. to ALUMINUM CO. OF AMERICA (U.S.P. 1,729,631, 1.10.29. Appl., 28.10.21. Renewed 24.3.27).—The metal, *e.g.*, aluminium or one of its alloys, is treated with a magnet to remove iron, then fed centrally into a bath of similar metal melted in a kettle provided with a stirring gear which produces upward and downward currents in the metal bath. The dross is removed, crushed, and treated on shaking screens to remove metal particles, which are returned to the main part of the scrap for re-treatment.

A. R. POWELL.

Treatment of aluminium or other light metals [to prevent corrosion]. ELECTROLUX, LTD., Assees. of PLATEN-MUNTERS REFRIGERATING SYSTEM AKTIEBOLAG (B.P. 294,237, 15.6.28. Ger., 22.7.27).—The metal, after anodic treatment in a bath containing a fluoride, *e.g.*, in a sodium fluoride solution containing 1–5% of ammonium carbonate, is submitted to anodic treatment in an electrolyte, *e.g.*, a solution of ammonium carbonate. Subsequently the surface of the metal is cleaned by being used, for a short time, as cathode.

J. S. G. THOMAS.

Producing a coating of chromium on objects of iron, steel, or aluminium, and particularly on knives, fork, and spoons. H. LEISER (B.P. 294,484, 23.7.28. Ger., 21.7.27).—Metal articles are coated with molten tin (which is smoothed by pressing or other means), then with another metal or alloy, *e.g.*, brass, and heated; a final coating of chromium is deposited electrolytically.

C. A. KING.

Electrolytically depositing chromium. Soc. CHIM. DE LA SEINE, and V. SZIDON (B.P. 320,952 and 320,959, 28.7.28).—(A) The electrolyte comprises a 25% solution of chromic acid containing 1–4% of chromic sulphate and 1–2% of sodium carbonate. A current density of 130 amp./ft.² at 4–6 volts is employed. (B) The articles to be plated are heated electrically before immersion in the electrolyte (cf. B.P. 320,440; B., 1929, 1020).

A. R. POWELL.

Production of electrolytically deposited gold in film or leaf form. W. F. GRUPE (U.S.P. 1,731,415, 15.10.29. Appl., 23.2.27).—Gold is electrodeposited on a continuous band or strip of silver, which is then caused to adhere, on the plated side, to a similar strip of paper coated with resin. After dissolving the silver in dilute nitric acid the gold-coated paper may be used as a transfer, the paper being readily removed by warming until the resin melts.

A. R. POWELL.

Blast furnace. Y. MURAKAMI (U.S.P. 1,735,293, 12.11.29. Appl., 14.9.26. Jap., 28.9.25).—See F.P. 621,588; B., 1928, 127.

Mechanical roasting furnace. G. BALZ, Assr. to BALZ-ERZRÖSTUNG GES.M.B.H. (U.S.P. 1,734,552, 5.11.29. Appl., 7.6.27. Ger., 22.2.27).—See B.P. 288,823; B., 1928, 451.

[Manufacture of] pure iron of small grain size. W. MEISER, W. SCHUBARDT, and O. KRAMER, Assrs. to I. G. FARBENIND. A.-G. (U.S.P. 1,735,405, 12.11.29.

Appl., 28.8.28. Ger., 10.9.27).—See B.P. 306,215; B., 1929, 329.

Steel alloy. A. FRY, Assr. to F. KRUPP A.-G. (U.S.P. 1,735,744, 12.11.29. Appl., 28.7.27. Ger., 23.8.26).—See B.P. 276,317; B., 1928, 451.

Manufacture of ductile bodies from highly refractory metals [tungsten]. J. A. VAN LIEMPT, Assr. to GEN. ELECTRIC CO. (U.S.P. 1,728,814, 17.9.29. Appl., 16.1.25. Holl., 24.1.24).—See B.P. 228,131; B., 1925, 750.

Production of metals and alloys. T. R. HAGLUND (U.S.P. 1,731,976, 15.10.29. Appl., 16.10.26. Swed., 23.10.25).—See B.P. 239,404; B., 1925, 887.

Coating aluminium or aluminium alloys with aluminium oxide. T. KUJIRAI and S. UEKI, Assrs. to ZAIDAN HOJIN RIKAGAKU KENKYUJO (U.S.P. 1,735,286, 12.11.29. Appl., 2.12.24. Jap., 19.12.23).—See B.P. 226,536; B., 1925, 725.

Rustproofing process. W. H. ALLEN, Assr. to PARKER RUST PROOF CO. (Re-issue 17,484, 12.11.29, of U.S.P. 1,654,716, 3.1.28).—See B., 1928, 235.

[Die] casting molten metal under pressure. R. H. V. CHRISTENSEN (B.P. 306,958, 25.2.29. Denm., 29.2.28).

Covering surfaces of metal pipes with a mixture of fibrous and cement substances, or forming pipes of such a mixture. A. ROCCA (B.P. 321,471, 14.8.28).

Metallised coke (B.P. 296,443).—See II. **Melting furnace** (B.P. 305,952). **Coating aluminium electrolytically** (U.S.P. 1,727,331).—See XI.

XI.—ELECTROTECHNICS.

Effect of drawing on the temperature coefficient of the electrical resistivity of constantan. R. S. J. SPILSBURY (J. Sci. Instr., 1929, 6, 357–358).—The variability of the temperature coefficient of resistance of commercial constantan wire has been traced to the effect of drawing. The temperature coefficient becomes more negative with progressive drawing.

C. W. GIBBY.

Low-temperature carbonisation and electricity production. SMYTHE and WEEKS.—See II. **Zinc.** EGER. **Cadmium.** WATANABE and TSUCHIMOTO. **Aluminium.** SETOH and MIYATA.—See X.

See also A., Dec., 1392, **Weston normal standard cell** (SUMMERS and GARDINER; GARDINER and HULETT). **Preparing standard cells** (GARDINER and HULETT). 1402, **Electrolytic production of fluorine** (FREDENHAGEN and KREFFT). **Separation of chromium from solution** (LIEBREICH and DUFFEK). **Electrodeposition of molybdenum** (MERRILL and RUSSELL). **Electrodeposition of tungsten** (JACKSON and others). **Electrolysis of molten ternary alloys** (KREMAN and others). 1403, **Electrochemical behaviour of gold and behaviour in hydrochloric acid solutions** (GRUBE and others). **Chlorination of benzene** (JAYLES). 1414, **Colorimetric reactions determined electrochemically** (FRITZ). 1415, **Thermoelectric temperature scales** (ROESER). **Thermostat** (HUME). 1416, **Regu-**

lation of temperatures (COOKE and SWALLOW). **Electrochemical switchboard** (MUNN; HOLMES and MORGAN). **Valve for p_H determinations** (LJUNGGREN and ELMQVIST). 1417, **Valve for electrometric titrations** (EHRHARDT).

PATENTS.

Electric melting furnace. ELECTRIC FURNACE CO., LTD., ASSEES. of HIRSCH, KUPFER- & MESSING-WERKE A.-G. (B.P. 305,952, 11.2.29. Ger., 11.2.28).—The charge is heated by induction or by a resistor, these heating means being used either separately or together. Thus the charge is arranged to flow from the induction furnace to the resistance furnace, so that the solid metal is heated by induction, and the liquid metal by the resistance elements. A pyrometer cuts off the inductive heating when the charge begins to melt.

J. S. G. THOMAS.

Electric [induction melting] furnace. V. STOBIE (B.P. 319,802, 31.3.28).—A portion only of the charge angularly surrounds a part of the magnetic circuit of the furnace which passes through an interlinking path composed of magnetic iron. Part of the energy of the furnace is induced in an annular circuit through a path of length and cross-section determined by the shape of the crucible, the remainder of the energy being induced in the charge as eddy currents.

J. S. G. THOMAS.

Protecting carbon electrodes from consumption in the atmosphere. I. G. FARBENIND. A.-G. (B.P. 302,891, 2.11.28. Ger., 23.12.27).—Carbon electrodes for use in furnaces are soaked in or coated with phosphoric acid. [Stat. ref.]

J. S. G. THOMAS.

Electrodes for electric arc-welding or soldering. (A) ALLOY WELDING PROCESSES, LTD., ASSEES. of LA SOUTURE ELECTRIQUE AUTOGENE SOC. ANON, and (B) ALLOY WELDING PROCESSES, LTD., and E. J. CLARKE (B.P. 307,760, 12.3.29. Fr., 12.3.28, and B.P. 320,596, 13.3.29).—(A) One or more oxyacid salts of the alkali and alkaline-earth metals, *e.g.*, 2–3% of the nitrates, chlorates, bromates, nitrites, chlorites, and corresponding per-salts, are added to the electrode coating to raise the m.p. of the electrode. Thus 3% of potassium nitrate may be added to a coating consisting of calcium carbonate (35%), magnesium carbonate (30%), and siliceous chalk (35%). (B) A powdered alloy of two or more non-ferrous metals is added to the usual fluxing materials and/or slag-forming materials used for coating the electrode in order to form with the metal of the core the desired alloy steel. Thus the coating may contain a powdered alloy of two or more of the metals nickel, chromium, iron, tungsten, molybdenum.

J. S. G. THOMAS.

Electric heating apparatus for heating bituminous or other materials. J. A. REAVELL (B.P. 319,298 and 319,391, [A, B] 19.6.28).—Intercommunicating jackets (one or more in number) surrounding a vessel containing material to be heated are provided with heating elements whereby heat-absorbing fluid contained in the jackets is heated and caused to circulate. In (B) constant circulation of the fluid is maintained by means of a force pump.

J. S. G. THOMAS.

Electrical insulation [material]. I. G. FARBENIND. A.-G. (B.P. 297,749, 26.9.28. Ger., 26.9.27).—Paper or

textile fabric is saturated with a solution of a cellulose ester of a higher fatty acid, other than cellulose oleate, or a mixture of such esters, or an ether-ester of cellulose with a higher fatty acid.

J. S. G. THOMAS.

Electric resistance material. T. A. SWARTZ and W. P. UHLER (U.S.P. 1,734,309, 5.11.29. Appl., 24.9.23).—The material comprises a vulcanised composition consisting of rubber, sulphur, barium sulphate, and finely-divided carbon; the relative proportions of the last two determining the specific resistivity of the product.

F. G. CROSSE.

Manufacture of magnetic cores of high permeability. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 319,854, 14.7.28).—Metallic powder, *e.g.*, iron, preferably prepared from a metal carbonyl, is impregnated with a condensation product of urea or its derivatives and formaldehyde, dried, and compressed.

J. S. G. THOMAS.

Manufacture of magnetic cores of high permeability. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 320,611, 14.7.28. Cf. B.P. 319,854; preceding).—Pitch-like or asphaltic materials prepared either in accordance with B.P. 302,710 (B., 1929, 233) or by treating asphalt, tar, pitch, etc. with vegetable or animal oils or fats and natural or artificial resins, at a high temperature with oxygen or gases containing oxygen, are impregnated with a metallic powder, *e.g.*, iron, preferably prepared from the carbonyl. Alternatively, solutions of pitch-like or asphaltic materials, *e.g.*, in benzene, may be so impregnated, dried, and pressed, or coumarone resin heated with pitch, asphalt, etc. and solid absorbing materials may be so treated.

J. S. G. THOMAS.

Solution for chemical rectifiers. F. T. BOWDITCH, ASST. to NAT. CARBON CO., INC. (U.S.P. 1,727,462, 10.9.29. Appl., 21.6.24).—A solution containing citrate and phosphate radicals in the ratio 3–15:1 is employed. Thus a solution containing about 42.5% of ammonium citrate and about 7.5% of ammonium phosphate may be used.

J. S. G. THOMAS.

Polarising electrolyte [for rectifiers or condensers]. P. E. EDELMAN, ASST. to E. BANNING (U.S.P. 1,730,725, 8.10.29. Appl., 19.3.28).—A syrupy solution of gum arabic containing a small quantity of borax is used as the electrolyte of an aluminium rectifier.

A. R. POWELL.

Rectifier compound. F. H. MACKENZIE, ASST. to M. H. LANE (U.S.P. 1,727,656, 10.9.29. Appl., 12.4.26).—A positive (aluminium) and a negative (lead) electrode are immersed in an aqueous solution of lead acetate and ammonium dihydrogen phosphate.

J. S. G. THOMAS.

Electrolytic apparatus [for production of oxygen and hydrogen]. A. E. KNOWLES (B.P. 320,388, 14.4.28).—An electrolyte feed-tank comprises a shallow tank of relatively large horizontal dimensions arranged below two gas-washing chambers, the combined superficial areas of the chambers and of the intervening space being equal to the superficial area of the feed tank. Liquid is drawn off from each chamber into the tank by a U-tube placed in the tank and having limbs of unequal length, the longer limb passing upwards through the bottom of the chamber and being vertically

adjustable to vary the level at which liquid is maintained in the chamber. J. S. G. THOMAS.

Cells for production of gases by electrolytic processes. A. LANE (B.P. 318,734, 21.8.28).—The vertical edges of the flanges of a vertical plate of substantially channel-shaped cross-section are welded to the line of fold of the succeeding similar plate so as to form a bell or funnel for the collection of gases evolved during the electrolysis. J. S. G. THOMAS.

Prevention of excess voltages in electrolytic cells for the electrolysis of water. A. VOGEL (B.P. 292,131, 14.6.28. Ger., 14.6.27).—A coating of colloidal or finely-divided material, *e.g.*, hydroxide or other compound of iron or of other metals of the iron group, is formed upon the cathodes, preferably roughened or covered with wire gauze. J. S. G. THOMAS.

Apparatus for electrolytic and similar treatments. F. T. TAYLOR, Assr. to HANSON-VAN WINKLE-MUNNING Co. (U.S.P. 1,727,736, 10.9.29. Appl., 23.9.25).—Separate workholders are conveyed along parallel paths through their respective separate tank compartments, the conveying mechanism providing a circuit connexion of one polarity for both compartments, whilst separate circuit connexions of the other polarity lead to the respective compartments and produce different potential drops therein. J. S. G. THOMAS.

Secondary electric cells. A. SISMANOPOL (B.P. 296,990, 6.9.28. Roum., 10.9.27).—A positive electrode of lead peroxide and a negative electrode of lead coated with electrodeposited copper, and having less than half as much active surface as the positive, are arranged in a container, the positive electrode being placed above the negative, which extends to the bottom of the container. J. S. G. THOMAS.

Electric storage batteries or accumulators. A. N. HAZLEHURST (B.P. 319,400, 21.6.28).—Positive plates of lead peroxide enveloped by a copper plate and negative plates of copper are interleaved and immersed in an electrolyte composed of sulphuric acid and/or a soluble sulphate (*d* 1.14), the copper electrodes being without contact with air in presence of the electrolyte. The capacity of the positive plates in relation to the volume of electrolyte is such that the latter does not become a supersaturated solution of copper sulphate. J. S. G. THOMAS.

Electrolyte for galvanic elements or [Leclanché] cells. G. HANEKOP and W. SCHMIDT (B.P. 320,526, 15.10.28).—A slightly alkaline, neutral, or weakly acid electrolyte is composed of a large excess of magnesium chloride and magnesium oxychloride to which is added a neutral aluminium salt solution, *e.g.*, the chloride, fluoride, or sulphate of aluminium, or double salts thereof, *e.g.*, aluminium fluochloride. If desired, zinc chloride, alkali chlorides, manganese chloride, or ammonium salts may be added. J. S. G. THOMAS.

Electroplating tank. C. E. JONES, Assr. to GEN. ELECTRIC Co. (U.S.P. 1,734,909, 5.11.29. Appl., 15.10.25).—Current is supplied to the walls of a tank containing electrolyte and an anode composed of metallic particles and a wire-mesh retaining device connected electrically with opposite sides of the tank. J. S. G. THOMAS.

Coating of aluminium electrolytically. C. L.

BEAL, Assr. to EASTMAN KODAK Co. (U.S.P. 1,727,331, 10.9.29. Appl., 17.1.27).—An aluminium surface, after treatment in a dilute aqueous alkaline bath (*e.g.*, hot 5% solution of trisodium phosphate), is used as cathode, under non-oxidising conditions, in an acid, dilute aqueous bath, and is then electroplated.

J. S. G. THOMAS.

Electron discharge device. INTERNAT. GEN. ELECTRIC Co., Inc., Assees. of ALLGEM. ELEKTRICITÄTS GES. (B.P. 299,857, 2.11.28. Ger., 2.11.27).—For the introduction of alkaline-earth metals into receiving or transmitting valves for wireless telegraphy etc., a mixture of aluminates or silicates of alkaline-earth metals, preferably coated with paraffin oil, with reducing agents which do not volatilise appreciably at the temperature of reaction is heated within the envelope, subsequent to evacuation of the valve. As reducing agents, aluminium, beryllium, or a rare-earth metal may be used. To moderate the reaction, if necessary, diluting agents suitable for the purpose are described.

J. S. G. THOMAS.

Introducing highly active metals [caesium] into sealed containers [radio valves]. WESTINGHOUSE LAMP Co., Assees. of J. W. MARDEN and E. A. LEDERER (B.P. 296,781, 24.8.28. U.S., 9.9.27).—A mixture of caesium permanganate or dichromate (1 pt.), silicon (3 pts.), and 1% of aluminium is introduced as a fine powder into the valve and, after evacuation, the powder is heated whereby metallic caesium is liberated in an active form which serves as a getter and produces a filament having a high emission. A. R. POWELL.

Rectifier. Electric discharge device. C. G. SMITH, Assr. to RAYTHEON, INC. (U.S.P. 1,731,944—5, 15.10.29. Appl., [A, B] 22.1.27).—(A) Solid alkali metal is inserted within an anode which almost completely encloses an electron-emitting electrode in an evacuated vessel. (B) Lithium is placed within an isolated chamber formed of electrodes, one of which is hollow and receives the others. J. S. G. THOMAS.

Taking X-ray photographs with a short exposure. A. E. O'DELL, From SIEMENS-REINIGER-VEIFA GES. F. MEDIZIN. TECHN. M.B.H. (B.P. 320,540, 29.10.28).—One or more condensers are suddenly discharged through a tube operating on direct current and having an incandescent cathode, and the primary current is interrupted at the beginning of the condenser discharge by an overload release device in the primary circuit, *e.g.*, by a delay-action relay or fusible cut-out.

J. S. G. THOMAS.

Electric furnace. V. SORREL and L. A. LAFONT, Assrs. to UGINE-Infra (U.S.P. 1,734,536, 5.11.29. Appl., 4.8.28. Fr., 29.9.27).—See B.P. 297,826; B., 1929, 985.

Electron-emitting cathode. G. L. HERTZ, Assr. to N. V. PHILIPS' GLOELAMPENFABR. (U.S.P. 1,735,080, 12.11.29. Appl., 31.12.23. Holl., 12.1.23).—See B.P. 209,730; B., 1924, 822.

Electrodes [with helical core] for electric arc-welding or soldering. ALLOY WELDING PROCESSES, LTD., and E. J. CLARKE (B.P. 319,487, 20.9.28).

Cleaning the electrodes of electrical gas-cleaning apparatus [by jarring]. LODGE-COTTRELL, LTD. From METALLGES. A.-G. (B.P. 321,571, 27.11.28).

Electric discharge tubes. S. G. S. DICKER. From N. V. PHILIPS' GLOEILAMPENFABR. (B.P. 320,358, 9.7.28).

Heating and mixing apparatus (B.P. 321,006).—See I. **Aluminium etc.** (B.P. 294,237). **Chromium-plating knives etc.** (B.P. 294,484). **Chromium** (B.P. 320,952 and 320,959). **Gold leaf etc.** (U.S.P. 1,731,415).—See X.

XII.—FATS; OILS; WAXES.

[Detection of adulteration in] cacao butter. W. SCHMANDT (Z. angew. Chem., 1929, 42, 1039–1040).—Differentiation between pure cacao butter obtained by pressing and the lower grades obtained by extraction or from the waste material may be effected by means of ultra-violet light. A sample of the butter (0.5 g.) is dissolved in 20 c.c. of pure light petroleum and examined under a quartz-mercury lamp. If only "press" butter is used, the solution remains dark and appears greyish in colour, but if 1% or more of cacao extract or waste butter is present the solution exhibits bright fluorescence. The presence of butter derived from the waste can be detected by a colorimetric test with acetic acid. Exactly 1 c.c. of the melted butter is added to 1 c.c. of acetic acid (98–99%) in a test-tube, the two layers being carefully heated in a glycerin-bath. At about 100° the liquids are mixed by shaking and the tube is then kept in water at 50° until two layers separate. A yellow or brown coloration of the acetic acid layer proves that "waste" butter is present. The adulteration of "press" butter with other fats can be detected by means of a special immersion refractometer, provided with a prism head, which can be heated. Using the sodium flame as illuminant, measurements at 40° could be duplicated within ± 0.05 of a scale division. The presence of 2% of foreign fat produced a change of more than 0.2 of a division. Figures are given to illustrate the change in refraction produced by 2% and 5% additions of such materials as palm-kernel oil, coconut oil, oleomargarine, and hardened arachis oil.

H. J. DOWDEN.

Cacao butter. SCHELLBACH (Pharm. Ztg., 1929, 74, 875–876).—Five samples of commercial (chocolate factory) cacao bean scrap, containing 30% of husks, were extracted with ether; the resultant fats had iodine values and refractive indices within normal limits. The author considers that the abnormally high values of the refraction found by Bodinus (B., 1929, 608) must have been due to material containing adulterants, to an abnormal proportion of shell fat, or to residual traces of the solvent used for extraction. E. LEWKOWITSCH.

Cacao oil. SCHELLBACH (Pharm. Ztg., 1929, 74, 1022).—The author re-asserts his opinion (cf. preceding abstract) concerning the abnormally high refraction found by Bodinus for extracted cacao butter, and adds that free fatty acids would lower the refraction, but their removal could not increase the value above the normal for neutral fat (cf. B., 1929, 608.)

E. LEWKOWITSCH.

Cacao oil. SCHELLBACH (Pharm. Ztg., 1929, 74, 1037–1038); BODINUS (*ibid.*, 1038).—A discussion (cf. preceding abstracts).

S. COFFEY.

Pulasan [*Nephelium mutabile*] and rambutan [*N. lappaceum*] fats. C. D. V. GEORGI and G. L. TEIK (Malayan Agric. J., 1929, 17, 364–366).—Pulasan and rambutan seeds yielded, respectively, 91.5 and 94.4% of kernels; these contained moisture 16.3, 16.9%, oil 62.7, 29.9%. Both fats are white solids melting at about 38° to pale yellow oils. The fats from pulasan and rambutan seeds respectively had d_{15}^{20} 0.8588, 0.8595; n_D^{20} 1.4570, 1.4587; saponif. value 194.5, 194.9; iodine value (Wijs) 35.2, 42.2; unsaponif. matter 0.3, 0.5%; acid value 0.2, 0.6. The fatty acids had titer value 52.8°, 56.9°; mean mol. wt. 285.3, 291.6; neutralisation value 196.6, 192.4; iodine value (Wijs) 37.2, 44.9. The high figures for the titer and mean mol. wt. of the fatty acids indicate the presence of fatty acids not usually occurring in vegetable fats. The fats are suitable for edible purposes or for hard soaps.

E. LEWKOWITSCH.

Liver oil from a young male shark "pèlerin" *Cetorhinus maximus*, Günner). Biological relations between the cholesterol and squalene. E. ANDRÉ and H. CANAL (Bull. Soc. chim., 1929, [iv], 45, 498–511).—The oil obtained (yield 50%) from the liver had d_4^{15} 0.9105, n_D^{20} 1.4865, $[\alpha]_D$ –6.9°, saponif. value 98.7, iodine value (Hanus) 155.2, being thus lighter and considerably less unsaturated than liver oil obtained from the adult fish. When hydrolysed the oil affords 3.21% of glycerol, 58.5% of fatty acids (m.p. 25–26°, n_D 1.4616, iodine value 111.1, mean mol. wt. 290.7), and 40.5% of unsaponifiable matter, the adult species containing 44–50% of unsaponifiable matter and 52–57% of fatty acids. Fractionation of the fatty acids by the usual methods yielded 15% of arachidic acid, 20% of myristic acid, 50–55% of cetoleic acid (m.p. 32–33°, iodine value 77.6; cf. Toyama, A., 1928, 154), and about 10% of an unsaturated acid, $C_{18}H_{28}O_2$, iodine value 249.8, for which the name *therapeutic acid* is proposed. About 32% of the acids are present as glycerides, the remainder being cholesteryl esters; the absence of free alcohols is shown by the negligible acetyl value of the oil. The unsaponifiable matter, m.p. 106–107°, iodine value 198.6, acetyl value 87.9, crystallised from acetone yields a fraction (22.5% of the original oil), m.p. 143°, $[\alpha]_D$ –35.83°, iodine value 84.6, acetyl value 145.7 (acetate, m.p. 114°), consisting of ordinary cholesterol, and a highly unsaturated cholesterol, the separation of which was incomplete on further fractionation from alcohol, and a liquid fraction d_4^{15} 0.851, n_D^{21} 1.4871, $[\alpha]_D$ +0.87°, iodine value 375, yielding on fractional distillation squalene and about 7% of pristane, $C_{18}H_{38}$ (d^{19} 0.8057, n_D^{21} 1.4500). Preparation and fractionation of the hexahydrobromides of the crude squalene indicated the presence of two hydrocarbons: $C_{30}H_{50}$ (hexahydrobromide, m.p. 109–110°) and $C_{31}H_{52}$ (hexahydrobromide, m.p. 142–143°). Addition of hydrogen bromide is, however, probably incomplete, and the iodine value, 420, of the fraction 230–235°/3 mm., d^{19} 0.8629, n_D^{21} 1.494, indicates the formula $C_{27}H_{44}$ for squalene, from which a genetic relationship with cholesterol can be traced. The highly unsaturated fatty acids which are always present in this and in other liver oils are regarded as the first stage of the physiological trans-

formation of saturated or slightly unsaturated acids into cholesterol. The low squalene content (18%) and high content of cholesterol, including a cholesterol with several double linkings, of the liver oil derived from the young pèlerin as compared with the high squalene (48%) and low cholesterol content (2%) of the liver oil derived from the adult species suggests that the transformation: fatty acids \rightarrow cholesterol \rightarrow squalene progresses with the growth of the animal. The same physiological transformation proceeding at ordinary temperatures and the presence in these marine animal liver oils of optically active alcohols in association with hydrocarbons lend further support to the marine-animal theory of the origin of petroleum.

R. BRIGHTMAN.

Marine animal oils. Oil of *Centrophorus granulosus*, Müller and Henlé. Comparative study of unsaponifiable matter taken from the egg, the foetus liver, and the liver of adult animals. E. ANDRÉ and H. CANAL (Bull. Soc. chim., 1929, [iv], 45, 511–524).—The yield of oil obtained from the eggs (29.6%), the foetus liver (56%), and the liver of adult *Centrophorus granulosus* (78–89%) increases with the maturity of the animal, the yields of unsaponifiable matter increasing in the same order. Thus the dark-coloured oil obtained from the eggs, d_{20}^{15} 0.9060, n_D^{20} 1.4880, iodine value (Hanus) 293.8, saponif. value 79.1, acetyl value 16.5, yields 3.9% of glycerol and 45.5% of fatty acids (iodine value 187.2, containing a large proportion of highly unsaturated acids of the clupanodonic group), and 55.1% of unsaponifiable matter. The last-named consists of 8.5–9% of at least two alcohols of the cholesterol group, one of which contains two or more ethylenic linkings, and 91% of squalene. Oil from the foetus liver, d_{20}^{15} 0.8857, n_D^{16} 1.4896, $[\alpha]_D^{20}$ –2.23°, saponif. value 66.5°, iodine value 298.4, acetyl value 28.8, contains 2.35% of glycerol, 32% of fatty acids of lower mol. wt. and less unsaturated (iodine value 178.8) than those present in oil from the eggs, and 66% of unsaponifiable matter, consisting of 5.7% of cholesterol, small amounts of batyl and selachyl alcohols (Toyama, A., 1924, i, 604), and 90–94% of squalene. Liver oil from a young immature female animal contained 84% of unsaponifiable matter, 1.6% of solid alcohols (cholesterol), and 15.8% of fatty acids (iodine value 121), the corresponding figures for oil from the fully-grown male or pregnant female being 90–93.6%, 0.8–1.0%, and 8.0–8.7%, respectively. The conversion from the clupanodonic glycerides into the unsaturated hydrocarbons (squalene) does not therefore appear to be direct, the cholesterol forming an intermediate phase as indicated by a study of the pèlerin liver oils (cf. preceding abstract). It is concluded that in passing from the eggs, through the foetus, and the young, to the adult *Centrophorus granulosus*, there is a progressive biological transformation: clupanodonic glycerides \rightarrow cholesterol \rightarrow hydrocarbons, which is reversed in passing from the liver of the pregnant female to the egg.

R. BRIGHTMAN.

Extraction of bones with the vapour of solvents. E. SCHLENKER (Chem.-Ztg., 53, 838–839).—For the extraction of fat etc. from bones in a cyclic process, four extraction vessels are required for each series of

operations and each series is divided into four 3-hr. period parts, viz., two for treatment with the vapour of the solvent, one for the final extraction with the boiling solvent, and one in which the solvent is drained away, the extracted bones are removed, and a fresh charge is put in. At any one time there is always one vessel at each stage of the process, and the vapour evolved from the final boiling is used for the first and second vapour-extraction stages.

A. R. POWELL.

Fatty acids of filter-press cake from spent soap lye. B. W. HOWK and C. S. MARVEL (Ind. Eng. Chem., 1929, 21, 1137–1138).—The filter-press cake, consisting of the iron salts of fatty acids, was acidified and esterified, and the mixed esters were fractionated under reduced pressure. In this way octoic, decoic, lauric, myristic, and palmitic acids were detected, the identification being completed by formation of the *p*-bromophenacyl esters.

F. R. ENNOS.

[Toilet] soap bases. J. DAVIDSOHN (Chem. Umschau, 1929, 36, 349–350).—German manufacturing practice is discussed; addition of coconut oil and rosin and the use of potash are considered, together with the specifications of other countries. The necessity for the absence of unsaponified fat is emphasised. E. LEWKOWITSCH.

Physico-chemical properties of fatty acids. E. L. LEDERER (Z. angew. Chem., 1929, 42, 1033–1035).—The corrosive action of fatty acids on metals has been studied by suspending sheets of copper and aluminium for 1024 hrs. under 12 atm. pressure in an autoclave during the refining of arachis oil. The corrodibility of copper and aluminium as shown by the loss in weight of the plates was 0.009 and 0.042 g./m.²/hr., respectively; the corrodibility of nickel at 192° in stearic acid (m.p. 56°) was 0.62 g./m.²/hr. The copper content of a commercial fatty acid would be about 0.00004%. The influence of light on the colour of fats during storage has been studied on a 2:1 mixture of stearic and oleic acids. Samples of the pure mixture and with additions of iron, nickel, copper, manganese, lead, zinc, and aluminium at concentrations of 0.00004, 0.0004, and 0.04% were exposed (a) in the dark, (b) to direct sunlight for 8 hrs., and (c) to ultra-violet light for 2 hrs. Manganese, aluminium, zinc, and lead produced no change at any of the concentrations by either method of exposure. In the sample containing 0.04% Ni a slight yellowing was caused by the sunlight, but not by the ultra-violet irradiation. The samples containing 0.04% Cu exhibited distinct yellowing, and those containing iron a considerable darkening, the effect being more pronounced in sunlight than in ultra-violet light. The samples containing no metallic adulteration were scarcely affected, and it therefore appears that the discoloration of fats after manufacture is due not to the action of light, but to traces of iron and copper. The conductivity of a number of fatty acids at elevated temperatures has also been determined, and values are given for decoic, myristic, palmitic, stearic, and oleic acids at temperatures between 100° and 200°. It was found that, over this range, the relationship between temperature and conductivity may be expressed by: $\log \lambda = -a + bt - ct^2$, wherein the value of *a* varies with the acid, and the values of *b* and *c* for the

acids investigated approximate to 0.028 and 0.000042, respectively. Although valid only for the range 100–200°, the formula has been used to calculate the conductivities of the acids at their m.p. and b.p.

H. J. DOWDEN.

Dependence of drying power of linseed oil on origin of seed. F. FRITZ (Farben-Ztg., 1929, 35, 287–288).—Previously published iodine values of linseed oils from various sources are recapitulated. Whilst the general impression is given that oil from seed grown in cold climates, e.g., Baltic seed, has a higher iodine value than oil from, e.g., La Plata and India, it is pointed out that other factors than climate must exercise influence, since Indian oil normally has higher drying power than South American oil.

S. S. WOOLF.

Drying of [fatty] oils. A. EIBNER (Farben-Ztg., 1929, 35, 285–287, 336–337).—Mainly a commentary on the work of Morrell and Marks (B., 1929, 860). The results obtained by earlier workers are discussed and the position in the various phases of the drying problem is summarised. It is considered that knowledge of “oxyns” has been very definitely advanced by the work of Morrell and Marks from the analytical aspect and of Staudinger from the constitutional viewpoint.

S. S. WOOLF.

Auer's gas coagulation theory. Drying process of drying oils. H. SCHMALFUSS and H. WERNER (Kolloid-Z., 1929, 49, 323–328).—Objections are raised to the gas coagulation theory of Auer (B., 1927, 145). The experimental work on which the theory is founded has been repeated and entirely different results have been obtained. In an atmosphere of air, drying oils do not increase in weight to an amount greater than that of the oxygen present, the oils do not dry in an atmosphere of nitrogen which is free from oxygen, and the pressure of air does not increase but decreases during the drying process.

E. S. HEDGES.

Gas coagulation theory and the control experiments of SchmalFUSS and Werner. L. AUER (Kolloid-Z., 1929, 49, 328–332).—A reply to SchmalFUSS and Werner (preceding abstract). The gas coagulation theory is maintained.

E. S. HEDGES.

Ratfish-liver oil as a source of vitamin-A. E. R. NORRIS and I. S. DANIELSON (Ind. Eng. Chem., 1929, 21, 1078).—The vitamin-A content of a commercial sample of the liver oil of the ratfish (*Chimarra collieri*) was determined by the method of Sherman and Munsell (B., 1925, 609) by feeding experiments on albino rats. The amount of oil required daily for a total gain in weight of 25 g. in 8 weeks (one U.S.P. unit) is calculated to be 0.03 g.

F. R. ENNOS.

Oiticica oil. F. WILBORN and A. LÖWA (Farben-Ztg., 1929, 35, 388–389).—Previously published literature (B., 1919, 645 A) on the oil is summarised. A sample of oil extracted from Pernambuco oiticica nuts had saponif. value 186.3, acid value 3.0, iodine value 178 (Hanus), 152 (Wijs), n_D^{25} 1.5094. The oil dries with a similar appearance to tung oil and gelatinises on addition of a chloroform solution of iodine. Crystals separate on storage. The fatty acids isolated from these were examined by lead-soap methods, but gave

inconclusive results. It would appear, however, that an isomeride of β -elæostearic acid (and not, as was at first thought, the acid itself) is present. The marked tendency of the oil to change to solid products might render it unsuitable for use as a varnish raw material, but it is considered likely that “working up” with rosin etc. would overcome this difficulty.

S. S. WOOLF.

Saponification value. ANON. (Chem. Umschau, 1929, 36, 353).—It is most convenient for makers of both hard and soft soaps to express the saponif. value as the number of c.c. of N-alkali required to saponify 100 g. of fat (“normal saponif. value”).

E. LEWKOWITSCH.

Report [on butter]. HARRISON.—See XVI.

See also A., Dec., 1396, **Saponification of oils, fats, waxes, and pure triglycerides** (McBAIN and others). 1424, **Sulphonated oils** (NISHIZAWA and SINOZAKI). 1490, **Fat-decomposing enzyme** (GYOTOKU and MATSUBARA).

PATENTS.

Extraction of oils from fish livers. MANUF. DE MACHINES AUXILIAIRES POUR L'ÉLECTRICITÉ ET L'INDUSTRIE (B.P. 314,505, 27.7.28. Fr., 29.6.28).—Extraction of the oil by grinding with water followed by centrifugal separation is facilitated by suitable treatment causing the liver cells to burst, e.g., by preliminary freezing, sudden rise in temperature (addition of hot water), fermentation, or by osmotic action induced by adding to the minced livers either salt water, with a salt concentration differing from that of the liver cells, or water as soft as, or softer than, sea-water.

E. LEWKOWITSCH.

Manufacture of sulphonated oils, fats, fatty acids, and waxes. W. SECK, Assr. to ERBA A.-G. (U.S.P. 1,734,050, 5.11.29. Appl., 3.2.28. Ger., 28.7.27).—See B.P. 294,621; B., 1928, 825.

Emulsifying fats etc. (B.P. 321,130).—See I. **Emulsions from isocolloids** (B.P. 318,562).—See III.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

“Bleeding” of [red] pigments. H. RASQUEN (Farben-Ztg., 1929, 35, 386–387).—The compositions of a number of red coal-tar dyes and their relative solubilities in linseed oil, mineral oil, turpentine, white spirit, and benzene are tabulated. “Bleeding” is bound up with solubility, and it is shown that the structure of the dye is an important factor in this connexion, the bleeding tendency increasing with basic character; thus, Para-red and Autol-red, from which acidic groups are entirely absent, are most prone to this defect, whilst Helio fast-red, of similar structure except for a *m*-substituted nitro-group conferring acidic properties, is on the border-line. Heliobordeaux BL, Litholrubin G, and other acidic dyes are free from bleeding. Faulty diagnosis of bleeding is sometimes attributable to “grinning” through a single covering coat of insufficient opacity or to insufficient drying of the red coat. In view of the difficulties associated with bleeding reds, it is suggested that paints containing them be applied in thin coats and allowed a lengthier

drying period than the normal. If this is not practicable, the use of an intermediate coat of spirit varnish is recommended. It would be desirable to dispense entirely with the use of other than "oil-fast" reds, but this is not at present feasible from economic considerations.

S. S. WOOLF.

Composition of turpentines from *Pinus sylvestris*. V. KRESTINSKI and F. SOLODKI (J. Appl. Chem., Russia, 1929, 2, 337—351).—Turpentine distilled from wood chips in presence of alkali contained α -pinene 43, Δ^3 -carene 38.5, terpinolene 6.5, alcohols ($C_{10}H_{17}\cdot OH$) 7, sesquiterpenes (probably cadinene) 3.5, residue 1.5%. Turpentine distilled in absence of alkalis contained α -pinene 42.5, Δ^3 -carene 32.5, terpinolene 4, alcohols 14, sesquiterpenes 3, residue 4%. CHEMICAL ABSTRACTS.

Colorimetric determination of turpentine in air. P. ANDREJEV and A. GAVRILOV (Chem.-Ztg., 1929, 53, 870—871, 889—891).—The air is drawn through 20 c.c. of concentrated sulphuric acid at the rate of 1.5—2 litres/min. and the colour of the resulting yellow to orange solution is compared with that of a standard solution of turpentine in sulphuric acid or with that of a solution made by adding to 93 c.c. of water 7 c.c. of a solution containing 200 mg. of diamine-yellow and 2.8 mg. of methyl-orange in 1 litre of water. This 100 c.c. of solution has the same colour as 100 c.c. of sulphuric acid containing 2.14 mg. of turpentine. A. R. POWELL.

Oiticica oil. WILBORN and LÖWA.—See XII.

See also A., Dec., 1456, **Fungi resins** (FRÖSCHL and ZELLNER). 1499, **Natural resins and resin acids** (BALÁS).

PATENTS.

Production of [non-lifting] lacquers. G. TRÜMPER (B.P. 294,261, 20.7.28. Ger., 21.7.27).—Non-lifting lacquers are obtained by adding water-miscible diluents, e.g., ethyl alcohol or other liquid boiling below 100°, to a preferably highly concentrated solution of one or more cellulose esters in water-miscible solvents (b.p. 125—200°), with which solution natural and/or artificial resins and plasticisers have been incorporated. The weight of non-solvent should be $2\frac{1}{2}$ — $3\frac{1}{2}$ times that of solvent, and the former should have higher vapour tension than the latter in order to favour gelatinisation of the lacquer. The lacquers so obtained can be rendered sprayable by the addition of hydrocarbons etc. having vapour tension above that of the solvents and below that of the non-solvents.

S. S. WOOLF.

Production of coloured material and coating [cellulose lacquer]. C. E. FAWKES, ASSR. to QUAKER OATS CO. (U.S.P. 1,732,124, 15.10.29. Appl., 11.5.25).—The lacquer comprises a solution of cellulose nitrate in a suitable solvent together with a plasticiser, e.g., castor oil, shellac, and up to 20% of furyl alcohol, and an acid reagent, e.g., sulphuric or hydrochloric acid, or a substance which hydrolyses readily to yield an acid. As the lacquer dries the furyl alcohol becomes converted into a jet-black compound and a glossy black lacquer is obtained. (Cf. B.P. 234,862; B., 1925, 642.)

A. R. POWELL.

Pyroxylin [lacquer] composition. R. H. VAN SCHAACK, JUN., ASSR. to VAN SCHAACK BROS. CHEM.

WORKS, INC. (U.S.P. 1,734,657, 5.11.29. Appl., 12.9.25).—The lacquer comprises a mixture of pyroxylin, a resin, butyl acetate and alcohol, toluene, and benzyl phthalate.

F. G. CROSSE.

Manufacture of intaglio printing colours. I. G. FARBENIND. A.-G. (B.P. 307,877, 18.2.29. Ger., 15.3.28).—Colouring materials in a sufficiently finely-divided or dissolved state, and, if desired, other substances, are incorporated with solutions of resinous products obtained from organic vinyl esters, or from dibasic acids and polyhydric alcohols, in volatile organic solvents, e.g., aliphatic alcohols containing 1—5 carbon atoms per mol., glycol monoalkyl ethers or ketones, etc.

S. S. WOOLF.

Manufacture of coating for wood, metal, and other surfaces. C. H. HOLMAN and O. W. HOOPAW (U.S.P. 1,734,130, 5.11.29. Appl., 22.7.26).—The coating consists of magnesia, an aqueous solution of magnesium chloride and sulphate, a volatile oil, and an emulsifier.

H. ROYAL-DAWSON.

Manufacture of shellac substitutes. W. DUX (B.P. 300,956, 19.10.28. Ger., 21.11.27).—Condensation is effected, preferably by the aid of suitable catalysts (e.g., anhydrous aluminium chloride), between the chlorinated derivatives of unsaturated fatty acids and of "resinol" or hydroaromatic acids, or, alternatively, between the hydroxy-derivatives of either and the chlorinated derivatives of the other (e.g., trihydroxystearic acid and chlorinated abietic acid, or chlorinated fatty acids and hexahydrosalicylic acid). The products resemble natural shellac resin in all its chemical properties, solubility, etc.

E. LEWKOWITSCH.

Production of moulded masses from blood. F. HOMBERG and M. LANDECKER, ASSR. to AMER. NUPLAX CORP. (U.S.P. 1,732,015—6, 15.10.29. Appl., 20.5.26. Ger., 7.7.25).—(A) Dry blood is moistened with 22% of its weight of a 2% solution of zinc chloride to obtain a uniform, moist, powdery product which is moulded under heat and pressure. (B) The blood is mixed with 5% of zinc oxide and 15% of water to a moist, pulverulent mass and then moulded.

A. R. POWELL.

Manufacture of film-forming solutions [from urea, or its derivatives, and formaldehyde]. K. RIPPER, ASSR. to F. POLLAK (U.S.P. 1,734,693, 5.11.29. Appl., 22.6.25. Austr., 31.3.23).—See B.P. 213,567; B., 1925, 681.

Emulsions from isocolloids (B.P. 318,562).—See III. **Titanium compounds** (U.S.P. 1,731,364).—See VII. **Non-splintering glass** (B.P. 321,178 and 321,189).—See VIII.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

See also A., Dec., 1455, **Cryoscopic measurements with caoutchouc** (PUMMERER and others). **Iodine and oxygen values of sol and gel caoutchouc** (PUMMERER and MANN).

PATENTS.

Manufacture of plastic or elastic polymerisation products of diolefines. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 320,960, 26.4. and 27.8.28).—Such products are obtained by heating diolefines

emulsified in suitable liquids in the presence of hydrogen peroxide, colloids of vegetable origin (*e.g.*, carrageen moss extract, gum arabic, molasses, linseed meal extract), and other substances favouring polymerisation by influencing surface tension, *e.g.*, higher alcohols and electrolytes, particularly buffer mixtures of definitely favourable p_H value. (Cf. B.P. 318,115; B., 1929, 903.) S. S. WOOLF.

Dispersion rubber in water. W. B. PRATT, ASSR. to DISPERSION PROCESS, INC. (U.S.P. 1,731,725, 15.10.29. Appl., 6.12.24).—A coagulated rubber mass is beaten up with water and a suitable agent, *e.g.*, bentonite, which affords a protective coating for the dispersed particles, and the suspension is treated with such a quantity of a flocculating agent, *e.g.*, aluminium sulphate, as to cause the rubber to set to a plastic mass which when spread in a layer and allowed to dry is tacky, coherent, and irreversible. A. R. POWELL.

Treatment of rubber dispersions. J. MCGAVACK, ASSR. to NAUGATUCK CHEM. CO. (U.S.P. 1,730,518, 8.10.29. Appl., 15.3.27).—A rubber latex of increased mechanical stability is obtained by adding to ordinary latex ammonia and a solution of resin in an alcohol or ketone in which rubber is insoluble but which does not coagulate the latex. A. R. POWELL.

Making reversible concentrates from natural milky juices, *e.g.*, [rubber] latex. P. SCHOLZ (U.S.P. 1,729,522, 24.9.29. Appl., 30.8.28. Ger., 11.7.27).—Rubber latex may be preserved and coagulation during concentration prevented by addition of 0.1–0.5% of salicylic acid together with potassium hydroxide to produce a neutral reaction. A. R. POWELL.

Improving the [ageing] properties of rubber goods. O. Y. IMRAY. From SOC. CHEM. IND. IN BASLE (B.P. 318,275, 31.5.28).—Anti-agers for rubber are obtained by condensing cyanuric chloride with 1, 2, or 3 mols. of ammonia or substituted ammonias; or with 1 or 2 mols. of these and 2 or 1 mol. of water, hydrogen sulphide, alcohols, phenols, thiols, or thiophenols. Examples are 2:4:6-trianilino-1:3:5-triazine, 4-amino-2:6-dianilino-1:3:5-triazine, and melamine. C. HOLLINS.

Reclaimed rubber. C. H. CAMPBELL, ASSR. to AMER. GLUE CO. (U.S.P. 1,729,706—7, 1.10.29. Appl., [A, B] 22.11.28).—Rubber scrap during the process of devulcanisation is subjected to the action of cleavage products of (A) collagen, (B) keratin. D. F. TWISS.

Rubber compositions. C. H. CAMPBELL, ASSR. to AMER. GLUE CO. (U.S.P. 1,729,708—9, 1.10.29. Appl., [A] 14.12.27, [B] 22.10.26. Renewed [A] 11.5.29).—(A) Reclaimed rubber is mixed with fission products of ox-blood by an alkaline hydrolytic process which renders the ox-blood and its fission products soluble. (B) The albuminate of a metal is incorporated in rubber before vulcanisation of the latter. D. F. TWISS.

Aqueous rubber dispersion. W. B. PRATT, ASSR. to DISPERSIONS PROCESS, INC. (U.S.P. 1,732,027, 15.10.29. Appl., 13.9.23).—See B.P. 233,370; B., 1925, 558.

Emulsions from isocolloids (B.P. 318,562).—See III.

XV.—LEATHER; GLUE.

PATENTS.

Sticking or cementing of leather [with celluloid solution]. J. GOLDACH (B.P. 321,171, 31.7.28).

[Work-operating tool for] machines for treating hides, skins, leather, etc. TURNER TANNING MACHINERY CO., LTD. From TURNER TANNING MACHINERY CO. (B.P. 321,217, 3.8.28).

XVI.—AGRICULTURE.

Report of the Imperial Agricultural Chemist. W. H. HARRISON (Agric. Res. Inst. Pusa Sci. Rep., 1927—1928, 30—39).—(1) Sugar cane fertilised with potash yielded juices which from November to February contained the largest amount of sucrose and the lowest of dextrose; ammonium sulphate gave low sucrose and high dextrose values. Superphosphate gave intermediate results, whilst unfertilised cane gave results inferior to those with potash but superior to those with other fertilisers. (2) For the detection of animal fat in butter, 1 g. of dry fat is dissolved in 3 c.c. of acetic anhydride and 4 c.c. of 93% ethyl alcohol. In presence of animal fat a precipitate is formed when the mixture is kept at 30° for 30 min. The test is effective for cow butter and for buffalo butter from animals not fed on cotton seed. For the latter the test is repeated with 4 c.c. and 3 c.c., respectively. (3) Uncured Indian tobacco leaves contain more nicotine and starch than American leaves, the upper leaves containing more than the lower. Curing has little effect on the nicotine, but markedly decreases the starch. (4) Agitation is not necessary in determination of the p_H of soils with the antimony electrode; in the quiescent liquid, $p_H = 2.04 \pm 0.469$. (5) Soil acidity is due to an insoluble colloidal acid which is associated with surface-active hydrogen and basic cations. The colloidal acid appears to be tribasic.

CHEMICAL ABSTRACTS.

Biochemistry of waterlogged soils. III. Decomposition of carbohydrates with special reference to formation of organic acids. V. SUBRAHMANYAN (J. Agric. Sci., 1929, 19, 627—648; cf. B., 1928, 26).—Percolation experiments on waterlogged Indian and Rothamsted soils indicate that, in the absence of decomposing organic matter, addition of nitrate leads to no loss of nitrogen by denitrification. Addition of 0.06–0.30% of dextrose led to rapid depletion of nitrates and oxygen, but no denitrification, to increase in acidity, bacterial activity, and to carbon dioxide formation. Most of the soluble nitrogen was assimilated by micro-organisms or otherwise converted, and most of the added carbohydrate was transformed into lactic, acetic, and butyric acids. Addition of calcium carbonate to the soils led to a distinct increase in lactic acid formation, but had little effect on the other acids. Organic acids were produced in the soils from a variety of carbohydrates, including glycerol, xylose, arabinose, lævulose, mannitol, sucrose, maltose, lactose, starch, maltodextrin, and cellulose in the form of cotton wool. Lactic acid was the first to be observed and appeared to be formed chiefly by direct splitting of the sugar; it decomposed readily giving acetic and butyric acids.

Some acetic acid was formed by direct oxidation of lactic acid, with pyruvic acid as the intermediate.

E. HOLMES.

Determination of soluble carbohydrates, lactic acid, and volatile fatty acids in soils and biological media. V. SUBRAHMANYAN (J. Agric. Sci., 1929, 19, 649—655).—Details are given of the specialised technique involved in the determination of minute quantities of carbohydrates and fatty acids in waterlogged soils (see preceding abstract).

E. HOLMES.

Composition of soil suspensions of various degrees of dispersion in the steppe, solonetz, and podsolised types of soil. L. P. BELYAKOVA (Leningrad Agric. Inst., Glinka Mem. Vol., 1928, 91—162).—The silica content of suspensions of various degrees of dispersion decreases with increase in the degree of dispersion and has no relation to the silica content of the soil; the other components resemble those of the soil. The humus, hygroscopic moisture, R_2O_3 content, sometimes manganese and magnesia, and loss on ignition increase with the degree of dispersion. The smallest fractions appear to contain free hydroxides and soluble salts. Observations with chernozem, solonetz, and degraded meadow soils are recorded.

CHEMICAL ABSTRACTS.

Determination of exchangeable bases in soils: magnesium, potassium, and total bases. R. WILLIAMS (J. Agric. Sci., 1929, 19, 589—599; cf. B., 1928, 723).—The method of determining exchangeable calcium in carbonate-free soils by leaching with 0.5*N*-acetic acid, already developed, has been extended to the determination of magnesium, potassium, and total bases. The results obtained for total bases differ from those obtained by summation of separate determinations by an amount equivalent to that of the sulphates and chlorides present. It is suggested that the total of exchangeable bases obtained by the present method gives a truer measure of the Hissink S-value than methods in which bases present as sulphates and chlorides are included.

E. HOLMES.

Determination of soil organic matter: wet combustion method. F. HARDY (J. Agric. Sci., 1929, 19, 727—733).—A gasometric method for determination of organic carbon in soil by the use of sulphuric-chromic acid mixtures at 100° is advocated. The method gives concordant but slightly lower values than the Kjeldahl method of Robinson, McLean, and Williams (B., 1929, 487), and has the disadvantage that nitrogen determinations cannot be made simultaneously.

E. HOLMES.

Microdetermination of carbon in soil. M. NICLOUX (Compt. rend., 1929, 189, 768—770).—The air-dried soil sample is ground to pass 120-mesh and diluted by admixture with anhydrous sodium sulphate similarly ground and sieved. The mixture is shaken in a thick flask with some steel balls (diam. about 9 mm.) until homogeneous. The portion utilised for analysis should contain approx. 3 mg. of carbon. The oxidation process is carried out with a mixture of sulphuric acid, potassium iodate, and silver sulphate, followed by the addition of potassium dichromate as previously described (A., 1927, 436).

A. G. POLLARD.

Plastometric studies of soil and clay pastes. B. A. KEEN and G. W. S. BLAIR (J. Agric. Sci., 1929, 19, 684—700).—The pseudo-viscosity of soil and clay pastes and their static rigidity (the energy required to cause the paste just to flow) have been examined. The latter quantity is related to the resistance of the soil to the passage of cultivating implements, the effect of chalk on soil resistance, and the moisture content at which a well-kneaded mass of soil becomes sticky.

E. HOLMES.

Variations in potassium content of lucerne due to stage of growth and soil type, and the relationship of potassium and calcium in plants grown on different soil types. J. F. FONDER (J. Amer. Soc. Agron., 1929, 21, 732—750).—Plants grown on light sandy soils contained most potassium, those grown on very heavy soils were intermediate, and on sandy loam contained least. The stems contained more than the leaves, but the expressed juices from the two portions contained equal amounts. The percentage of potassium decreased with advancing growth period. Repeated cropping did not deplete the soil-potassium to the extent that it controlled the plant-potassium. Little of the potassium in stems and leaves was present in the woody tissue. A physiological balance between potassium and calcium appeared to exist.

CHEMICAL ABSTRACTS.

Artificial manure from straw. R. C. COLLISON and H. J. CONN (New York State Agric. Exp. Stat. Bull. No. 573, 1929, 17 pp.).—The rotting of cereal straw by means of a nitrogenous nutrient medium has been studied under controlled conditions and the suitability of the resultant material as a fertiliser has been tested by measuring the growth of barley, rape, and peas in sand to which known amounts of the rotted straw had been added. A heap of mixed oat and wheat straw was impregnated with a mixture of salts in the following proportions per ton of dry straw: ammonium sulphate 60 lb., ground limestone 50 lb., superphosphate 30 lb., and potassium chloride 25 lb., and the stack allowed to ferment with periodical additions of water. A second heap was built under parallel conditions using the "Adco" material (B.P. 152,387; B., 1920, 827 A) developed by Richards and Hutchinson. In three or four months both piles had rotted completely and resembled decomposed farmyard manure. The vegetative tests showed that the injurious effects of fresh straw had been entirely eliminated and the material produced active growth in proportion to the amount added to the sand. A subsequent experiment indicated that, unless a very much longer fermentation period can be allowed, natural rainfall will not successfully replace the artificial watering, which amounts to about 800 gal. per ton of straw. The economics of the processes are discussed.

H. J. DOWDEN.

Action of "nitrophoska I.G.I." in comparison with fertiliser mixtures of various physiological reactions. H. SIBBE (Landw. Jahrb., 1929, 68, 755—773; Chem. Zentr., 1929, i, 2225).—A study of the effect of various fertilisers on the p_H value of soils.

A. A. ELDRIDGE.

Four-year field trial with six different nitrogenous fertilisers. L. MEYER (Fortschr. Landw.,

1929, 4, 167—169; Chem. Zentr., 1929, i, 2226).—A comparative study of ammonium sulphate, ammonium chloride, sodium nitrate, and calcium nitrate.

A. A. ELDRIDGE.

Determination of tervalent arsenic [in plant protective materials]. G. FESTER (Z. angew. Chem., 1929, 42, 1040).—In the analysis of plant-spraying materials, such as Schweinfürth-green, the method involving boiling with caustic soda followed by titration with iodine solution in presence of sodium bicarbonate leads to low values for arsenious oxide when calcium compounds are present. More accurate results are obtained if the material is dissolved in boiling hydrochloric acid, and the solution, largely diluted, is then treated with ammonium carbonate solution until the copper deposit is redissolved. The blue solution is then titrated with 0.1*N*-iodine until it turns green. The results for a material containing calcium sulphate were in good agreement with those obtained by vaporising the arsenic in a stream of hydrochloric acid, and a check analysis on pure arsenious oxide gave a result of 99.9% of the theoretical.

H. J. DOWDEN.

New solvents for removal of arsenical spray residue. R. H. ROBINSON (Ind. Eng. Chem., 1929, 21, 1132—1135).—The most satisfactory single substance for dissolution of lead arsenate residue is hydrochloric acid in approx. 0.01% concentration. By the addition of certain sulphates and chlorides to the acid larger amounts of lead arsenate may be dissolved; both with the mixed solvents and with hydrochloric acid alone dissolution is rapid, reaching its maximum in under 5 min. A combination of hydrochloric acid with sodium sulphate appears to be the most useful of the solvents studied, but on account of the few commercial washing tests so far completed general recommendations cannot yet be made.

F. R. ENNOS.

Lowering of the carbonate horizon in the soils in the vicinity of Odessa due to irrigation. V. G. TANFILEV (Pochvovedenie, 1928, 23, No. 1—2, 96—98).

See also A., Dec., 1411, **Micro-determination of iodine** (REITH). 1413, **Determination of aluminium in plants** (WINTER and others). 1497, **Determination of aluminium in plants** (WINTER and BIRD). 1498, **Luxury consumption of potassium by plants** (BARTHOLOMEW and JANSSEN).

PATENTS.

Disinfection of seeds. W. P. RALEIGH and C. B. DICKEY, Assrs. to PITTSBURGH PLATE GLASS CO. (U.S.P. 1,734,646, 5.11.29. Appl., 1.2.28).—A disinfectant for maize and similar seeds consists of a mixture of a solid, inert carrier and yellow mercuric oxide to give a product containing 8—10% Hg.

F. G. CROSSE.

Manufacture and use of insecticides. C. N. HAND, Assr. to RUBBER SERVICE LABS. CO. (U.S.P. 1,734,519, 5.11.29. Appl., 12.12.23).—An aqueous suspension of *s*-diphenylthiourea and starch is claimed.

F. G. CROSSE.

Dispersions containing copper (B.P. 321,260).—See VII.

XVII.—SUGARS; STARCHES; GUMS.

Laboratory apparatus for diffusion experiments [with sugar beet]. V. STANEK (Z. Zuckerind. Czechoslov., 1929, 54, 37—41).—A laboratory slicing machine for producing normal cossettes was constructed, the roots being moved over fixed Goller knives. Two forms of laboratory diffusion batteries are described (capacity about 200 c.c. and 1 litre, respectively), these being capable of giving a normal juice with a good exhaustion of the slices.

J. P. OGILVIE.

Determination of the sugar content of carbonatation scums [filter-press cake]. J. KADLEC (Z. Zuckerind. Czechoslov., 1929, 53, 747—748).—The content of sugar in unwashed carbonatation filter-press cakes, as determined directly by the usual method of analysis (using zinc nitrate to assist dissolution), was 11.13%. On the other hand, by extracting the unsweetened sample of cake by digesting with a large volume of water at 82°, evaporating down the extracts, and polarising them, a value nearly double the above was obtained. This considerable difference was not due to the presence of dextrorotatory substances extracted during the digestion, the determination of sucrose by the double-polarisation method having eliminated this possible source of error.

J. P. OGILVIE.

Use of "carboraffin" [decolorising carbon] in the sugar industry. E. ZAPPELLI (Internat. Sugar J., 1929, 31, 430—431).—Raw sugar was refined in Java on the Somobito plantation by remelting it, clarifying the resulting liquor with lime and phosphoric acid, filtering, and passing through Scheibler bags coated with "carboraffin." Only 0.1% of the carbon was used, calculated on the sugar in solution, and an average 50% decolorisation was obtained. Sugar was produced which was described as "very good."

J. P. OGILVIE.

Factors affecting colour in sorghum syrup. J. J. WILLAMAN and S. S. EASTER (Ind. Eng. Chem., 1929, 21, 1138—1145).—The colour value of sorghum syrup, as measured by the Pfund colour grader, varies linearly with the logarithm of the concentration (in degrees Brix) and with the p_H . On heating the diluted syrup the colour produced is proportional to the temperature but independent of the initial p_H . The most important source of colour is levulose. In factory practice colour production depends on the degree of inversion of the sucrose and on the time and temperature of heating, provided the reaction never becomes alkaline.

F. R. ENNOS.

Treatment of low-grade beet-sugar products. V. I. KUZNETZOV (Zhur. Sakh. Prom., 1927, 1, 235—238).—By liming at 90°, decolouring, and saturating with carbon dioxide, or by dissolving in syrup, liming at 90°, and sulphitation, the colour is decreased but the purity is scarcely affected.

CHEMICAL ABSTRACTS.

Treatment of low-grade beet products. G. S. BENIN and B. E. KRASILSHCHIKOV (Nauch. Zapiski, 1929, 8, 73—90).—Sulphitation is preferred to carbonatation; for heating at 75—95° for 5—10 hrs., p_H 7.0 (remelts) or 6.5 (green syrups) is advisable, since at lower p_H values inversion occurs unless a lower temperature is employed.

CHEMICAL ABSTRACTS;

Experiments on the rapid cooling of low-grade massecuites. A. H. WARREN (Sugar News, 1929, 10, 317—323).—Experiments are described demonstrating how much more rapidly low-grade massecuite can be centrifuged hot than when cold, the capacity of the machines being thus doubled at least. A temperature of 60° is recommended. J. P. OGILVIE.

Zamaron's method of clarifying molasses for analytical purposes. K. K. BHARGAVA (Internat. Sugar J., 1929, 31, 421—423).—For decolorising solutions of sugar previous to polarisation, calcium hypochlorite, hypochlorous acid, and chlorine were found to be unsuitable, each causing inversion. Sodium hypochlorite increased the polarisation, though no invert sugar was formed. J. P. OGILVIE.

Glycerin from molasses. P. V. GOLOVIN (Zhur. Sakharnoi Prom., 1927, 1, 22—25).—Equal volumes of molasses and water are boiled for 1 hr. with turf powder, the solution is diluted to d_{20}^{20} 1.074—1.091 and fermented with yeast, after addition of ammonium salts, phosphates, calcium, manganese, and sodium hydrogen sulphite, for 36—48 hrs. The fermented solution is distilled to remove alcohol and aldehyde, the sulphite is recovered with lime, and the solution filtered and neutralised. The crude glycerin is distilled with steam.

CHEMICAL ABSTRACTS.

Relation of the "quality" of potato starch to the formation of mucilage. SPROCKHOFF (Z. Spiritus-ind., 1929, 52, 341—343, 350—351).—The formation of mucilage is due to the hydration of the amylopectin fraction of the starch molecule. This process begins at about 57° and becomes marked at 63—65°. The starch grain absorbs a small quantity of water with the production of two phases consisting of starch with very little water surrounded by a very dilute solution of starch. As the temperature rises the starch grains swell, allowing the absorption of more water, until at 100°, with a 0.5% solution, almost all the water is taken up and only one phase remains. The viscosity is then so great that sedimentation does not take place on cooling and keeping. A high viscosity value is taken as a criterion of the capacity of a starch to form a satisfactory mucilage. The viscosity depends on the temperature and concentration of the starch solution, and for the practical test of the starch should be determined at a temperature which is rigidly fixed and with a 0.4—1% solution of starch. With dilute solutions the true viscosity is given by the measurement, the internal friction between the two phases which occurs with higher concentrations being absent. With starch concentrations ranging from 1.2 to 3.6% there is a maximum viscosity depending on the temperature: 2% solution, max. 90—95°; 2.8%, 80—85°; 3.2%, 75—80°. At higher concentrations the maximum viscosity cannot be measured. With concentrations less than 1% there is no maximum viscosity, but the value rises rapidly between 90° and 100°. The "quality" of the starch is measured by the Saare test, which determines the power required to withdraw a disc from the starch mucilage. The resulting curves, which show maxima varying with the temperature, resemble those obtained from the viscosity determinations. Just as the viscosity

curves show a very steep fall between 75° and 90°, so the Saare test, being very sensitive at the same range of temperature, also indicates such changes, and the omission definitely to fix the temperature of the test has led to the publication of conflicting results.

C. RANKEN.

Report [on sugar cane]. HARRISON.—See XVI. **Lemon residues.** MELIS. **Sugar-beet pulp as source of pectin.** CODLING and WOODMAN.—See XIX. **Sugar-factory effluents.** NOLTE.—See XXIII.

See also A., Dec., 1488, **Chemistry of starch** (POLAK and TYCHOWSKI).

PATENTS.

Refining of sugar. E. N. EHRHART, Assr. to J. J. NAUGLE (U.S.P. 1,731,237, 15.10.29. Appl., 4.3.26).—A relatively dilute sugar solution ($d_{1.14}$ —1.24) is partially decolorised with spent carbon, "suchar," from the final decolorisation of a concentrated sugar solution, and the sp. gr. of the filtered liquor is increased to that required in the boiling pans by the addition of a more concentrated solution of crude sugar. The mixture is decolorised and purified by boiling with fresh carbon and the filtered syrup is passed to the boiling pans, the carbon being used again for the preliminary purification of more dilute liquor. A. R. POWELL.

Treatment of cellulose-containing materials (B.P. 299,844).—See V.

XVIII.—FERMENTATION INDUSTRIES.

Treatment of brewing waters. H. LÜERS [with W. SCHREMPF] (Woch. Brau., 1929, 46, 469—474).—Beers brewed with a decarbonated water originally containing 15° of hardness, of which 14.2° were due to carbonates, showed variations depending on the method of decarbonation. The greatest increases in the nitrogen content of the wort were produced when the water was decarbonated either by the addition of lime or by neutralisation by lactic acid. Nitrogen assimilated during fermentation was chiefly of the formol type. Worts prepared from water neutralised by lactic acid showed the highest alkalinity of the ash, the greatest amount of buffer substances, the greatest increase in the content of phosphate, and, during fermentation, the maximum assimilation of nitrogen. Untreated water yielded a beer with a dark red colour and a coarse, bitter flavour. Water decarbonated by lime yielded a bright yellow-coloured beer with a pleasantly bitter flavour. The addition of gypsum as well as lime accelerated the ripening of the beer but lowered its quality, giving a harsher flavour. The colour of the beer was palest when brewed with water corrected by lactic acid, but the flavour was so mild that a higher hop rate was necessary to obtain the desired bitterness. A comparison was made between a soft water and the same water artificially carbonated by passing carbon dioxide into a suspension of calcium and magnesium carbonates. The original water yielded a wort containing more total and formol nitrogen, and more nitrogen was assimilated during fermentation. With the hardened water the buffering was greater and the phosphates and ash were less. Maltose and final attenuations differed but little.

The hardened water gave a beer with a rounder and fuller flavour.

C. RANKEN.

Determination of lactic acid in wine by "step" titration. J. TILLMANS and E. WEILL (Z. Unters. Lebensm., 1929, 57, 515—519).—The volatile acids are steam-distilled from 50 c.c. of wine, and after addition of a few drops of phenolphthalein solution to the residue cold saturated baryta solution is added along with 5 c.c. of 10% barium chloride solution until a faint pink colour is produced. In order to hydrolyse any lactic anhydride present, the mixture is warmed for 10 min. on the boiling water-bath with 2—3 c.c. of baryta solution until a pink colour persists, neutralised with carbon dioxide, and evaporated on the water-bath to 10 c.c. The solution is made up to 25 c.c. with water, and then to 100 c.c. at 15° with neutral 96% alcohol, added in a thin stream with stirring. After frequent shaking during 2 hrs., the liquid is filtered, and 75 c.c. of the filtrate at 15° are treated with 25 c.c. of 5% sodium sulphate solution. The mixture is shaken, and after remaining in a closed vessel for 15 min. is filtered; then 20 c.c. of the filtrate at 15° are evaporated to 4 c.c. with addition of a little pure animal charcoal, and again filtered, with careful washing of basin and filter, into a colourless 50-c.c. glass cylinder, 13 cm. high and 2.5 cm. in diam. The filtrate should amount to 20 c.c. A few drops of phenolphthalein are added and 0.1*N*-sodium hydroxide to the end-point. A control at p_H 3.2 is prepared by dissolving 21.008 g. of citric acid in 200 c.c. of *N*-sodium hydroxide, diluting to 1 litre, and mixing 43 c.c. of this with 57 c.c. of 0.1*N*-hydrochloric acid. 20 c.c. of this are placed in a similar cylinder to the first, and to both solutions 0.3 c.c. of a 0.01% solution of dimethylaminoazobenzene in 90% alcohol is added. The solution in the first cylinder is titrated with 0.1*N*-hydrochloric acid to the colour of the control. The lactic acid, x (in grams), in 1 litre of wine is given by $x = 1.45a$, in which a is the number of c.c. of 0.1*N*-hydrochloric acid used after deduction of 0.20 c.c. for the acid equivalent of the indicator.

W. J. BOYD.

Colorimetric micro-determination of glycerol in wine. C. DE COQUET (Bull. Soc. Pharm. Bordeaux, 1928, 66, 235—250; Chem. Zentr., 1929, i, 2115).—The method is based on the development of a greenish-blue colour by the addition of codeine and sulphuric acid to methylglyoxal produced by the action of bromine water.

A. A. ELDRIDGE.

Detection of fruit wine by the sorbitol process. FIESSELMANN (Mitt. Lebensm. Hyg., 1929, 20, 45—46; Chem. Zentr., 1929, i, 2599).—The test is rendered more difficult by the presence of much invert sugar. Such a wine is preferably first fermented by a pure yeast culture. Coloured wines and wines high in extractives are preferably treated with "eponite." The validity of the test is confirmed (cf. B., 1929, 619, 834).

A. A. ELDRIDGE.

Extraction of colour from red-juice grapes. JOSLYN and others.—See XIX.

See also A., Dec., 1397, **Mechanism of enzyme action** (NORD and WEICHERZ). 1488, **Enzyme catalysts** (ARMSTRONG and HILDITCH). **Amylase from**

Cumbu (*Pennisetum typhoideum*) (NARAYANAMURTI and others). **Chemistry of starch** (POLAK and TYCHOWSKI). **Malt catalase** (MATSUYAMA). 1489, **Enzyme action: tyrosinase** (NARAYANAMURTI and AYYAR). 1490, **Effect of electrolytes on glycerophosphatase** (INOUE). **Fat-decomposing enzyme** (GYOTOKU and MATSUBARA). **Action of papain on polarisation of gelatin** (GORE). **Proteolytic enzymes of green malt** (HOPKINS). 1493, **Endo-cellular enzymes of *B. coli communis*** (YOUNG). 1496, **Vitamin-B contents of fresh yeast and of the derived dried yeast** (SCHEUNERT and SCHIEBLICH). 1498, **Post-mortal alcoholic fermentation of peas** (ZALESKI and NOTKINA).

PATENT.

Manufacture of yeast. E. A. MEYER, Assr. to FLEISCHMANN Co. (U.S.P. 1,724,952, 20.8.29. Appl., 30.4.27. U.K., 4.5.26).—See B.P. 275,328; B., 1927, 792.

XIX.—FOODS.

Minerals of wheat. I. Sulphur and chlorine. B. SULLIVAN and M. HOWE (Cereal Chem., 1929, 6, 396—400).—Determinations of magnesium, calcium, phosphorus, chlorine, and sulphur were made on a hard spring wheat, on the products milled from it, and on bread baked from the patent flour. These materials also were ashed by ignition for 16 hrs. at 590—600° and similar analyses then made. The wheat products and the bread contained about 0.2% S, but in the ash only traces could be found. The chlorine content of the products as calculated from the percentage found in the ash shows that 93—99% of the chlorine is lost during ignition. Practically all the sulphur in wheat is present as a constituent of cystine, and it was found that the sulphur contents of the materials increased with the protein contents.

H. J. DOWDEN.

Colloid chemistry of gluten. H. L. B. DE JONG and W. J. KLAAR (Cereal Chem., 1929, 6, 373—378).—When sodium hydroxide solution is slowly added to a gluten solution in dilute hydrochloric acid containing 1.134 g. of protein per 100 c.c. at p_H 4.6, a second liquid phase separates. The clear solution becomes at first increasingly opalescent and at a certain concentration of alkali again becomes clear. The globules show Brownian movement, are deformed by pressure, and are filterable through a porous crucible. The droplets are relatively rich in protein and are deeply coloured by iodine, the surrounding liquid remaining pale. The phase equilibrium is shifted by addition of alcohol, glycerin, sucrose, or acetone, and a cloudy gluten solution becomes clear with an acetone concentration of $\pm 30\%$ and opalescent again at 50%. The viscosity of the gluten solution falls rapidly when small amounts of electrolytes are added, the drop in viscosity depending on the valency of the anion.

H. J. DOWDEN.

Report on methods of analysis [for cereals]. M. J. BLISH (Cereal Chem., 1929, 6, 423—429).—Collaborative studies have shown that in protein determinations, replicated tests may vary over a range of 0.2% (cf. Treloar, following abstract), and accordingly the Committee of the American Association of Cereal

Chemists recommends that protein results should be reported to the first decimal figure only. It is further recommended that all equipment should be checked periodically by a large number of determinations on a typical flour, the variability of the results being compared with the standards. Bromocresol-green as the indicator for ammonia titrations is advocated (cf. Bailey, B., 1930, 11).

H. J. DOWDEN.

Statistical study of collaborative protein determinations. A. E. TRELOAR (Cereal Chem., 1929, 6, 429—453).—Samples of three different flours of high, low, and average protein content were distributed to a number of laboratories to be analysed by official methods. Twenty determinations and twenty blanks from each investigator were received, and the results subjected to statistical analysis. The variations from laboratory to laboratory show that discrepancies of 0.35% for the average of three determinations and 0.6% for a single determination may occur in the protein analysis.

H. J. DOWDEN.

Effect of storage and of various bleaching agents on the carotene concentration of flour. C. G. FERRARI and C. H. BAILEY (Cereal Chem., 1929, 6, 457—482).—To investigate the natural bleaching of flour by atmospheric oxidation of the carotene, samples of a straight-grade flour were stored in stoppered bottles (a) in the air at room temperature, (b) in carbon dioxide at room temperature, and (c) in air at 0°, the carotene content being determined at intervals by measuring the transmittancy of the petroleum extract to light, $\lambda = 435.8 \text{ m}\mu$ (cf. B., 1929, 657). Temperature exerted a greater influence than carbon dioxide in inhibiting the bleaching of the flour, and at the end of 100 days the carotene contents of the three samples had fallen to 1.85, 1.91, 2.12 p.p.m., respectively, the original concentration being 2.46 p.p.m. of flour. The influence on carotene of gaseous bleaching agents was studied by means of a special apparatus, which permitted a known volume of the gas to be admixed with flour contained in a revolving wooden box. With chlorine doses of 253, 315, and 394 p.p.m. of flour, the measurements immediately after treatment showed that 50, 66, and 75%, respectively, of the carotene had been bleached. The action of chlorine is not instantaneous, and after the large initial effect bleaching continues at a rate greater than can be accounted for by natural ageing. At the end of 104 days the concentration of bleached carotene in the above samples had risen to 66, 71, and 80%, respectively. Doses of chlorine of the same magnitude were used on a Marquillo wheat of high carotene content, viz., 4.56 p.p.m., and produced the same percentage bleaching. Nitrogen trichloride is used commercially for bleaching in the Agene process. Experiments on a straight-grade flour, using dosages of 15.9 and 47.8 pts. of nitrogen trichloride per million pts. of flour, showed immediate bleaching of 36% and 47%, and after 100 hrs. 43% and 60%, respectively. On the high-carotene wheat, using higher concentrations of nitrogen trichloride, correspondingly greater bleaching effects were produced: 96 p.p.m. of flour effected a 96% bleach in 71 days. Experiments were also made with Novadel (benzoyl peroxide mixed with calcium phosphate). The pow-

dered material was mixed with a sample of flour (500 g.) by agitation in a large jar for 20 min. Using Novadel concentrations of 0.011, 0.0145, and 0.016%, the bleaching produced at the end of 4 hrs. was 24, 38, and 41%, respectively of the original carotene content, and by the end of 153 hrs. 60% had been bleached by all concentrations. The influence of Novadel at various concentrations on the wheat of high carotene content was also studied. It appears that with this reagent all flours are bleached the same proportional amount in the same time; thus, in 197 hrs., all samples with all doses of the reagent were bleached to about 60% of the carotene. Large doses of the reagent produce more rapid results, but the final bleaching effect after a long interval of time is almost identical for all doses. Ultra-violet light is also an effective bleaching agent, and samples of flour exposed to the mercury-quartz arc were bleached 47% in 7 hrs.

H. J. DOWDEN.

Influence of environment on the moisture content of flour and wheat. T. H. FAIRBROTHER (Cereal Chem., 1929, 6, 379—395).—Investigations have shown that the moisture content and consequently the gross weight of flour is closely related to the atmospheric humidity, the variations in weight when packed in cotton or in paper bags being about the same. By exposing samples in a closed chamber under conditions of controlled humidity and temperature it was proved that flour containing 15% of moisture may lose over 4% in weight in a dry atmosphere. When flour which has been stored in a moist atmosphere is subjected to dryer conditions for a short period a change in the hydration capacity occurs which is independent of temperature conditions, since on re-exposure to the original R.H. the loss in weight is not entirely regained. A bag of flour weighing 693.3 g. at 75% R.H. lost 15 g. when exposed for 24 hrs. to R.H. 36%. After the humidity had been rapidly increased to 75% again the flour regained 11.3 g. by the end of 120 hrs. and thereafter remained unchanged. From observations on a sample of flour containing 13.06% of moisture it was found that between 15% and 90% R.H., a linear relationship exists between moisture content and R.H. On mixing a wet wheat and a dry wheat an exchange of moisture occurs, and for a 1:1 mixture equilibrium is reached in 3 days, but equality of moisture is never attained, the final difference being about 2%.

H. J. DOWDEN.

Influence of flour moisture on the Pekar test.

A. W. ALCOCK and N. J. EDIGER (Cereal Chem., 1929, 6, 410—413).—When the moisture content of unbleached flour is lowered, the flour appears whiter as judged by the Pekar test, the original colour being resumed as the moisture is restored. By measuring the weight of crust per unit area, it was found that the dough formed by the flour of high moisture content is definitely thicker than that from the flour of low moisture content, even if the samples are dipped for a considerable time to allow both flours to imbibe equal amounts of water. Consequently the colour of the high-moisture flour dough is darker and it would be judged of low quality. It is recommended that before flours are compared by the Pekar method they should be brought to approximately the same moisture content.

H. J. DOWDEN.

Plasticity of flour-water suspensions. J. L. Sr. JOHN (Cereal Chem., 1929, 6, 400—410).—An attempt has been made to correlate flour quality with the plasticity of flour-water suspensions. The suspensions were made by adding the exact amount of water to a weighed sample of flour, stirring gently in a beaker, and finally working into a smooth suspension in a pestle and mortar, the whole procedure requiring 10 min. The author's plastometer was used (cf. B., 1928, 71), and it was found that duplicate measurements were in close agreement. The results obtained with ten different flours, expressed in terms of mobility, show that there is a gradual though irregular increase in mobility up to 8 hrs. from the time of mixing. There is also an increase in mobility with decrease in concentration of the suspension. The manometer pressures were maintained within narrow limits at 40 cm. and 60 cm. of water, but subsequent experiments showed that great accuracy of control is not essential. There is little change in mobility with age of the flour up to 2 years, after which it is not suitable for use in baking. Baking tests showed that there is a progressive increase in mobility as the loaf volume decreases, but there is no relationship between loaf volume and protein content or p_H of the flour.

H. J. DOWDEN.

Acetonedicarboxylic acid as a leavening agent. E. O. WING (Ind. Eng. Chem., 1929, 21, 1145—1146).—A mixture of starch and acetonedicarboxylic acid when used as a leavening agent is equally effective in raising the baked product as is a commercial baking powder yielding the same amount of carbon dioxide. Such mixtures are moderately stable—one containing 15% of available carbon dioxide lost only 3% in 12 months—and possess the advantage of leaving no solid residue, although in one instance acetone was detected in the baked product. (Cf. A., 1928, 963.) F. R. ENNOS.

Panification [of flour] in presence of de-acidifying agents. D. MAROTTA and F. DI STEFANO (Annali Chim. Appl., 1929, 19, 459—466).—Bread was made from a high-percentage flour (85%) with additions of small proportions of either lime water, calcium glucosate, or sodium hydrogen carbonate. The first of these renders the bread less soft and less porous, and lowers the acidity by about 1°; the second leaves the bread soft and porous, but has little effect on its acidity; the third gives a soft bread with increased porosity, and pleasant smell and taste, the acidity being lowered by about 1°. Hence addition of sodium hydrogen carbonate is recommended when the flour used contains an exceptionally high percentage of the whole wheat corn. The acidity of the corn, discarding the germ, increases from the centre to the periphery, reaching a maximum in the grey zone preceding the bran proper. The acids present appear to be largely fatty acids and the grey zone contains a solid acid. T. H. POPE.

Points for consideration in baking tests. C. G. HARREL (Cereal Chem., 1926, 6, 414—423).—A survey of the results obtained over one year with the standard experimental baking test has shown that differences in moulding treatment introduce wide variations in the results, and will probably necessitate the use of moulding machines. A standard practice must be adopted

with regard to pan-greasing and greater attention given to oven-temperature control. H. J. DOWDEN.

Determination of sand in rice meal. E. WALTZINGER (Chem.-Ztg., 1929, 53, 891).—The extraction of the ash of the material with 5—25% sodium carbonate solution gives a result for sand which is much too high. Accurate results are obtained by boiling the meal, without ashing, with a 1.25% solution of sodium carbonate and washing the residue with 1.25% sulphuric acid.

A. R. POWELL.

Differentiation of cow's and goat's milk. F. G. KOHN (Z. Fleisch- Milch-hyg., 1929, 39, 279—281; Chem. Zentr., 1929, ii, 232—233).—When mixed with amyl alcohol and sulphuric acid (in the butyrometer) the casein of cow's milk forms larger and more voluminous flocks than does that of goat's milk; with the latter the layer is more mobile and the interface appears horizontal. The distinction is not observed with mixtures or with diluted cow's milk. A. A. ELDRIDGE.

Influence of neutral salts on alcohol coagulation of fresh milk. K. MITAMURA (Sapporo J. Forestry Agric., 1927, 19, 1—36).—Neutral salts (0.001N-solution) increase the sensitivity of fresh milk to coagulation by alcohol. The effect increases with the valency of the cation. Dialysis of milk decreases the sensitivity to coagulation by alcohol, which is not related to the p_H .

CHEMICAL ABSTRACTS.

Effect of heat on the antineuritic vitamin of milk. A. L. DANIELS, M. L. GIDDINGS, and D. JORDAN (J. Nutrition, 1929, 1, 455—466).—In superheated milk, except that dried by the roller process, there is considerable destruction of vitamin-B. In the closed method of pasteurisation vitamin-B is not destroyed; the slight loss in the open method is much less than that with evaporated or spray-dried milk. If milk is boiled quickly and cooled rapidly there is little loss of vitamin-B; temperature and aeration are important factors.

CHEMICAL ABSTRACTS.

Bacteria that survive and grow during pasteurisation of milk and their relation to bacterial counts. P. S. PRICKETT and R. S. BREED (New York State Agric. Exp. Sta., Bull. No. 571, 1929, 25 pp.).—The development of pin-point colonies in the plating of pasteurised milk is shown to be due to thermophilic and heat-resistant bacteria. Ordinary media and methods of incubation do not reveal these bacteria, so that microscopical examination is necessary to furnish a true bacterial count. Seven groups of organisms (three thermophilic and four heat-resistant) were isolated during the examination of milk at various stages of production and of farm and pasteurising plant and buildings. All these groups were isolated from pin-point colonies, and by adopting special media and appropriate incubation temperatures they were made to yield active cultures. The evidence tends to prove that the presence of these organisms is due to contamination at the farm, and measures are recommended for their control, such as more sanitary conditions of feeding and bedding and the disinfection of utensils. At the milk plant repasteurisation of tailings and returns will infect subsequent batches and the practice should be discon-

tinued. Foam should be entirely removed between batches of milk. Since thermophiles are sensitive to cold, refrigeration after pasteurisation will lower the bacterial count of the milk.

H. J. DOWDEN.

Nature and significance of the volatile substances present in foodstuffs. J. KÖNIG and E. KRACHT (Z. Unters. Lebensm., 1929, 57, 377—412).—Various foodstuffs were heated with water at 100° in the apparatus described by König and Schreiber (B., 1927, 344). The use of the expressed juice of vegetable products instead of the sliced material and the substitution of 5% salt solution for water gave slightly larger yields of volatile material, but neither of these modifications is recommended. The substitution of calcium hydroxide-hydrogen peroxide solution for ammoniacal silver oxide solution in the fourth Peligot tube was necessary in order to oxidise all the volatile reducing substances. In general, these yielded on oxidation a variable mixture of formic, acetic, and butyric acids, with two non-volatile acids, probably malonic and valeric acids. On heating various vegetable products at 100° or milk and flesh at 101—102° no volatile ammonia could be detected. Drying of the product at 50—60° produced changes in the yields of volatile substances. Carbon dioxide and formaldehyde are to some extent volatilised at these temperatures. Carrots and apples yielded increased quantities of hydrogen sulphide and mercaptans after being dried, whereas dried white cabbage yielded less of these substances than the fresh product. It is concluded that the labile substances occur in both a looser and a firmer combination. After storage of carrots in the earth or of apples in a cellar for 4 months, the volatile sulphur compounds had almost entirely vanished, carbon dioxide and formaldehyde had decreased, and the less volatile aldehydes had accumulated. The labile substances and their volatile products appear to be retained better in presence of organic acids (as in sauerkraut) than in the neutral or alkaline state. The behaviour of certain products occurring in foodstuffs on being heated with water at 100° was studied. Malonic acid yields acetic acid and carbon dioxide, but no reducing substances. Maleic and fumaric acids are stable. Oleic and stearic acids are slightly volatile in steam, but the former yields also reducing substances, including traces of formic acid and, after being heated for 10 hrs., considerable quantities of butyric acid. Cholesterol heated with water at 100° with a current of air or nitrogen passing through the liquid yields more reducing substances than does ergosterol. Formic acid was always detectable among the products. Lecithin yields formaldehyde and other volatile aldehydes on heating with water at 100° and a small quantity of a volatile phosphorus compound at 101—102°. Nuclein yields under the same conditions no formaldehyde nor volatile phosphorus compound and only traces of other volatile reducing substances. Irradiation with ultra-violet light had no influence on the yields of volatile substances from these compounds.

W. J. BOYD.

Vitamin content of honey and honeycomb. H. B. KIFER and H. E. MUNSELL (J. Agric. Res., 1929, 39, 355—366).—Examination of various samples of

honey and of the comb revealed in no case detectable quantities of vitamin-A, -B, -C, or -D.

A. G. POLLARD.

[Use of the] formol titration in examination of honey. A. GOTTFRIED (Z. Unters. Lebensm., 1929, 57, 558—560).—The observations of Tillmans and Kiesgen (B., 1927, 456) are confirmed, in that the formaldehyde titration values of honey in general correspond with the results of the Ley and Fiehe tests and of the Lund precipitation method. When 20 g. of honey in 100 c.c. of water require about 1 c.c. or less of 0.1*N*-sodium hydroxide, the presence of artificial honey is indicated.

W. J. BOYD.

Vitamins in canned foods. VIII. Home canning and commercial canning contrasted in their effect on vitamin values of pears. M. M. KRAMER, W. H. EDDY, and E. F. KOHMAN (Ind. Eng. Chem., 1929, 21, 859—861; cf. B., 1929, 450).—The growth, survival periods, and severity of scurvy of rats have been used to study the vitamin contents of Kieffer and of Bartlett pears in the raw state and after canning by commercial and by domestic methods. As has been shown in the case of apples (cf. B., 1925, 81), if precautions are taken to remove oxygen, Kieffer pears can be canned commercially without any apparent loss of vitamin-C, although by domestic methods vitamin-C is almost completely destroyed (cf. B., 1927, 638). The effect of the maturity of the pears at the time of canning is somewhat obscure. The vitamin-C content of Bartlett pears is relatively low, and is approximately equal to that of Kieffer pears or apples. Canning destroys a definite though small proportion of the vitamin-C content of Bartlett pears, and the situation is not improved by removal of oxygen. This variety of pear is not rich in vitamins-A and -B.

H. J. DOWDEN.

Composition of West Indian seedling avocados. J. TILT and M. WINFIELD (J. Home Econ., 1928, 20, 43—46).—Maximum, minimum, and average values for different varieties and stages of maturity are: H₂O 81.65, 83.92, 83.02; protein 1.12, 1.16, 1.14; fat 6.43, 8.09, 7.33; carbohydrate 6.72, 6.92, 6.82; crude fibre 1.16, 1.19, 1.17; ash 1.02%. The ash (g. per 100 g. of fresh avocado) contained P 0.0477, 0.0507, 0.0492; Fe 0.0054, 0.0072, 0.0063; Ca 0.0368, 0.0381, 0.0370; Mg 0.0323, 0.0407, 0.0365.

CHEMICAL ABSTRACTS.

Quality and maturity of apples. J. L. ST. JOHN and O. M. MORRIS (J. Agric. Res., 1929, 39, 623—639).—Chemical analysis of Jonathan apples in 1923—25 showed that the amounts of sugar etc. vary in different years, and that although the amounts of dry matter, ash, nitrogen, and reducing sugars show no progressive variation during the growing season, the total sugars increase due to increase in sucrose, and the percentage of acid tends to decrease. For dessert quality in apples the amount of sugar present is of more importance than that of acid. The decrease in the percentage of alcohol-insoluble, acid-hydrolysable fraction during the growing season is striking and needs further investigation.

E. HOLMES.

Sampling cleaned apples for determination of arsenical spray residue. J. W. BARNES and C. W.

MURRAY (Ind. Eng. Chem., 1929, 21, 1146—1147).—For apples carrying not more than 0.01 grain As_2O_3 /lb., a sample of six apples taken at random from a lot all parts of which have had the same treatment will give an accuracy of ± 0.0015 grain/lb. F. R. ENNOS.

Chemical treatment of lemon residues. B. MELIS (Giorn. Chim. Ind. Appl., 1929, 11, 399—404).—In America these residues are worked almost exclusively for the extraction of the pectins, but the procedure here described yields acid glucose extract (from the internal residues), bitter glucose extract (from the skins), and fats, nucleoproteins, pectins, and cellulose from both classes of residue. The main operations consist of drying of the finely-minced material, alcoholic extraction, and treatment of the residual pectocellulose to extract pectins and cellulose. The alcohol extraction is carried out in a reflux apparatus with 80% alcohol, and is repeated until the alcohol remains colourless. The combined extracts are concentrated under reduced pressure and the alcohol is recovered, the alcohol-free residue being taken up in water, and collected on a filter to remove separated fats and proteins, which are washed with hot water. Concentration of the filtrate yields about 6% of dense glucose extract (calculated on the original material) having, for the inner (outer) residues of the fruit, the mean composition: citric acid 23.2 (2.45), dextrose 31.27 (35.40), ash 3.26 (1.65), pectins 0.40 (—), water and undetermined matter 41.87 (60.50)%. The material filtered off represents about 0.6% of the fresh residues and contains about 25% of fats and 75% of nucleoprotein. The pectocellulose residue from the alcohol extraction, when freed from alcohol by distillation, forms about 9 (15)% of the inner (outer) residues. To separate the pectin and cellulose, it is steeped for 20 min. with cold 0.1% chlorine water, which is then heated to boiling and stirred. In this way the whole of the pectin passes into solution, leaving a white porous cellulose through which the dense, almost syrupy pectic liquors readily filter. Colloidal precipitation of the pectin, as practised in America, is attended by various inconveniences, and it is found preferable to precipitate by means of an aluminium salt and ammonia and to treat subsequently with alcoholic hydrochloric acid. The pectin thus obtained contains not more than 0.4% of ash and gives perfect jellyfication with 200 times its weight of sugar. A method of analysis of pectocellulose, based on the above procedure, is described. The results of various analyses give the mean percentage composition: pectin 37.6, cellulose 34.6, ash 4.3, undetermined 23.5. T. H. POPE.

Effect of temperature and time of heating on extraction of colour from red-juice grapes. M. A. JOSLYN, H. B. FARLEY, and H. M. REED (Ind. Eng. Chem., 1929, 21, 1135—1137).—The intensity of the colour extracted increases slowly as the temperature is raised from 20° to 70°, but more rapidly from 70° to 90°; the rate of increase is greater at the higher than at the lower temperatures. The tannin content of the juice is similarly affected by time and temperature of heating.

F. R. ENNOS.

Organisms found in spoiled tomato products. C. S. PEDERSON (New York State Agric. Exp. Sta., Tech.

Bull. No. 150, 1929, 46 pp.).—Bottles etc. of spoiled tomato products, e.g., ketchup, have been examined and the organisms causing the spoilage have been isolated, identified, and characterised. Of the six most commonly-occurring species, five were of the *Lactobacillus* type, viz., *L. lycopersici*, *gayoni*, *pentoceticus*, *mannitopoeum*, and *plantarum*, and the sixth was *Leuconostoc pleofructi*. Of these, none survived for more than 15 min. at 76°, so that they should all be destroyed in properly conducted canning operations. A key for the identification of the organisms has been developed.

H. J. DOWDEN.

Control of spoilage in tomato products. C. S. PEDERSON and R. S. BREED (New York State Agric. Exp. Sta., Bull. No. 570, 1929, 16 pp.).—The organisms causing spoilage of tomato products are of the *Lactobacillus* type (cf. preceding abstract), the products of which, though not poisonous, are disagreeable to the taste and slimy in appearance. Owing to the viscosity of these materials a longer period of processing during canning operations is necessary to allow the centre of the container to attain the destructive temperature. Removal of unripe or rotten fruits during sorting and more careful washing will help to eradicate the organisms, whilst closer attention to temperature control, especially after breakdowns, and the elimination of wooden holding vats are most necessary. The stoppers of bottles, jars, etc. should be sterilised, and material which has been allowed to cool before sealing should be resterilised. For the storage of tomato pulp, wooden barrels should be abolished and the 5-gal. cans must be carefully handled and adequately supported by staging between tiers.

H. J. DOWDEN.

Evaluation of preserved crab products and detection of crab constituents. G. BÜTTNER and A. MEIERMEISTER (Z. Unters. Lebensm., 1929, 57, 431—437).—It is not possible to distinguish the natural pigment of crab products from added artificial dyes by means of ultra-violet light, as the luminescence attributed to the former is due to another component of crab tissue; nor is it possible to detect artificial pigments in presence of the natural pigment by the wool-stain test. By reduction with stannous chloride and hydrochloric acid the artificial pigments may, however, be destroyed and the natural pigment left unchanged. The latter is slowly decomposed by light, especially by ultra-violet light, but with proper precautions the natural colour of preserved crab products may be retained unimpaired. W. J. BOYD.

Detection of castor bean in feeding-stuffs. M. WAGENAAR (Z. Unters. Lebensm., 1929, 57, 413—418).—The finely-powdered material is heated for 1 hr. on the boiling water-bath with 4 g. of potassium chlorate and 50 c.c. of 2N-hydrochloric acid for every 1 g. of sample. Then 50 c.c. of 4N-sodium hydroxide are added for every 1 g. of sample, and steam is passed through the mixture for 1 hr. The undissolved residue, consisting almost entirely of platelets of *Ricinus* palisade cells, is separated by means of the centrifuge and mixed with a syrup of invert sugar prepared from 70 g. of sucrose, 30 g. of water, and 1 g. of citric acid. The area of palisade platelets in the whole suspension is found by

measuring the area of these in an aliquot portion under the polarising microscope, using a calibrated cover-glass ($1500 \text{ mm.}^2 = 1 \text{ g. of fat-free castor bean}$). Under polarised light the platelets appear as opaque areas surrounded by a bright fringe. W. J. BOYD.

Luminescence of creatinine. G. REIF (Z. Unters. Lebensm., 1929, 58, 28—32).—Creatinine ordinarily exhibits a blue luminescence in ultra-violet light, but when its solution in butyric acid is heated at $165\text{--}170^\circ$ for 10 min. and the crystalline mass which separates on cooling is recrystallised from alcohol and the crystals are washed with ether, they show marked yellowish-green luminescence. Repeated crystallisation does not affect the intensity of the luminescence. The crystals have the elementary composition of creatinine. The abnormal luminescence changes to the original bluish luminescence in acid solution, but is stable in alkaline solution. Only fatty acids, particularly butyric acid, produce the change to the yellowish-green luminescence; inorganic, tartaric, and lactic acids do not produce it. It is probably due to transformation into the enol form. Other amino-acids, amides, and organic bases do not behave like creatinine in this respect. The simultaneous occurrence of creatinine and fatty acids in many foodstuffs may have an influence on the luminescence of these foodstuffs. W. J. BOYD.

Sugar-beet pulp as a source of pectin. A. J. CODLING and H. E. WOODMAN (J. Agric. Sci., 1929, 19, 701—714).—Dried sugar-beet pulp contains about 67% of nitrogen-free extractives of which a large proportion is pectose. Successive digestions of pulp with 0.5% ammonium oxalate at 100° extracts 34.5% of pectin calculated on the dry weight of pulp; a single prolonged digestion gives 32.2%. Acid digestion with 0.5% oxalic acid, 0.6% tartaric acid, 0.05N-hydrochloric acid, etc. leads to greater extraction owing to quicker hydrolysis of pectose to pectin, but does not necessarily enhance pectin yield. Prolonged digestion with water at 100° leads to satisfactory extraction of pectin. Beet-pulp pectin cannot impart a jelly condition to syrups of sucrose and free acid, but this inability is connected neither with the mineral impurities nor with changes in the pulp pectose during factory drying of the material. The pectin of beet pulp so far extracted has, therefore, no technical significance. E. HOLMES.

Protein content as a factor in grading wheat. H. M. TORY and others (Nat. Res. Council Canada Bull., 1929, 13, 7—60).—An interim report.

CHEMICAL ABSTRACTS.

Cause and prevention of cloudiness [in beverages]. E. WALTER (Destillateur u. Likörfabr., 1929, 42, 119; Chem. Zentr., 1929, i, 2596).

Ammonia titrations. BAILEY.—See VII. Cacao butter. SCHMANDT; SCHELLBACH. Pulasan and rambutan fats. GEORGI and TEIK.—See XII. Report [on butter]. HARRISON.—See XVI.

See also A., Dec., 1496, Nutritive value of garbanza pea (MITCHELL). 1497, Production of avitaminosis; vitamin-C (RANDOIN and LECOQ).

PATENTS.

Dough composition and its manufacture. J. R. WHITE (U.S.P. 1,729,409, 24.9.29. Appl., 22.3.28).—Yeast for bread making is propagated in a series of fermentable liquors, e.g., molasses, each containing a higher concentration of sodium chloride and of a bromate or iodate than the preceding, and the final liquor containing 3% of sodium chloride and 0.75% of potassium iodate or bromate together with 1—1.75% of mucic acid. A. R. POWELL.

Distillation and complete recovery of alcohol produced in baking ovens. N. DE NAVROTZKY (B.P. 305,223, 31.1.29. Fr., 2.2.28).—Vapour from the oven is drawn off and the alcohol condensed by passing through a vertical fractionating column containing an air-cooled condenser followed by a series of scrubbing chambers and a condensing chamber. Provision is made for returning water and dilute liquors to the oven. The air current used for cooling the condenser is actuated by the chimney draught of the oven. E. B. HUGHES.

Preservative treatment of fresh fruit. E. M. BROGDEN, Assr. to BROGDEN Co. (U.S.P. 1,732,118, 15.10.29. Appl., 2.3.25).—Citrus fruit is pickled in an alkaline hypochlorite solution and the surface well rubbed to remove spores of blue mould, then dried, and coated with a thin film of waxy material.

A. R. POWELL.

Preparation of milk, skimmed milk, or butter-milk free of milk sugar. J. POHLMANN and J. R. F. RASSERS (U.S.P. 1,732,026, 15.10.29. Appl., 10.11.28. Holl., 26.8.27).—See B.P. 320,497; B., 1929, 1030.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Detection of small traces of carbon monoxide in ethylene. B. S. WALKER and O. E. ALLEY (Anesth. and Analg., 1929, 8, 227—229).—Manchot and Scherer's reagent (silver oxide in pyridine) is specific for carbon monoxide in presence of ethylene under certain conditions of alkalinity. The pyrotannic acid method of Sayers, Yant, and Jones is also recommended.

CHEMICAL ABSTRACTS.

Detection of lead and copper salts in citric and tartaric acids by the official (D.A.B. VI) method. P. SCHÜTZ (Pharm. Ztg., 1929, 74, 1127—1128).—The dilute standard lead acetate solution prescribed for this test must be freshly prepared because it often becomes weaker when preserved in glass containers, owing to interaction of the lead salt and glass. This has been noted previously for lead nitrate (cf. Bernard, B., 1925, 831). Glass vessels which satisfy the official specification may or may not take up lead in this way. The official method is also unsatisfactory because in making up the dilute solution (10 mg. Pb per litre) no allowance is made for the sp. gr. of a 10% lead acetate solution, so that actually the dilute standard solution contains 10.6 mg. Pb per litre. W. A. SILVESTER.

Nipagin [methyl p-hydroxybenzoate] as a preservative for 3% hydrogen peroxide solution. G. TELLERA (Pharm. Zentr., 1929, 70, 727—728).—Addition of nipagin very greatly improves the keeping properties, whether the solution be exposed to the air or kept in sealed vessels. S. I. LEVY.

Comparison of the official pepsins of various pharmacopœias: correspondence between the different titres. P. LEGRAND (J. Pharm. Chim., 1929, [viii], 10, 385—401).—The methods of preparing and standardising pepsin as given by such pharmacopœias as those of England, France, Germany, America, Belgium, Spain, etc. are reviewed. The factors for converting French standards into the English, German, American, and Belgian ones, and *vice versa*, are given.

A. A. GOLDBERG.

Standardisation of preparations containing vitamin-D. O. SCHULTZ (Deut. tierärztl. Woch., 1929, 37, 152—155; Chem. Zentr., 1929, i, 1972).—A definition of units.

A. A. ELDRIDGE.

Iodine content and biological activity of thyroid preparations. A. STASIAK (Ber. Ungar. pharm. Ges., 1928, 4, 385—391; Chem. Zentr., 1929, i, 1845—1846).—The iodine contents of tablets, corresponding with the same quantity of thyroid substance, varied considerably. Aqueous extracts of thyroid gland contain only traces of iodine and are devoid of physiological activity.

A. A. ELDRIDGE.

American "poison barley." P. W. DANCKWORT (Deut. tierärztl. Woch., 1929, 37, 170—171; Chem. Zentr., 1929, i, 2435).—The results of chemical analysis scarcely deviated from the normal; hydrogen cyanide and alkaloids were absent.

A. A. ELDRIDGE.

Sterilisation of urotropine [hexamethylenetetramine] solutions. V. CAZZANI (Boll. Chim. farm., 1929, 68, 821—823).—A criticism of the method of sterilisation of hexamethylenetetramine solutions at 120° for 20 min. given by Leulier, Simeon, and Finck (cf. Cazzani, B., 1928, 68). After one sterilisation at 70° for 30 min. only traces of formaldehyde and no ammonia (Nessler's test) can be detected; after three such sterilisations the amount of formaldehyde is increased, but still no ammonia is detected, whilst after heating at 100° for 1 hr. a strong positive test for ammonia is obtained. At 120° polymerides of formaldehyde, formic and carbonic acids, methyl formate, and other products may be formed. Sterilisation is best effected at 80°.

J. W. BAKER.

Determination of nicotine in a cadaver. B. KROFT and G. STEINHOFF (Arch. Pharm., 1929, 267, 609—616).—The dipicrate method of Pfyl and Schmidt (B., 1927, 955) gave good results when applied to the determination of nicotine in the cadaver of a boy who died from nicotine poisoning. The best results, however, were obtained when the nicotine was extracted by ether from the alkaline suspension of the tissues, precipitated with an ethereal solution of picric acid, and the resulting ether-insoluble dipicrate weighed.

C. C. N. VASS.

Medicinals of the somnifen type. E. V. CHRISTENSEN (Arch. Pharm., 1929, 267, 589—599).—Greater accuracy in the determination of the total barbituric acid content in preparations containing this acid or its derivatives is attained if chloroform is used to extract the free acids instead of ether. Diethyl- and dipropyl-barbituric acids are separated by fractional crystallisation from water. The allylbarbituric acid content is determined by bromination, which occurs at the allyl double linking, and subsequent iodometric titration. Diethylamine, as the salt of the barbituric acid, is deter-

mined by direct titration with hydrochloric acid, using methyl-red as indicator.

C. C. N. VASS.

Oil of petitgrain. L. S. GLITCHITCH and R. NAVES (Parfums de France, 1929, 7, 60—66; Chem. Zentr., 1929, i, 3045).—The oil obtained by steam-distillation from the leaves and branches of Sicilian *Citrus* [*Bigaradia*] had d_{15}^{20} 0.875, α_D^{21} 21° 25', n_D^{20} 1.4739, acid value 1.12, ester value 42.7. The following constituents were detected: citral, camphene, *d*- α -pinene, cineole, linalool, geraniol, sesquiterpenes, a cyclic sesquiterpene alcohol, and a phenol (phenylurethane, m.p. 133.5—134°; benzoyl derivative, m.p. 107—108°). Hydrolysis afforded geranic and acetic acids, and traces of nitrogenous bases. The approximate composition is: terpenes 55, free *l*-linalool 4, free geraniol and nerol (1:1) 3, linalool and terpineol as acetate 2, geraniol and nerol as geraniate and acetate 10, citral 15, sesquiterpene substances 2, combined acids (geranic and acetic) 3%.

A. A. ELDRIDGE.

Vitamin-A in ratfish-liver oil. NORRIS and DANIELSON.—See XII. Report [on tobacco]. HARRISON.—See XVI. Lemon residues. MELIS.—See XIX.

See also A., Dec., 1410, Nephelometric determination of "argyrol" (RIMATTER). 1462, 1-Phenyl-3-methyl-5-pyrazolone (BRUNNER and MOSER). 1470, Strychnos alkaloids (LEUCHS and KRÖHNKE). 1471, β -Anilinopropionamide-4-arsinic acid etc. (HAMILTON and SIMPSON). Pyridine and quinoline derivatives (BINZ and others). 1490, Nephelometric determination of pepsin (VAN ARKEL). 1496, Concentration of vitamin-B (GUHA and DRUMMOND). 1497, Production of avitaminosis: vitamin-C (RANDOIN and LECOQ). 1499, Protein complexes in tobacco (GAVRILOV and KOPERINA). Determination of protein in tobacco (GAVRILOV and TARANOVA).

PATENTS.

Manufacture of active substances from vegetable organisms. SCHERING-KAHLBAUM A.-G. (B.P. 295,361, 9.8.28. Ger., 10.8.27. Addn. to B.P. 291,005; B., 1929, 911).—Extracts free from tissue and containing germinal gland hormones, prepared from vegetable organisms as described in B.P. 271,492 (B., 1928, 769), are subjected to irradiation with ultra-violet rays.

L. A. COLES.

Water-soluble substance containing colloidal silver chloride. O. NEUBERT, Ass. to WINTHROP CHEM. CO., INC. (U.S.P. 1,734,269, 5.11.29. Appl., 30.7.28. Ger., 9.8.27).—See B.P. 317,121; B., 1929, 911.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Preservative for photographic industry. W. LESZYNSKI (Phot. Ind., 1929, 27, 426—427; Chem. Zentr., 1929, ii, 121).—Experiments with methyl *p*-hydroxybenzoate as an emulsion preservative are described.

A. A. ELDRIDGE.

Photochemistry of mercuric iodide. LÜPPO-CRAMER (Phot. Korr., 1929, 65, 97—100; Chem. Zentr., 1929, i, 3071).—With emulsions of red mercuric iodide solarisation is not observed, a final condition being attained by the photochemical reaction. Iodine acceptors are without influence. Mercuric iodide emulsions exhibit

phenomena corresponding with the Schwarzschild effect.

A. A. ELDRIDGE.

Silver iodide problem. A. STEIGMANN (Phot. Ind., 1929, 27, 375—376; Chem. Zentr., 1929, ii, 120).—The effect on the sensitivity of substitution of silver iodide by colloidal silver iodide in an emulsion is described.

A. A. ELDRIDGE.

Herschel effect in a fogged pankine-film. A. STEIGMANN (Phot. Ind., 1929, 27, 507—508; Chem. Zentr., 1929, ii, 120).—The Weigert and Herschel effects are considered to be interdependent.

A. A. ELDRIDGE.

Action of developers. K. WENSKE (Phot. Ind., 1929, 27, 482—484; Chem. Zentr., 1929, ii, 121).

Silver iodide bleach-out layers. LÜPPO-CRAMER (Phot. Ind., 1929, 27, 506—507; Chem. Zentr., 1929, ii, 120).

See also A., Dec., 1382, **Growth of silver in gelatin layers** (ARENS and EGGERT). 1404, **König-Marten spectrophotometer** (SCHAUM and others). 1405, **Action of polarised light on photographic plates** (COTTON). **Blackening surfaces of two slightly sensitive emulsions** (ARENS and EGGERT). **Photochemistry of silver halides** (SCHMIDT and PRETSCHNER). 1431, **Photosensitiveness of nitroprussides** (LEFFMANN and PINES).

PATENTS.

Photographic production of differentially tanned colloid images. G. KÖGEL (B.P. 315,236, 3.4.28).—A light-sensitive dye or such quinone as is not a dye is incorporated in the colloid film, which is treated after exposure with a solution of potassium dichromate. After washing, any of the usual after-treatments applied to dichromated colloid layers may be used. In examples the use of sodium anthraquinone-2:7-disulphonate and of stilbenephénylazonium (1:2:3-triphenylquinoxalinium) chloride is claimed.

J. W. GLASSETT.

Preparation of anaglyphs. KALLE & Co. A.-G. (B.P. 301,490, 5.11.28. Ger., 1.12.27).—Light-sensitive diazo-compounds are used in the preparation of complementary-coloured stereo part-pictures. For example, separate celluloid films are coated with (a) 2-ethylamino-toluene-5-diazonium fluoroborate and H-acid for blue, and (b) 1-diazo-2-naphthol-4-sulphonic acid and 1-phenyl-3-methyl-5-pyrazolone for orange, and are exposed under appropriate diapositives. The part-pictures are superposed and viewed through eye-glasses coloured blue and orange (preferably with the same dyes as are developed in the prints).

C. HOLLINS.

X-Ray photographs (B.P. 320,540).—See XI.

XXII.—EXPLOSIVES; MATCHES.

Modern mining explosives. W. CULLEN (Bull. Inst. Min. Met., 1929, No. 302, 36 pp.).—The lines on which the explosives industry has been proceeding in recent years are reviewed.

S. BINNING.

Black powder. K. A. HOFMANN (Sitzungsber. preuss. Akad. Wiss., 1929, 25, 509—515).—Experiments with black powder containing percentages of sulphur varying from 0 to 10 show that the strength of the mixture (c.c. of gas evolved \times heat evolved in g.-cal.) remains practically constant, as an increase in the sulphur present diminishes the heat evolved but increases the volume

of gaseous products. For blasting powders an increase in the sulphur content to 15—20% is justified by the increased volume of the gaseous products. Sulphur lowers the ignition point of the charcoal-nitrate mixture, and this renders it more easily ignited by heat. Investigation of the part played by sulphur in the combustion of black powder shows that it exerts an autocatalytic effect on the reaction velocity.

S. BINNING.

Picric acid. DESVERGNES.—See III. **Nitrocellulose.** PARTRIDGE.—See V.

XXIII.—SANITATION; WATER PURIFICATION.

Treatment of sugar-factory effluents with chlorine. E. NOLTE (Z. Ver. deut. Zucker-Ind., 1929, 79, 463—469).—Chlorination has been applied with considerable success in the treatment of waste waters from beet-sugar factories, in particular where the water is returned to the factory. For example, the disposal of flume and wash waters has been in part solved by using them repeatedly with periodic chlorination at the rate of 10—15 g. of chlorine per cub. m. every 4 or 5 days. It is not practicable to destroy organic matter in the effluents so as to prevent subsequent fermentation, although hydrogen sulphide can be oxidised. Chlorination of fresh waste waters will check decomposition, so that in using the waters again the impurities introduced into working are only those natural to the processes, and not the much more highly melassigenic products of fermentation and putrefaction, such as organic acids.

J. H. LANE.

Lime-aggressive and rust-prevention inhibiting carbonic acid in natural water. J. TILLMANS (Z. Unters. Lebensm., 1929, 58, 33—52).—A review of the author's work on this subject. The varying rôles of carbon dioxide and of oxygen dissolved in water in relation to the action of natural waters on calcareous and iron structures are exhaustively discussed.

W. J. BOYD.

Detection of nitrites in water. S. VERGNOUX (Bull. Sci. pharmacol., 1929, 36, 146—147; Chem. Zentr., 1929, ii, 82).—Sulphuric acid (80 g.) is added, with cooling, to a filtered solution of neutral-red (2 g.) in water (18 g.), and the mixture is protected from light. Water (100—150 c.c.) is treated with 5 drops of the reagent; if more than 0.5 mg. per litre of nitrous acid is present, the green colour becomes blue or, with smaller quantities, violet. The sensitivity is 0.1 mg. per litre.

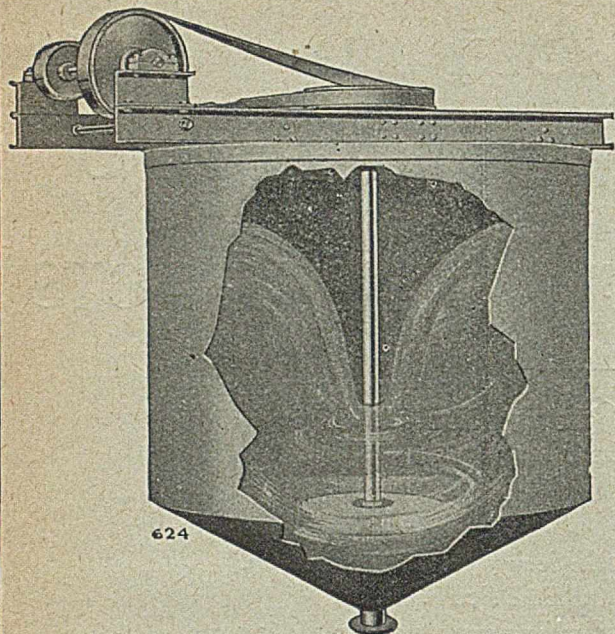
A. A. ELDRIDGE.

Direct enumeration on solid medium of *B. coli* contained in a large volume of water. DIENERT and ETRILLARD (Ann. Inst. Pasteur, 1929, 43, 1278—1281).—The *B. coli* in 100 c.c. of the water are separated by shaking with alumina, which, after centrifuging off and mixing with a dilute gelatin solution, is spread on a suitable solid medium. The colonies which then develop on incubation are counted.

W. O. KERMAK.

Brewing waters. LÜERS.—See XVIII.

See also A., Dec., 1411, **Micro-determination of iodine** (REITH). **Micro-determination of nitrates and nitrites** (WÖDICH). 1494, **Disinfecting properties of alkylphenols; *n*-butylphenol** (RETTGER and others).



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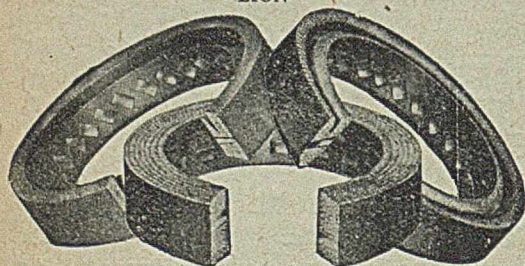
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