

# BRITISH CHEMICAL ABSTRACTS

## B.—APPLIED CHEMISTRY

MAY 6 and 13, 1932.\*

### I.—GENERAL; PLANT; MACHINERY.

**Automatic remote control of boilers.** J. W. YOUNG (J. Inst. Fuel, 1932, 5, 217—223).—The operation of electrical control and the type of equipment employed are described in detail. C. B. MARSON.

**Two-stage spray drying with reversed currents.** P. D. V. MANNING (Chem. and Met. Eng., 1931, 38, 702—704).—A description is given of the latest form of the Peebles spray desiccator. The machine combines in one operation the processes of concn., drying, and atomisation. Particulars of the production of milk and kraft-pulp black-liquor powders by its use are given. D. K. MOORE.

**Diffusion calculations applied to drying porous solids.** A. B. NEWMAN (Chem. and Met. Eng., 1931, 38, 710—713; cf. Sherwood, B., 1929, 153, 1035).—Equations and curves are given for calculating the moisture content of slabs, cylinders, and spheres of solids while drying during the period when the rate of drying is limited by the rate of diffusion of  $H_2O$  from the interior to the surface of the solid. D. K. MOORE.

**Mechanical handling in the chemical industry.** E. J. BURNELL (Ind. Eng. Chem., 1932, 24, 28—33).—The use of belt, screw, apron, flight, drag, and overhead-trolley conveyors, and chain and bucket elevators, is discussed. Promal, a processed malleable Fe, is especially suitable for conveyor chains. D. K. MOORE.

**The Rothamstead pachimeter.** R. K. SCHOFIELD and G. W. S. BLAIR (Chem. and Ind., 1932, 205—206).—A sample of plastic material, such as clay, dough, resin, wax, etc., is made into a cylinder of known radius and length and placed between two plates the upper of which is fixed to one end of a long horizontal beam, the other end being pivoted, thus allowing the plate free vertical movement. The lower plate is moved to and fro with sufficient amplitude to cause the test cylinder to turn at least one complete revolution. No permanent lengthening occurs unless the upper plate is exerting more than a crit. stress on the test cylinder, which stress the machine is designed to measure. H. S. GARLICK.

**Towers and packings for chemical plants.** A. M. FAIRLIE (Chem. and Met. Eng., 1932, 39, 76—80).—It is usually believed that the height of an absorption tower should be 5—6 times the diam. In the case of very wide towers of high capacity, however, this ratio can equally well be obtained by using two or more towers in series. The practical details of the handling of acid-resistant cements are described. The choice of suitable raw materials for chemical stoneware and acid bricks

demands a knowledge of the sp. purpose for which they are to be used. Eleven considerations in the selection of tower packings are listed. The inefficiency of coke and quartz packings is mainly due to segregation, the gas following the larger passages and the liquid the smaller. This occurs with some artificial packings also. The author favours a hexagonal block containing a double-helical vane. They are stacked in vertical columns not staggered. C. IRWIN.

**Distillation.** W. K. LEWIS (Ind. Eng. Chem., 1932, 24, 89—91).—Laboratory rectification is not so effective as that on large scale. High-vac. laboratory distillation is indicated for bringing about separation. D. K. MOORE.

**Use of the tungsten-molybdenum thermocouple.** D. BINNIE (J. Inst. Fuel, 1932, 5, 211).—W—Mo thermocouples are recommended for the accurate determination of temp. up to 1600°. Such couples must be protected when used in oxidising atm., but in atm. consisting of  $H_2$  and  $N_2$ , from cracked  $NH_3$  gas, bare couples may be used. High-grade porcelains such as "Pythagoras" are recommended as sheaths. The thermo-electric curve is parabolic; calibration curves vary slightly for different batches of wire. The portion of the couple exposed to high temp. in a  $H_2$  atm., particularly the W element, becomes extremely brittle and consequently fresh junctions have frequently to be made. C. B. MARSON.

**Analysis of roaster gas.**—See VII. **Refractories.**—See VIII. **Embrittlement in boilers.**—See X. **Granular fertilisers.**—See XVI.

### PATENTS.

**[Heat-treating] furnace [for strip or wire etc.].** B. R. SHOVER and F. P. TOWNSEND, Assrs. to STRIP TIN PLATE Co. (U.S.P. 1,811,522, 23.6.31. Appl., 14.5.31. Fr., 17.11.30).—The wire or strip is passed through adjacent chambers for heating and cooling, respectively, in the form of vertical  $\Omega$ -shaped loops. B. M. VENABLES.

**Furnace or heat-treatment chamber cooling means.** E. L. SMALLEY, Assr. to HEVI DUTY ELECTRIC Co. (U.S.P. 1,811,158—9 and 1,811,979, [A, B] 23.6.31, [c] 30.6.31. Appl., [A, B] 1.4.29, [c] 9.2.28).—In (A), vertical ducts are spaced along the walls of the goods chamber and a controlled current of air is blown through. In (B), heat insulation is removed from the outer parts of the furnace for controlled periods of time; e.g., an outer layer of the roof may be lifted and replaced by an electric motor under thermostatic control. In (c), cooling is effected in a series of flues. B. M. VENABLES.

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

**Furnace [for heating air].** H. W. NEAL, Assr. to HALL-NEAL FURNACE CO. (U.S.P. 1,811,182, 23.6.31. Appl., 21.10.29).—A sheet-metal casing provided with fins is described. B. M. VENABLES.

**Air-heating and -supplying devices for furnaces.** B. KALT (B.P. 367,572, 2.3.31).—In, e.g., a domestic boiler, secondary air is brought from outside into and through a massive cast-Fe block situated above the fire. B. M. VENABLES.

**Treatment [roasting] of solids [ores etc.].** T. A. DICKSON, Assr. to COLORADO IRON WORKS CO. (U.S.P. 1,811,920, 30.6.31. Appl., 6.2.28).—In a multiple-hearth roasting furnace, portions of the original material are supplied to different hearths simultaneously, all the portions being treated together on the lower hearths. The ore (etc.) may be screened and the coarsest particles subjected to the longest roast. B. M. VENABLES.

**Apparatus for heat interchanging.** G. H. HORNE and M. A. LISSMAN, Assr. to INTERNAT. PRECIPITATION CO. (U.S.P. 1,812,339, 30.6.31. Appl., 25.2.29).—The apparatus comprises vertical tubes through which the inner fluid passes in a whirling manner, downwards if it is to be cooled, the whirling being produced by slitting the ends of the tubes within the inlet header and bending the metal to form tangential scoops. The outer fluid may either be an unconfined atm., or, by the provision of outer tubes, be caused to travel in the annular spaces countercurrent to the inner fluid. B. M. VENABLES.

**Direct-contact heat exchanger for cooling gases.** H. F. DE SAUGY (B.P. 367,518, 15.1.31. Fr., 16.6.30).—Approx. vertical surfaces are irrigated and the gases are passed downwards over the surfaces at about the same speed as the film of liquid moves, with the object of cooling the gases without saturating them. B. M. VENABLES.

**Carrying out chemical processes [hydrogenation] at elevated temperatures.** J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 366,762, 9.3.31).—High-pressure vessels for use at high temp. are made of or lined with an alloy of Fe containing < 10 (0.5–3)% Ti and < 15 (5–8)% Al, with or without a small proportion of one or more of the following elements: Cr, W, Mo, V, Si, Ni, Co, Cu, Mn, Sn, Zn, Pb, Ag, or Be. For the destructive hydrogenation of Mexican Panuco oil containing 4% S the alloy lining of the pressure vessels contains 1.5% Ti, 6% Al, and 92.5% Fe, and for the synthesis of NH<sub>3</sub> it contains 1% Ti, 5% Al, 3% Cr, and 91% Fe. A. R. POWELL.

**Carrying out adsorption and regeneration operations.** METALLGES. A.-G., and G. MÜLLER (B.P. 366,885, 19.9.31).—The adsorption material is divided into layers with free spaces in between so that the gases being treated and, usually, the gases for regeneration may be passed through the layers in series but in opposite directions, whereas the heating, cooling, or drying media may be passed through wholly or partly in parallel. Indirect heating means also may be placed in the free spaces. B. M. VENABLES.

**Catalytic apparatus.** A. O. JAEGER, Assr. to SELDEN RES. & ENG. CORP. (U.S.P. 1,812,341, 30.6.31.

Appl., 4.2.30).—The catalyst is contained in vertical tubes which are surrounded by a bath of liquid, subdivided, for the purpose of promoting circulation, by at least one horizontal baffle fitting closely around the tubes and also, if desired, by vertical baffles. The liquid has a b.p. above the temp. of operation, but may be in indirect contact with another liquid boiling below that temp. Forced circulation may be provided. B. M. VENABLES.

**Absorption of aqueous vapour applicable to ice-making and drying.** P. SCHLUMBOHM (B.P. 367,341, 8.10.30).—In an apparatus in which water vapour is absorbed by, e.g., H<sub>2</sub>SO<sub>4</sub> passing over a water-cooled surface, a vac. is produced by a jet ejector operated by the same water, which may also cool a Hg-vapour vac. augments. B. M. VENABLES.

**Separation of powdered or granular material, especially coal.** CLEAN COAL CO., LTD., R. LESSING, and R. H. ALLEN (B.P. 367,482, 4.12.30).—In a circulating air system is placed an inclined conduit having an outlet at the extreme bottom for coarse material, above that on the upper side of the tube is the main air inlet, above that on the underside of the tube are subsidiary air inlets, and above those (on the underside) is the inlet for material. The fine coal drawn away is further separated in an analysing tube of opposite inclination, and the ultimate dust is collected in a cyclone or other separator. B. M. VENABLES.

**[Bowls for] centrifuges.** AKTIEB. SEPARATOR (B.P. 366,703, 22.1.31. Swed., 25.1.30).—Besides the usual weirs for discharge of lighter and heavier liquids, the centrifuge is provided with outlets for solid matter leading into a continuous annular chamber which is supplied with additional liquid and from which the mixture finally exhausts. The supply of additional liquid is regulated by changing the radius of an overflow from a supply chamber at the top of the centrifuge. B. M. VENABLES.

**Strainer or filter for liquids.** F. G. SEELEY (B.P. 367,358, 17.11.30).—A group of cylindrical edge filters are rotatable against a star-shaped scraper in the centre. B. M. VENABLES.

**Filtering or fine-straining apparatus for liquids.** F. C. FÜLCHER (B.P. 367,379 and 367,458—9, 15.8.30).—The filters comprise two or more series of intercalating plates which are not in contact except for perhaps local projections to preserve the spacing. The series are of different size, or non-concentric, or arranged in some other way so that the prefilter enters comparatively wide spaces between only one series of plates and is finally filtered through the narrowest spaces where all series are abreast. The filters are cleaned by relative movement of the plates. The difference between the three patents lies in the form of construction only. B. M. VENABLES.

**Purification of liquids.** J. T. WELSH (B.P. 367,412, 8.11.30. U.S., 21.11.29).—A process for the mechanical separation of oily water etc. is described. B. M. VENABLES.

**Centrifugal apparatus for purifying [lubricating] oil.** W. SCHWERTFEGER (U.S.P. 1,811,157, 23.6.31. Appl., 10.12.28. Ger., 2.1.28. Renewed 3.2.30).—

The centrifuge is driven by the dirty oil acting on a turbine combined with it. B. M. VENABLES.

**Filtering device.** J. H. BUTLER (U.S.P. 1,812,736, 30.6.31. Appl., 17.9.29).—A continuous band of filtering material traverses a course which is triangular with one side re-entrant; the roller which causes the reverse bend also squeezes the belt against the upper roller. The base of the triangle is submerged in a trough to which the prefilter is supplied, and the filtrate is removed from the interior of the triangle.

B. M. VENABLES.

**Tapered-tube filter-press.** H. H. CANNON, Assr. to CANNON-PRUTZMANN TREATING PROCESSES, LTD. (U.S.P. 1,812,773, 30.6.31. Appl., 2.10.29).—In a tubular filter having several filtering tubes lined with foraminous material, a valve disc is axially (and removably) placed over one end of each tube in such a way as to retain the material in position and close the tube against passage of liquid therethrough.

**Apparatus for screening (A) pastes, (B) liquid materials.** (A) I. T. THORNTON, (B) R. O. WOOD and B. L. WEST, (A, B) Assrs. to NAT. ANILINE & CHEM. CO., INC. (U.S.P. 1,810,933 and 1,810,935, 23.6.31. Appl., 26.8.29).—The paste, or liquid, is impelled in an inclined direction against the screen, in (A) in ribbon form from slits in a feed pipe.

B. M. VENABLES.

**Method of attaching filter cloth.** C. M. STANLEY and F. J. EVANS, Assrs. to OLIVER UNITED FILTERS, INC. (U.S.P. 1,812,725, 30.6.31. Appl., 27.8.27).—The cloth is attached in a taut condition to a frame or leaf by forcing it into a dovetail groove on the edge proper or edge of the face, and secured by caulking in a soft metal. A caulking roll is described.

B. M. VENABLES.

**Filter-discharging mechanism.** W. GARDELLA, Assr. to OLIVER UNITED FILTERS, INC. (U.S.P. 1,812,648, 30.6.31. Appl., 3.1.29).—The cake is removed from a rotary drum filter by means of a roller rotating in the same direction, *i.e.*, oppositely at the line of contact. The roller is smooth and is situated  $< 45^\circ$  above the horizontal plane passing through the axis of the filter. The action of the roll is first to roll up the cake, which later falls over the outer side of the roll and on suitable adjustment of the speed often may be removed in a continuous sheet.

B. M. VENABLES.

**Determining the viscosity of liquid substances.** R. VON DALLWITZ-WEGNER (U.S.P. 1,810,992, 23.6.31. Appl., 22.12.26. Ger., 7.1.26).—The liquid is pumped at a const. rate, preferably by a screw type of pump, and returns through a tube sufficiently narrow to induce stream-line flow. The pressure across the ends of the capillary tube is measured by columns of the liquid under test.

B. M. VENABLES.

**Fractionating column.** J. B. HEID, Assr. to UNIVERSAL OIL PRODUCTS CO. (U.S.P. 1,811,627, 23.6.31. Appl., 31.1.27).—The "trays" are constructed of V-shaped baffles at right angles in alternate layers.

B. M. VENABLES.

**Bubble tray.** A. J. SMITH, Assr. to SMITH ENG. CO. (U.S.P. 1,811,247, 23.6.31. Appl., 22.5.30).—The well for receiving liquid from the tray above is situated near the circumference, and the liquid is caused to flow

around in both directions, meeting in a central compartment. To regulate the flow the surface of the tray is divided into compartments bounded on the sides where flow is not required by walls, and in the directions where flow is required by weirs of decreasing height. To compensate for the varying level of the liquid the bubble caps are individually adjustable.

B. M. VENABLES.

**Apparatus for spraying materials.** E. ROTHEIM (B.P. 366,626, 18.11.30. Norw., 19.11.29).—A stopper or cap adapted to be fastened to, and to pierce, a hermetically sealed vessel containing vaporous fluid under pressure is described.

B. M. VENABLES.

**Centrifugal separating apparatus.** H. L. MILLS, Assr. to CENTRIFUGAL SEPARATION CO. (U.S.P. 1,810,922, 23.6.31. Appl., 28.5.28).—In a power-driven centrifugal apparatus for separating solids from gases, the surface upon which the solids are deposited is provided with rappers.

B. M. VENABLES.

**Gas washer.** K. BERGFELD (U.S.P. 1,812,767, 30.6.31. Appl., 16.5.28. Ger., 26.11.26).—In an apparatus of the type in which the gas is passed through the spray produced by a number of discs dipping into a liquid, means are provided so that the discs are also irrigated by liquid near to their centres, such liquid being spray-collected on and drained from the upper part of the walls of the vessel.

B. M. VENABLES.

**Apparatus for cleaning gases.** A. STEINBART (U.S.P. 1,811,597, 23.6.31. Appl., 28.12.29).—A cyclone separator especially suitable for blast-furnace gases has a narrow inlet of considerable height subdivided by horizontal webs for strengthening it against explosions and permitting one or more of the sections to be bricked up to increase the speed of the gases. The conical outlet for dust is protected from the swirl of the gases by a disc spaced from the wall, and the outlet pipe for clean gas is tapered with the entrance narrower.

B. M. VENABLES.

**Automatic analysing and control system and apparatus therefor.** A. C. HARRISON, Assr. to BROWN INSTRUMENT CO. (U.S.P. 1,811,233, 23.6.31. Appl., 7.7.24).—The materials to be regulated are brought into contact with a reagent that, with one of them, will evolve gas. Preferably the vol., temp., and rate of admixture of materials are held const. and the pressure produced (by the gas escaping through an orifice) is caused to effect the control, electrically. The process is applicable, *e.g.*, to the regulation of the ratio of  $\text{CaCO}_3$  to shale in the manufacture of cement, and in the acid and alkali industries, etc.

B. M. VENABLES.

**Apparatus for testing the hardness of water.** UNITED WATER SOFTENERS, LTD., and H. S. LAWRENCE (B.P. 367,606, 27.3.31).—Soap solution and the  $\text{H}_2\text{O}$  are admitted through parallel jets into a transparent vessel in which the liquid level is maintained const. by a siphon discharge. The amount of froth in conjunction with the proportion of soap used indicates the hardness.

B. M. VENABLES.

**[Sheet-metal] laggings for gas and steam turbines.** A.-G. BROWN, BOVERI & Co. (B.P. 368,643, 13.7.31. Ger., 21.2.31).

[Lifting baffles for] rotary drying, cooling, or calcining drums. E. SEYFFERT (B.P. 367,625, 22.4.31).

Heating of water and other liquids. W. HAMILTON (B.P. 366,802, 11.4.31).

Refrigeration [with solid carbon dioxide]. E. RICE, JUN. (B.P. 367,765, 18.8.30).

Baking of cement slurry.—See IX.

## II.—FUEL; GAS; TAR; MINERAL OILS.

Errors in the sampling of coal from wagons. N. SIMPKIN (J. Inst. Fuel, 1932, 5, 212—215).—Wagon sampling of dry slacks by the B.E.S.A. method yields results which are incorrect and unreliable since they show too high an ash content and too much fines. The only satisfactory method so far is to sample the fuel by taking increments as the wagons are being emptied or filled. C. B. MARSON.

Evaluation and blending of coals for coke making. R. A. MOTT (Gas World, 1932, 96, Coking Sect., 16—25).—The volatile matter content is only a rough guide to the quality of a coking coal, its C content, calc. to an ash-free dry basis, being a more reliable guide; coals of high C content (up to 90%) give the hardest cokes. The agglutinating val. is not a primary measure of the coking val. The swelling power is of considerable significance, and details are given of the Sheffield coking test, which has been devised to determine this and other related properties. Whilst laboratory tests are useful as a general guide, it is desirable to test the coals under conditions approximating to those of large-scale practice; the design and operation of the Midland Coke Research experimental oven is given. Experiments showing the influence of coking time on the size, uniformity, and hardness of the coke, the beneficial effects on coke quality of adding up to 3% of fusain to the coal charge, and the influence of the size of the coal are described. Storage of certain coals increased the coke hardness, an observation confirmed by laboratory experiments. Blending experiments indicated that with certain binary mixtures an optimum blend was obtained which gave a coke of better quality than that from either of the components alone. The addition of one coal to another frequently had a detrimental, and sometimes a beneficial, effect (cf. Marson, B., 1930, 646). To avoid in practice a possible detrimental effect, it would seem preferable to make 40/60 or 60/40 blends of two coals.

C. B. MARSON.

Commercial evaluation of coke. R. A. MOTT (J. Inst. Fuel, 1932, 5, 193—205).—Statistical information is given showing the production and use of coke over a no. of years. The sale of coke to specification is advocated. The qualities which need specifying are: moisture and ash contents, hardness, and, in special circumstances, S and P contents. The special requirements for foundry cokes, cokes used for crucible steel melting, lime burning, and for domestic and export purposes are discussed.

C. B. MARSON.

Coking and swelling of bituminous coals. Bitumens of bright and dull coal constituents. H. BROCHE and H. SCHMITZ (Brennstoff-Chem., 1932, 13, 81—85).—The bright and dull constituents of a German bituminous coal have been subjected to  $C_6H_6$

extraction under pressure (cf. B., 1925, 233). The caking and swelling properties of the bright coal, initially high, diminished with successive extractions and practically disappeared after five (total extract 11.8%; oily bitumen 7.4%, solid 4.4%); these properties were restored when the bitumen was again added to the extracted coal if care had been taken to avoid atm. oxidation of the latter. The dull coal, which was non-caking and non-swelling, yielded 14.1% of total bitumen (oily bitumen 11.7%, solid 2.4%). The caking and swelling properties of the bright coal were restored by adding, to the extracted coal, bitumen obtained from the dull coal, but the addition of the bitumen obtained from the bright coal to the extracted dull coal failed to confer any caking properties on the latter. The non-caking properties of the dull coal therefore appear to be due to some characteristic of the residue after extraction. The factors determining the behaviour of a coal during carbonisation are (1) the content of oily bitumen, which determines the caking but not the swelling properties of the coal; (2) the content of solid bitumen, which determines the swelling properties of the coal; and (3) the tendency of the residual coal to soften on the addition of bitumen.

A. B. MANNING.

“Heat of re-coking” of coke and a new method of determining it. H. BRÜCKNER and W. LUDEWIG (Brennstoff-Chem., 1932, 13, 85—88).—Data on the amount and composition of the gas evolved from 10 cokes on being reheated at 900—1200° (cf. B., 1931, 1080) have been used to calculate the net “heat of re-coking” of the cokes, *i.e.*, the heat of reaction of the evolution of volatile matter at the temp. of reheating (cf. Agde and Schimmel, B., 1931, 660). The heats of re-coking varied from —222 to +99 g.-cal./g. With some cokes they increased and with others decreased with rising temp. The heats of re-coking were approx. related to the diminution in combustible S of the coke during the heating; they were also probably influenced slightly by the reduction of the  $Fe_3O_4$  in the coke, and by the transformation of amorphous into graphitic C.

A. B. MANNING.

Agde's apparatus for determining the swelling pressure of coking coals and the strength of coke buttons from caking-power tests. G. GÖLZ and A. WINTER (Brennstoff-Chem., 1932, 13, 88).—A simple apparatus is described in which the pressure required to maintain the vol. of the coal const. during carbonisation in a cylindrical crucible can be read off directly from a gauge. By replacing the crucible by a flat plate the apparatus can be used to determine the crushing strength of a coke button. A. B. MANNING.

Carbonisation of swelling coals. W. HAUSWALD (Brennstoff-Chem., 1932, 13, 88—91).—The methods that have been suggested for preventing damage to the retorts or coke ovens when carbonising swelling coals are briefly discussed. They include blending with non-swelling coals or coke breeze etc., diminishing the rate of carbonisation, preheating the coal, etc.

A. B. MANNING.

Apparatus for measuring the contraction and expansion of coals on heating. A. SHIMOMURA (J. Fuel Soc. Japan, 1932, 11, 17—19).—1 g. of coal

(0.208-mm. powder) is contained in a  $\text{SiO}_2$  tube (15 mm. diam.) supported in a gas-heated massive Al retort, the temp. of which is observed with a high-temp. thermometer. Movement of a counterbalanced steel piston which rests on the coal is magnified 3.7 times by a pulley system and the magnified movement is recorded on a rotating drum. The load on the piston may be varied. The temp. of initial contraction and expansion, of max. expansion, temp. range, and % of contraction and expansion, and the yield of semi-coke (at  $500^\circ$ ) may be determined. The results of examination of Japanese and Chinese coals when heated under standard conditions (to  $200^\circ$  in 10 min.,  $200\text{--}300^\circ$  at  $10^\circ/\text{min.}$ ,  $300\text{--}500^\circ$  at  $5^\circ/\text{min.}$ ) are given.

H. E. BLAYDEN.

**Bomb calorimeter.** S. B. BILBROUGH (J. S. African Chem. Inst., 1932, 15, 20).—For simplification in the calculation of the calorific val. of fuels, the quantity employed is derived from the wt. in g. of the usual factor of the bomb (when 1 g. is used) divided by the nearest integer. The val. = corrected rise in temp.  $\times$  the same integer.

P. G. MARSHALL.

**Steaming in continuous vertical retorts.** M. BARASH and T. A. TOMLINSON (Third Int. Conf. Bitum. Coal, Nov., 1931, 19 pp.).—A series of tests with const. coal throughput, but with increasing steaming, shows that the  $\text{CO}_2$  content of the gas increases owing to the reaction temp. of the retort falling below that for efficient production of water-gas. A coal, which theoretically gave 323.5 therms per ton by distillation and steaming, gave a max. of 245.0 therms per ton at a low daily throughput of 1.33 tons with 95 wt.-% of steam. Yields obtained in practice agreed well with theoretical figures over a wide range of steaming, giving a check on the efficiency of working. The coke produced by steaming has a higher ash content, but as the reaction takes place at the surface, this increase is conc. in the breeze; the screened coke is practically unchanged. There is no increase in fuel consumption below 20% steaming. A series of curves is given showing the expected yields of gas under varying conditions of steaming with a wide selection of coals.

R. N. B. D. BRUCE.

**Wet purification for removal of sulphur from gas.** A. THAU (Gas World, 1932, 96, 144—147).— $\text{H}_2\text{S}$  is absorbed by aq.  $\text{K}_3\text{Fe}(\text{CN})_6$  and  $\text{K}_2\text{CO}_3$  and is oxidised to S. The  $\text{K}_4\text{Fe}(\text{CN})_6$  and  $\text{KHCO}_3$  formed can be regenerated by electrolysis, with production of  $\text{H}_2$ . In a plant treating 400,000 cu. ft. of water-gas per day, the solution is forced through an electrolytic activator, from which it runs into the gas washer. The S after settling out is removed by a filter-press, the liquor being returned to the anodic cell. This consists of a tank containing a large number of metallic baffle plates perforated alternately at the top and bottom and separated from each other by rubber. The gas washer is of centrifugal design to assist removal of the colloidal S. Dilution of the liquid is automatically compensated by the heats of electrolysis and reaction. The economy of the process depends on the S and  $\text{H}_2$ ; the latter, being 99% pure, should have a higher val. than that based on its calorific val. The costs of treating 4 million cu. ft. per day are calc. to be 66% of the dry

oxide process. When purifying coal gas, tar may deposit on the S and lower its val.

R. N. B. D. BRUCE.

**Influence of hydrocarbons [added for naphthalene removal] on the life of the leather in dry gas meters.** W. SCHAIRER (Gas- u. Wasserfach, 1932, 75, 185—188).—The leather used in gas meters is impregnated with a mixture of animal and mineral oils. Gas streams saturated with  $\text{C}_6\text{H}_6$  hydrocarbons or with tetralin were found to wash these oils out of the leather and after 60 hr. not a trace remained. The same result occurs with oils of all types. The leather, however, is not then dry, but remains moist owing to the presence of the hydrocarbons in the gas. Leather membranes after use when extracted with  $\text{Et}_2\text{O}$  are found to yield aromatic hydrocarbons, including tetralin where this is used. The breaking strength of a number of strips of leather was determined; it was shown that both  $\text{C}_6\text{H}_6$  and tetralin reduce it, the former the more seriously. Inequalities of such leathers are shown by the fact that one sample which had been in use for six years with tetralin-treated gas was stronger than another unused sample. Min. vals. for thickness and strength in new leathers should be provided for, and, in view of impurities in the gas, the use of Fe salts in tanning should be excluded.

C. IRWIN.

**Economies to be derived from the use of gas industrially.** C. M. WALTER (J. Inst. Fuel, 1932, 5, 176—180).—The economic advantages resulting from the use of town's gas, in preference to other forms of fuel, for certain industrial heating processes are discussed.

C. B. MARSON.

**Simple apparatus for rapid determination of combustible vapours in the atmosphere.** L. C. McNAIR and H. C. GULL (Analyst, 1932, 57, 159—162).—A modification of the Haldane apparatus is described. It is simpler and more portable.

T. McLACHLAN.

**Conversion of algæ into bitumen and petroleum, and the fucosite-petroleum cycle.** J. E. HACKFORD (J. Inst. Petroleum Tech., 1932, 18, 74—123).—It has been possible to make oil from algæ by processes similar to those occurring in nature. Prolonged acid hydrolysis of algæ at low temp. yields oils and bitumen; this does not occur with alkaline hydrolysis. The products of decomp. of algæ will also yield oil and bitumen on acid hydrolysis. A bitumen, algarite, similar in properties to the naturally occurring McKittrite, can be obtained from algæ, and, as the purified form, algarose, by the acid hydrolysis of the sugar formed by the decomp. of algæ. Some oils and bitumens contain the same range of metallic salts as algæ. Naturally occurring oils and seepages are known which contain the decomp. products of algæ. Fucosite is a product of oxidation of some oils which on hydrolysis give sugars.

A. J. MEE.

**Bitumen penetration test.** D. M. WILSON (Chem. and Ind., 1932, 203—204).—The method of testing and certain refinements making for accurate and rapid determinations are described.

H. S. GARLICK.

**Properties and compositions of gasoline fractions of representative Japanese crude petroleum.** VII. M. MIZUTA (J. Soc. Chem. Ind., Japan, 1932, 35,

42—43 B; cf. B., 1932, 297).—Thiophen has about 60% of the  $\text{NH}_2\text{Ph}$ -point depression of  $\text{C}_6\text{H}_6$  and is present (with homologues) in minute quantities in straight-run gasoline. Its influence on the determination of  $\text{C}_6\text{H}_6$  ( $\text{NH}_2\text{Ph}$ -point method) is negligible. H. E. BLAYDEN.

**Natural gases from the Apsheron peninsula.** I. RABINOVICH (Azerbaij. Neft. Choz., 1931, No. 6, 37—41).—The hydrocarbons in the natural gas from the Baku oilfields consist almost entirely of  $\text{CH}_4$ ; the gas is low in gasoline. Small quantities of  $\text{N}_2$  are present, and probably little He, but in some cases recovery of  $\text{CO}_2$  is profitable. CHEMICAL ABSTRACTS.

**Suitability of cobalt catalysts for benzene synthesis.** F. FISCHER and H. KOCH (Brennstoff-Chem., 1932, 13, 61—68).—The influence of the method of prep. and the proportion of the constituents on the activity of a Co- $\text{ThO}_2$ -kieselguhr catalyst has been studied. The highest activity was exhibited by a Co+18%  $\text{ThO}_2$  mixture on 1—1½ pts. of kieselguhr; the metals were pptd. from solution as carbonates on to the kieselguhr by  $\text{K}_2\text{CO}_3$  and subsequently reduced in  $\text{H}_2$ . With this catalyst 153 c.c. of liquid product were produced per cu. m. of initial gas (26—28%  $\text{CO}$ , 55—58%  $\text{H}_2$ ), corresponding to a 71% conversion of the  $\text{CO}$ . An equally active catalyst was prepared by similarly pptg. a Co+15% Mn mixture on to kieselguhr with  $\text{Na}_2\text{CO}_3$ . The addition of Cu to the catalyst lowered the reduction temp. to the reaction temp. (200°) so that the preliminary reduction with  $\text{H}_2$  at a higher temp. was unnecessary; indeed, catalysts containing Cu almost completely lost their activity after being heated in  $\text{H}_2$  at 350°. A Co- $\text{ThO}_2$  catalyst has been used in continuous operation for 63 days, during which the yield of liquid products fell by about 10%; the activity of the catalyst was completely restored by extraction of the paraffin wax which had been deposited thereon. The reaction mechanism is briefly discussed. A. B. MANNING.

**Relation between chemical structure and resistance of fuels to knocking.** A. W. SCHMIDT (Petroleum, 1932, 28; Motorenbezt., 5, 2—4).—Examination of the effects of admixture (10%) of chemically pure substances on the compression ratio and  $\text{C}_6\text{H}_6$  val. of a Russian petrol ( $d^{15} 0.741$ ) shows that the resistance to knocking induced by aromatic substances is influenced by the kind and no. of substituents present, e.g., the increase in compression ratio and  $\text{C}_6\text{H}_6$  val. resulting from substitution of H in  $\text{C}_6\text{H}_6$  is in the order Me, OH,  $\text{NH}_2$ , and substitution by any two of these three groups gives greater effect. *cyclo*Paraffins behave similarly, but have less antiknock effect owing to hydrogenation. Unsaturated compounds lose their effect on storing the mixture. The resistance to knocking induced by paraffins is influenced by the no. of linked C atoms and the form of the chain; branching and accumulation of Me groups on one C atom gives the max. antiknock effect. Other open-chain compounds (e.g., alcohols) do not give this effect. H. E. BLAYDEN.

**Measurement of resistance [of fuels] to knocking.** A. LION (Petroleum, 1932, 28; Motorenbezt., 5, 4—5).—The methods applicable to the examination of knocking in petrol engines are briefly reviewed. H. E. BLAYDEN.

**Lowest value of flash points of compressor oils.** M. MIZUTA (J. Soc. Chem. Ind., Japan, 1932, 35, 41—42 B).—Calculation (from the initial and final pressures and the no. of stages) of the compression ratios and final temp. attained in a no. of air compressors indicated that the compression ratio was 6 for the greater no. and the final temp. were rarely above 130°. It is concluded that the min. safe val. of the flash point for compressor oils may be taken as 180°. H. E. BLAYDEN.

**Dew points of paraffin hydrocarbons.** K. HACHMUTH (Ind. Eng. Chem., 1932, 24, 82—85).—The dew points of  $\text{C}_3\text{H}_8$ , *isobutane*, *isopentane*, mixtures of *n*- and *iso*-butane, and mixtures of these both with and without the addition of air have been determined. The results are in very good agreement with those calc. from Raoult's law. D. K. MOORE.

**Flow of petroleum lubricating greases.** M. H. ARVESON (Ind. Eng. Chem., 1932, 24, 71—75).—Greases were forced through a capillary by a piston moving at a const. speed. The pressure of the grease at the point of entry to the capillary was measured. Curves of apparent viscosity-rate of shear (reciprocal sec.) are given. The apparent viscosity of greases made from the same oil at given rates of shear increases with increasing soap concn., decreases with increasing rate of shear, and approaches a val. of the same order of magnitude as, but higher than, that of the oil in the grease. The nature of the curves suggests one general relation for each type of grease. D. K. MOORE.

**Determination of paraffin wax.** H. J. TORMEY (Chemist-Analyst, 1931, 20, No. 6, 15).—The petroleum product (3—5 g.) is dissolved in a mixture of abs. EtOH and  $\text{Et}_2\text{O}$  and the solution is cooled to -20°. The deposited paraffin is collected with suction, washed with EtOH +  $\text{Et}_2\text{O}$ , and dissolved in hot  $\text{C}_6\text{H}_6$ ; the solvent is evaporated and the residue weighed. CHEMICAL ABSTRACTS.

**Oil and petrol from coal.** C. H. LANDER (Proc. Roy. Inst., 1931, 27, 77—106).

**Pachimeter.**—See I. Fuels for furnaces.—See X. Activated C.—See XVII.

#### PATENTS.

**Carbonising chambers or retorts.** GAS CHAMBERS & COKE OVENS, LTD., N. J. BOWATER, and A. H. LYMAN (B.P. 366,656, 15.12.31).—The retort has a bottom gas offtake which communicates with a foul-gas main and is provided with an adjustable and/or removable liquid seal, e.g., a swinging cup-valve, which is adjusted in depth in accordance with the rate of gas evolution and is fully opened during the period of max. evolution. A. B. MANNING.

**Production of metallurgical coke in coke ovens and the like.** C. STILL (B.P. 367,617, 10.4.31. Ger., 10.4.30. Addn. to B.P. 356,079; B., 1931, 1036).—A swelling or insufficiently shrinking coal is charged loosely into the chamber ovens and the volatile products of distillation are withdrawn through ducts formed in the charge, as described in the prior patent, at a pressure considerably less than atm. A. B. MANNING.

**Coking of fluid or liquefiable bituminous materials.** AMER. TAR PRODUCTS CO., INC., Assees. of E. O. RHODES (B.P. 367,652, 18.5.31. U.S., 6.12.30. Cf. B.P. 337,800; B., 1931, 190).—Fluid bituminous material is introduced, preferably by spraying, into a highly-heated chamber, which may be of the ordinary coke-oven type, at such a rate that it is partly coked, but is still in a plastic condition, as it falls freely through the chamber. Steam or an inert gas is introduced into the chamber with the material. A. B. MANNING.

**Downdraught gas producers for combustion engines, such as motors for motor vehicles.** F. LEVEQUES and M. LEYTENS (B.P. 367,514, 10.1.31).—The producer comprises a fuel container communicating with a double inverted-cone structure, which constitutes the carbonising and cracking zone (*A*); this in turn communicates with a central chamber and serves as the downdraught combustion and reaction zone (*B*). The latter is surrounded by an annular reduction chamber packed with charcoal. Air is admitted to *A* and passes thence down through *B*, through the grate separating the latter from the ash pit and thence up through the annular chamber, wherein the  $\text{CO}_2$  in the gases is reduced to  $\text{CO}$ , to the engine. A. B. MANNING.

**Gasification of finely-divided fuels.** F. HERZBERG (B.P. 367,363, 17.11.30).—Finely-divided solid or liquid fuels are gasified by interaction with steam in externally-heated chambers of the size of ordinary coke-oven chambers. The fuel inlet and gas offtake pipes are situated in the top of the chamber, and the steam inlets in or near the bottom. Part of the gas produced in the lower part of the chamber is withdrawn and burned in the heating flues. The amount of fuel supplied to the chamber may be so adjusted that part of it leaves the chamber ungasified and is also burned in the heating flues. Partition walls may be provided in the chamber in order to lengthen the path of travel of the fuel. The fuel dust leaving the chamber may be passed into a decomp. chamber wherein it is further gasified, if necessary by the addition of steam, air, or  $\text{O}_2$ , before it enters the heating flues. The latter may be designed to function also as regenerators or recuperators. [Stat. ref.] A. B. MANNING.

**Manufacture of water-gas and coal gas.** HUMPHREYS & GLASGOW, LTD., and A. R. GRIGGS (B.P. 366,782, 23.3.31).—Coal is completely gasified in a generator comprising an upper carbonisation chamber (*A*) and a lower gasification chamber (*B*). The top of *A* is connected to the top of a superheater (*C*) by a conduit provided with a steam injector (*D*). The coke in *B* is blasted with air and the blast gases are burned with secondary air in *C*. Steam is then admitted to *D* and passes, together with gas which is withdrawn from the top of *A*, through *C*, up through *B* with the production of water-gas, and thence up through *A* with the production of coal gas. Part of the mixed gases are recirculated, the remainder pass to storage. A. B. MANNING.

**Drying and purification of fuel gases.** S. G. WATSON, D. M. HENSHAW, and W. C. HOLMES & Co., LTD. (B.P. 366,646, 5.12.30).—The fuel gases, prior to their admission to the distributing mains, are subjected

to the action of a hygroscopic liquid, e.g., aq.  $\text{CaCl}_2$ , in a brush-washer, preferably of the type described in B.P. 331,818 or B.P. 357,712 (B., 1930, 888; 1931, 1127), but having means for regulating the proportion of the liquid supplied to each of the compartments of the washer, the largest proportion, about half, being supplied to the compartment into which the gas is first introduced. Provision is made for the continuous or intermittent re-concn. of the liquid. The circulation of the liquid can be effected by a single pump.

**Purification of gas mixtures containing ammonia and hydrogen sulphide.** J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 367,343, 15.10.30).—Gases containing  $\text{NH}_3$  and more  $\text{H}_2\text{S}$  than is necessary for the conversion of the  $\text{NH}_3$  into  $(\text{NH}_4)_2\text{SO}_4$  are washed with acid thionate or sulphite-bisulphite liquors in order to remove as much as possible of the  $\text{NH}_3$ , but little or none of the  $\text{H}_2\text{S}$ . Part of the gas, corresponding to the excess of  $\text{H}_2\text{S}$ , is removed, and may be used in heating the retorts, and the remainder is freed from  $\text{H}_2\text{S}$ , or from  $\text{SO}_2$  obtained therefrom by catalytic oxidation, using for this purpose the liquors employed for the  $\text{NH}_3$  wash of the original gas. A. B. MANNING.

**Removal of naphthalene from gases.** VEREIN. STAHLWERKE A.-G. (B.P. 366,712, 29.1.31. Ger., 19.2.30).—The gases are washed at room temp. or slightly above and, if desired, under pressure, with a mist of finely-atomised  $\text{H}_2\text{O}$ . After separation of the entrained  $\text{C}_{10}\text{H}_8$  by filtration the  $\text{H}_2\text{O}$  is recirculated. It may be preferable to remove the bulk of the  $\text{C}_{10}\text{H}_8$  by a preliminary oil-scrubbing. A. B. MANNING.

**Production of non-poisonous town gas.** H. COHN (B.P. 366,563, 3.11.30. Ger., 2.11.29. Cf. B.P. 360,448 and 365,902; B., 1932, 298).—Low-grade gases, e.g., water-gas, are freed from  $\text{CO}$ , e.g., by its catalytic conversion into  $\text{CH}_4$  and  $\text{CO}_2$ , and the residual gas is adjusted to have the sp. gr., calorific val., and speed of ignition required for town gas, e.g., by the removal of  $\text{CO}_2$  and the addition of  $\text{H}_2$  and/or  $\text{N}_2$ .

**Production of non-poisonous fuel gas.** W. BERTELSMANN, A. C. BECKER, and D. WITT (B.P. 367,577, 4.3.31. Ger., 4.3.30).—The gas is mixed with steam and passed, without previously removing the S compounds, over a catalyst of porous C at a moderate temp. (below  $600^\circ$ ) and, if desired, under pressure, and is then purified from  $\text{H}_2\text{S}$  and  $\text{CO}_2$ . The catalyst may be prepared by the low-temp. carbonisation of peat, lignite, etc., and may be activated by treatment with  $\text{H}_2\text{O}$  or  $\text{CO}_2$  at  $500\text{--}700^\circ$ ; it may also be impregnated with the oxides, hydroxides, or carbonates etc. of the alkali metals, alkaline-earths, or Mg. In the presence of the catalyst and  $\text{H}_2\text{O}$  the  $\text{CO}$  in the gas is converted into  $\text{CO}_2$  and  $\text{H}_2$ . A. B. MANNING.

**Conversion of methane into liquid hydrocarbons.** J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 366,494, 22.9. and 22.12.30).—The conversion of  $\text{CH}_4$  or other gaseous paraffin hydrocarbons into  $\text{C}_6\text{H}_6$  etc. by thermal treatment at  $800\text{--}1200^\circ$  is carried out in apparatus constructed of, or lined with, graphite or Cr, W, or Mo, or alloys of these metals with each other.

The reaction tubes resist deformation and chemical attack and the deposition of C is greatly diminished or prevented. [Stat. ref.] A. B. MANNING.

**Conversion of hydrocarbons into hydrocarbons lower in hydrogen content at elevated temperatures.** J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 366,549, 29.9.30).—The heat treatment of the hydrocarbons is effected in a reaction chamber so designed that the same linear velocity of flow of gases is maintained over all parts of the surfaces, *e.g.*, by making the channels between the fillers of approx. the same cross-section throughout, and that sharp bends and surfaces which would exert a baffling action are avoided. The yield of the desired hydrocarbons is increased and the deposition of C diminished. A. B. MANNING.

**Oxidation of hydrocarbons and waxes.** J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 366,997, 15.10.30. Cf. B.P. 324,189; B., 1930, 314.)—Waxes or heavy hydrocarbons are blown with air at 120–180° in the presence of 0.1–1% of an alkaline catalyst consisting of an alkali-metal compound, *e.g.*, aq. NaOH or aq. K<sub>2</sub>CO<sub>3</sub>, until the reaction product has an acid val. between 40 and 120. After separation of the oxidation products the unattacked material may be again subjected to oxidation. A. B. MANNING.

[Retarding the oxidation of] (A) mineral oil, (B) soap and soap products, and agents therefor. H. A. MORTON (U.S.P. 1,805,953–4, 19.5.31. Appl., 17.8.28).—A hydrogenated glyoxaline free from strongly negative groups, *e.g.*, 1:3-diphenyl-2-*n*-propyl- or -2:4-dimethyl-tetrahydroglyoxaline, is added as anti-oxidant (A) to lubricating, transformer, or paraffin oils (0.01–0.5%), (B) to soaps or soap products (0.01–1%). C. HOLLINS.

**Methods of using fuels in internal combustion engines.** W. HELLMORE (B.P. 366,947, 3.10.30).—A primer, *e.g.*, EtNO<sub>3</sub>, preferably in solution in EtOH, is introduced with the intake air into the cylinder of a compression-ignition engine in order to promote rapid ignition and efficient combustion of the oil. A. B. MANNING.

**Means of effecting automatic sampling of coal.** FIFE COAL CO., LTD., and H. RULE (B.P. 368,039, 16.2.31).

**Closure means for coke ovens.** P. VAN ACKEREN, Assees. of H. KOPPERS A.-G. (B.P. 368,384, 5.12.30. Ger., 9.12.29).

**Vertical gas retorts and coke extractors therefor.** E. WEST, and WEST'S GAS IMPROVEMENT CO., LTD. (B.P. 368,481, 5.2.31. Addn. to B.P. 344,860).

**[High-pressure] acetylene generators. Waterlocks for acetylene generators.** H. WENDTLAND (B.P. [A] 368,074 and [B] 368,185, 13.3.31. Ger., [A] 30.4.30).

**Automatic control apparatus, particularly suitable for use in the manufacture of water-gas and other cyclic processes.** HUMPHREYS & GLASGOW, LTD., Assees. of SOC. DE CONSTRUCTION D'APPAREILS POUR GAZ A L'EAU ET GAZ INDUSTRIELS (B.P. 368,529, 17.3.31. Fr., 5.6.30).

**Oil burners.** A. RITCHIE, and GRETNA ENG. CO., LTD. (B.P. 368,339, 3.12.30).

**Application [to liquid fuel tanks] of inert gases for preventing fire.** H. FAURE (B.P. 367,498, 22.12.30. Fr., 26.12.29).

**Grinding and separation of coal. [Apparatus for] hydrogenations. Purifying liquids [oily water]. Cleaning lubricating oil.**—See I. Alcohols from waxes.—See III. Cr-Fe alloys [for oil cracking apparatus].—See X.

### III.—ORGANIC INTERMEDIATES.

**Detection of methyl alcohol in presence of ethyl alcohol.** H. S. KING and A. C. BELL (Proc. Nova Scotian Inst. Sci., 1931, 18, 11–13).—The alcohols are distilled with HI and the iodides are collected in an abs. EtOH solution of NMe<sub>3</sub>. The sparingly sol. NMe<sub>4</sub>I indicates the presence of MeOH in the original sample. The procedure allows the determination of 0.1% MeOH in a 1-c.c. sample or 0.2% MeOH in a 0.1 c.c. sample. A no. of alcoholic beverages, CH<sub>2</sub>O, and higher alcohols gave a negative test for MeOH. E. S. HEDGES.

**Sulphonation of naphthalene by equimolecular quantities of sulphuric acid.** A. A. SPIRKOV (J. Chem. Ind. Russ., 1931, 8, No. 20, 41–45).—97% yields of C<sub>10</sub>H<sub>7</sub>·SO<sub>3</sub>H are obtained using theoretical quantities of H<sub>2</sub>SO<sub>4</sub> and removing H<sub>2</sub>O formed during the reaction by passing purified benzine vapour through the reaction mixture (about 2.5 kg. of benzine per kg. C<sub>10</sub>H<sub>8</sub> at 160°). The low yields and impure product obtained by Gay, Auméras, and Mion (B., 1928, 595) were due to the use of impure ligroin. R. TRUSZKOWSKI.

**Preparation of technical phenanthrene.** R. M. NIKOLAEV and M. N. TRATSCHENKO (J. Chem. Ind., Russ., 1931, 8, No. 20, 46–48).—Crude anthracene is heated with twice its wt. of crude benzol under reflux, the solution is cooled to 10°, and cryst. anthracene is filtered off. The filtrate is fractionally distilled: fraction A (below 230°) consists chiefly of solvent, and B (230–290°) of C<sub>10</sub>H<sub>8</sub>, whilst C (290–340°) contains 90% of phenanthrene, 5.4% of carbazole, and 4.6% of anthracene; the yield of C is 30% of the crude anthracene taken. Above 340° the anthracene content becomes increasingly great. R. TRUSZKOWSKI.

**Gas from coal. Benzine synthesis.**—See II. Aliphatic thiocyanates as insecticides.—See XVI. EtOH from cane molasses. Spirit. Alcohol.—See XVIII.

### PATENTS.

**Polymerisation of diolefines.** J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 363,810, 11.12.30).—The polymerisation by Na etc. proceeds smoothly in presence of H<sub>2</sub> and in absence of oxygenated org. compounds. Increase in H<sub>2</sub> pressure leads to products of lower viscosity. Vinyl chloride or other org. halide may be added. C. HOLLINS.

**Manufacture of 1:4-dioxan.** CARBIDE & CARBON CHEMICALS CORP. (B.P. 363,895, 20.2.31. U.S., 20.2.30).—A ββ'-dihalogenodiethyl ether is heated at about 200° with dil. aq. NaOH. C. HOLLINS.

**Recovery of alcohols of high mol. wt. from waxes and the like by distillation.** J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 366,553, 2.10.30).—



Substances containing alcohols of high mol. wt. are fractionally distilled in the presence of the vapour of a volatile liquid, *e.g.*, H<sub>2</sub>O or EtOH, at a pressure below 100 mm. Hg, and at a temp. above the b.p. of the liquid used. Any esters present in the starting material are converted into free acids and alcohols, *e.g.*, by treatment with superheated steam under pressure or by saponification with aq. NaOH and subsequent acidification, prior to distillation. A. B. MANNING.

**Manufacture of diazo preparations.** SOC. CHEM. IND. IN BASLE (B.P. 363,950, 21.5.31. Switz., 21.5.30).—An aminodiaryl ether, *e.g.*, 4-chloro-2-aminodiphenyl ether, is diazotised and the conc. diazo solution is neutralised, *e.g.*, with CaCO<sub>3</sub>, and the diazonium chloride etc. is salted out, *e.g.*, with MgCl<sub>2</sub>. C. HOLLINS.

**C<sub>10</sub>H<sub>8</sub> from gases. Converting CH<sub>4</sub> into liquid hydrocarbons. Dehydrogenation of hydrocarbons. Oxidation of hydrocarbons etc.**—See II. Anthraquinone-acridones.—See IV.

#### IV.—DYESTUFFS.

##### PATENTS.

**Manufacture of fast vat dyes [of the anthraquinone series].** A. CARPMAEL. FROM I. G. FARBENIND. A.-G. (B.P. 363,740, 6.10.30).—An anthraquinone-2-carboxyl halide, carrying in position 1 an NH<sub>2</sub> group or in positions 1:9 a hetero-ring, is condensed with Ph<sub>2</sub>, C<sub>10</sub>H<sub>8</sub>, Ph<sub>2</sub>O, 5-ethylcarbazole, or other polynuclear compound in presence of AlCl<sub>3</sub> etc. to give, directly or in two stages, diketones. Vat dyes are thus obtained from Ph<sub>2</sub> and pyrazolanthrone-3-carboxyl chloride (blue-violet), thiazolanthrone-3-carboxyl chloride (green-lemon), 1-aminoanthraquinone-2-carboxyl chloride (blue-red), and from thiazolanthrone-3-carboxyl chloride and Ph<sub>2</sub>O (yellow) or diphenylene oxide (yellow). C. HOLLINS.

**Dyestuffs and intermediates of the anthraquinone[acridone] series.** W. W. TRIGGS. FROM E. I. DU PONT DE NEMOURS & Co. (B.P. 363,647, 13.6.30).—A 1-halogenoanthraquinone-2-carboxylic acid is condensed with an *o*-, *m*-, or *p*-aminobenzoic acid; the product is converted into the di-acid chloride and after cyclisation is condensed with an aliphatic or aromatic primary amine. Examples are 1-chloroanthraquinone-2-carboxylic acid with *p*-aminobenzoic acid, cyclised, and condensed with alkylamines or arylamines for yellow-pink to violet-red vat dyes or with 1-amino-5-benzamidoanthraquinone (red-orange), 1:5-diaminoanthraquinone (orange-red to red-brown); 1-chloroanthraquinone-2-carboxylic acid with 5-aminosalicylic acid. [Stat. ref.] C. HOLLINS.

**Manufacture of vat dyes [of the pyrazolanthrone series].** A. CARPMAEL. FROM I. G. FARBENIND. A.-G. (B.P. 363,832, 22.12.30).—A pyrazolanthrone-3-carboxyl halide is condensed with an *o*-diamine, an *o*-aminophenol, or *o*-aminothiophenol to give, directly or by way of the amide, a  $\mu$ -3-pyrazolanthronyl-iminazole, -oxazole, or -thiazole; the product may be alkylated etc. Vat dyes are thus obtained from 1:2-diaminoanthraquinone (yellow), *o*-phenylenediamine (greenish-yellow), 2-amino-3-hydroxyanthraquinone (greenish-yellow; methylated,

orange), and 2-amino-1-thiolanthraquinone (similar with pyrazolanthrone-3-carboxyl chloride; and from 1:2-diaminoanthraquinone (orange) with the *N*-Me compound. C. HOLLINS.

**Dyes and dyeing [sulphuric esters of leucoindanthrones].** D. A. W. FAIRWEATHER, J. THOMAS, and SCOTTISH DYES, LTD. (B.P. 363,668—9, 13.6.30. Cf. B.P. 359,889; B., 1932, 333).—(A) The di-ester of anthraquinone-anthrahydroquinonedihydroazine is reduced by alkaline hyposulphite to anthraquinone-anthranoldihydroazine monosulphuric ester, also obtainable by action of acids on anthraquinone-anthranolazine trisulphuric ester. The mono-ester may be developed by heating with dil. acid in absence of oxidant. (B) Salts, other than K and Na salts, of dianthrahydroquinone-azine tetrasulphuric ester are prepared by double decomp.; Mg, Li, NH<sub>4</sub>, Ca, and methylpyridinium salts are described. C. HOLLINS.

**Manufacture of [direct black] azo dyes.** A. CARPMAEL. FROM I. G. FARBENIND. A.-G. (B.P. 363,955, 26.5.31. Addn. to B.P. 349,600; B., 1931, 920).—Greener blacks are obtained by the process of the parent patent when the N-groups of at least one of the diazo components are *meta* to one another. Examples are: *p*-nitroaniline (acid)  $\rightarrow$  2S-acid  $\leftarrow$  (alkaline) 4-nitro-*o*-anisidine, reduced,  $\rightarrow$  *m*-phenylenediamine; 4-amino-2-acetamidobenzoic acid (acid)  $\rightarrow$  2S-acid  $\leftarrow$  (alkaline) *p*-aminoacetanilide, hydrolysed,  $\rightarrow$  *m*-phenylenediamine (1 or 2 mols.); 6-acetamido-*m*-anisidine (acid)  $\rightarrow$  2S-acid  $\leftarrow$  (alkaline) *m*-aminoacetanilide, hydrolysed, *m*-phenylenediamine and resorcinol. C. HOLLINS.

**Diazo preps.**—See III.

#### V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

**Spinning of cellulose acetate direct from the acetylation mixture.** A. A. LAUTENBERG (Ind. Chem., 1932, 8, 50—52).—The direct spinning of primary solutions of cellulose triacetate has not yet been successfully worked on an industrial scale, one of the difficulties encountered being the instability of the ester. The Knoll patents claim to have overcome this by neutralising the free H<sub>2</sub>SO<sub>4</sub> catalyst by NaOAc, NH<sub>4</sub>OAc, or NH<sub>4</sub>NO<sub>3</sub> after complete acetylation. In the Zdanowich patents, by a suitable combination, the catalysts are limited to a small amount, thereby reducing the saponifying and degrading effect on the acetylcellulose produced. Acetylation is carried out in two phases: in the first (a slow phase) Cl<sub>2</sub> is used as catalyst, whilst in the second very small quantities of H<sub>2</sub>SO<sub>4</sub> are employed, which, with the HCl derived from the Cl<sub>2</sub> in the first phase, are sufficient to complete the reaction in a short time. When acetylation is finished the viscosity is reduced by addition of AcOH, the excess of Ac<sub>2</sub>O is hydrolysed by aq. CH<sub>2</sub>O, and the solution is spun in H<sub>2</sub>O or salt solutions. Spinning of the triacetate solution is difficult owing to its corrosive action on the apparatus and to the large contraction on drying of the threads, which, although elastic, are very brittle. The triacetate yarn differs from the COME<sub>2</sub>-sol. acetate in its resistance to boiling H<sub>2</sub>O, soap solutions, and dil. alkali without loss of lustre or partial saponification, and also in its dyeing properties. F. R. ENNOS.

**Influence of the quality of water and hydrochloric acid on the ash content of viscose cellulose.**

I. ZEMSKOV (Bumazh. Prom., 1931, 10, No. 4, 53—56).—Ca, S, and Fe were introduced into the pulp, rendering it unsuitable for the manufacture of viscose.

## CHEMICAL ABSTRACTS.

**Elimination of sulphur from viscose silk.** Z. KAWATA (J. Cellulose Inst., Tokyo, 1932, 8, 21—24).—Aq.  $\text{Na}_2\text{S}$  containing 1% of glucose or 3% of glycerin effectively desulphurises viscose silk; the addition of  $\text{NH}_4\text{Cl}$  protects the fibre, although the S is less completely removed. Treatment with 3% (20 vols.) or 4% (10 vols.)  $\text{Na}_2\text{SO}_3$  solution eliminates the S in 10 min. at 65—70°; the action is less efficient than with  $\text{Na}_2\text{S}$ , but the fibre does not suffer damage. Aq.  $\text{NaOH}$  (25—30 g. per litre) can be used at 50° or above, this bath being rendered more efficient and less harmful by the addition of  $\text{Na}_2\text{S}$  solution (5—10 g. per litre). This process is rendered very economical by using waste alkali solution from alkali-cellulose preps.

V. E. YARSLEY.

**Use of concentrated alkali for pulping [of wood].**

W. E. ADLINGTON and J. H. ROSS (Pulp and Paper Mag., 1932, 32, 248—251, 270).—Highly conc. solutions of alkali effect a min. dissolution of non-ligneous constituents of wood and max. dissolution of lignin. Digestion of Jack pine, spruce, and birch with 40%  $\text{NaOH}$  at 150—170° is complete in 1½—2 hr., yields of 40—50% of good-quality pulp being obtained. Lignin is not re-pptd. on the fibres if the concn. of  $\text{NaOH}$  is above 20%, and countercurrent washing is arranged to give max. removal of lignin decomp. products before the liquor is too dil. Two experimental digesters are described.

T. T. PORTS.

**Classification of [wood] pulp by selective screening.** J. S. HART, H. R. PATTON, and H. W. JOHNSTON (Pulp and Paper Mag., 1932, 32, 252—257, 270).—Apparatus is described and illustrated whereby pulps may be screened according to length of fibres instead of diam. Agitation is designed so that fibres are alined in the direction of flow and matting is avoided. The results of fractionation of a no. of commercial pulps are given for screens of 50-, 90-, and 200-mesh. Application of the method is indicated for the quant. analysis of newsprint and for the large-scale removal of shieve from pulp.

T. T. PORTS.

**Methods of determining the degree of decomposition and the strength of pulps.**

G. K. BERGMAN (Papier-Fabr., 1932, 30, 121—126).—Comparisons are made between the Enso, Björkman, Tingle, and Bergman methods of determining degree of decomp. From the viewpoint of variation of the results from the mean val. there is nothing to choose among them, but they differ in the way they enable the decomp. process to be followed. Judged on the basis of consumption of  $\text{Cl}_2$  to give a good white, and considering both kraft and sulphite pulps, the Bergman method is best and the Tingle next, but the former requires a much longer time than the others. The methods vary in their applicability according to the precise requirements, and the most suitable one for a particular purpose should be chosen. In strength testing, the "unbeaten-

test" method of the Brit. Paper Makers' Assoc. gives higher and more uniform vals. than other methods and is to be preferred for most purposes. Factors such as time and degree of beating etc. are discussed in relation to tensile strength, bursting surface, etc.

B. P. RIDGE.

**Transparent packing materials.** H. EBBINGE (Chem. Weekblad, 1932, 29, 167—173).—The mechanical, optical, and electrical properties and the stability towards moisture and micro-organisms of several commercial transparent packing materials were examined.

S. I. LEVY.

**Scientific documentary evidence in criminal trials.**

C. A. MITCHELL (Analyst, 1932, 57, 144—154).—A full account is given of the methods employed for the detection of forged documents and forged additions to documents, whether caused by inks, pencils, type-writing, artificial watermarks, or seals. Differences in composition must be noted on documents, or compared with dyes in use at the reputed period of documents. Physical rather than chemical tests must usually be employed, and for this purpose Osborn's comparison microscope, photography in various kinds of lighting, and examination in ultra-violet light are useful. Particular attention must be given to the scientific examination of handwriting.

T. McLACHLAN.

**Spray-drying [of black liquors].**—See I. **Potato flour for paper-making.**—See XVII.

## PATENTS.

**Refining of raw cellulose pulp.** G. A. RICHTER, Assr. to BROWN Co. (U.S.P. 1,816,343, 28.7.31. Appl., 15.5.29).—The raw pulp is treated with a lignin-reactive reagent ( $\text{Cl}_2\text{-H}_2\text{O}$ ) and digested first with a hot dil. alkali ( $\text{Na}_2\text{CO}_3$ ) to dissolve certain  $\text{Cl}_2$ -lignin reaction products and afterwards with a conc. alkali ( $\text{NaOH}$ ) to remove other non- $\alpha$ -cellulose components therefrom.

F. R. ENNOS.

**Treatment of wood-pulp fibres and paper product made therefrom.** J. A. DE CEW, Assr. to PROCESS ENGINEERS, INC. (U.S.P. 1,816,423, 28.7.31. Appl., 19.9.29. Can., 14.2.29).—In the manufacture of an unsized newsprint paper, a wax emulsion is added to the stock and coagulated by an alkaline or neutral salt (of Ca or Mg) so as to cover the natural resins of the pulp and prevent it from adhering to the paper machines.

F. R. ENNOS.

**Apparatus for feeding artificial-silk spinning machines with spinning fluid.** E. MOSSGRABER (B.P. 367,960, 15.12.30. Ger., 13.12.29).

**Coating of materials with metals.**—See X.

## VI.—BLEACHING; DYEING; PRINTING; FINISHING.

**Testing the fastness to light of dyed textile materials.** ANON. (Mitt. Materialprüf., 1931, 11, 172—174).—A review of recent methods, with special reference to the efforts of Sommer (B., 1931, 484), Haller and Ziersch (B., 1930, 369), and Jost and Flüttsch (Textilber., 1930, 11, 296), to render fading measurements independent of the observer, and the method of Kraus (A., 1930, 1260) for measuring light-intensity during exposure of the dyed materials by means of Victoria-

Blue paper and the Zeiss step-photometer (cf. Sommer, B., 1931, 484); formulæ are given by which fading can be expressed independently of the depth of shade and the substrata. A. J. HALL.

**Fastness to light.** H. H. GRAY (Chem. and Ind., 1932, 189).—It is suggested that the fading of fabrics in sunlight is primarily due to the ozonising action of the latter in certain atm. conditions. C. W. DAVIES.

**Occurrence and detection of certain faults in textile fabrics.** O. S. RHODES (Chem. and Ind., 1932, 179—180).—The deterioration of cotton and viscose fabrics in sunlight is greatly accelerated by certain dyes, especially Indanthrene Yellow FFRK. Discoloration of certain pieces on storage has been traced to fumes from gas stoves and to contact with Aniline Black-dyed pieces. C. W. DAVIES.

#### PATENTS.

**Dyeing jigs.** J. DOWNHAM & Co. (1927), LTD., J. LITHGOW, and G. CALVERT (B.P. 368,668, 24.9.31).

**Dyeing with esters of leucoindantrones.**—See IV.

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

**Adapting packed-cell operation to a by-product sulphuric acid plant.** E. L. LARISON and J. B. CHRISTIE (Chem. and Met. Eng., 1932, 39, 66—70).—The plant described is a tower plant in Chile consisting of 2 units of 125 tons per day capacity, burning Cu concentrate containing 33% S. The flotation concentrate is dried down to 1% H<sub>2</sub>O in air-cooled Wedge furnaces, with Cottrell precipitators to deal with the dust. Four roasters are used for the burning, and it is desirable to leave 15—20% S in the concentrate. The gases leave these at 500—700°, pass through a preliminary dust chamber, and then through a Cottrell treater. Each unit has a single Glover tower followed by five Larison "packed cells" fed with chamber acid and by three Gay-Lussac towers similar to the packed cells. There are four fans to each unit, the first between cells 1 and 2. HNO<sub>3</sub> is used, this being manufactured as mixed acid by washing the gases from HNO<sub>3</sub> retorts with H<sub>2</sub>SO<sub>4</sub>. The low normal barometric pressure of 531 mm., due to the elevated site, greatly modifies the reaction, and a nitre consumption of about 7% on the S in H<sub>2</sub>SO<sub>4</sub> made is as low as is practicable under such conditions. C. IRWIN.

**Platinum versus vanadium as catalyst for sulphuric acid.** A. P. THOMPSON (Chem. and Met. Eng., 1931, 38, 705—709).—Data from contact H<sub>2</sub>SO<sub>4</sub> plants show that the space velocity (cu. ft. of gas at N.T.P. per hr. per cu. ft. of catalyst) and SO<sub>2</sub> content of inlet gas (from S, unless stated otherwise) are with platinised MgSO<sub>4</sub> 924, 10%; platinised asbestos 970, 8% (pyrites); platinised asbestos 970, 10%; platinised SiO<sub>2</sub> gel 1008, 7% (pyrites); V mass I 768, 8%; V mass II 627, 7%; V mass III 794, 7%; the conversion is 95% in each case except with V mass I, when it is 96%. V catalysts do not operate satisfactorily with > 8% SO<sub>2</sub> gas because a large excess of O<sub>2</sub> (225—300%) is necessary to prevent the reduction of V<sub>2</sub>O<sub>5</sub> to lower oxides with loss of catalytic activity. This necessitates larger blower and

converter capacity and higher constructional and operating costs for V catalysts. At equal space velocities the temp. range over which high conversion is maintained is much wider with Pt than with V catalysts, and the former are capable of dealing with high overloads with far less reduction in conversion than the latter. V masses and platinised SiO<sub>2</sub> gel are not poisoned by As, but the other Pt catalysts are; on the other hand, if in the case of pyrites or smelter gas the As is not removed, neither is all the dirt or suspended matter, and the activity of the catalyst, whether Pt or V, suffers. If good-grade H<sub>2</sub>SO<sub>4</sub> is required there is no difference in the purification required for Pt or V catalysts. Detailed costs are given showing the advantage of Pt catalysts.

D. K. MOORE.

**Analysis of roaster gases.** A. BÖNISCH (Zellstoff u. Papier, 1932, 12, 114—115).—SO<sub>2</sub> and SO<sub>3</sub> are determined by aspirating the gas sample through 2 wash-bottles, the first containing 10 c.c. of 0.1N-I, the second 20 c.c. of 0.1N-NaOH, until the colour of the I disappears. The solutions are then mixed, a little KIO<sub>3</sub> is added, and the I liberated titrated with Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>. The I liberated in this way is equiv. to the SO<sub>2</sub> in the gas. The advantages of the method are that only one determination is necessary, and this can easily be carried out by artificial light. An error is introduced if CO<sub>2</sub> is present in appreciable quantities; in this case the total S must be determined as BaSO<sub>4</sub>. As is determined by absorption in a wad soaked with NaOH. The wad is heated with fuming H<sub>2</sub>SO<sub>4</sub> and HNO<sub>3</sub>, the solution evaporated with passage of SO<sub>2</sub>, and the As liberated as AsH<sub>3</sub> and determined colorimetrically with HgCl<sub>2</sub> paper. Sublimed S is determined by filtration through glass wool or asbestos in a water-cooled tube. The wad is washed free from H<sub>2</sub>SO<sub>4</sub>, dried, and extracted with CS<sub>2</sub>. C. IRWIN.

**Manufacture of nitric acid by oxidation of ammonia.** G. PASTONESI (Giorn. Chim. Ind. Appl., 1932, 14, 69—75).—Physico-chemical and other data are given for the three principal phases of the manufacture of HNO<sub>3</sub> from NH<sub>3</sub>: oxidation of the NH<sub>3</sub>, cooling and oxidation of the nitrous oxides to NO<sub>2</sub>, and absorption of the oxides. Detailed figures are calc. for the cooling of the nitrous oxides and observations and analyses made in connexion with a Fauser plant are described. For the oxidation of the NH<sub>3</sub> in contact with Pt gauze, the optimum temp. and gas velocity for the conversion into N oxides are worked out, and the application of pressure, in relation especially to the oxidation and absorption, is considered.

T. H. POPE.

**Lime and stannic oxide as catalysts in the oxidation of ammonia.** I. E. ADADUROV and R. Y. VAISHENKER (J. Appl. Chem., Russia, 1931, 4, 183—190).—SnO<sub>2</sub> is satisfactory. Catalysts suitable for such direct oxidation must be able to excite O<sub>2</sub>; the shorter are the coinciding wave-lengths of the catalyst and of the catalysed substance the higher is the contact temp.

CHEMICAL ABSTRACTS.

**Production of highly-concentrated hypochlorite solutions.** T. L. KOLKIN (Ind. Chem., 1932, 8, 97—98).—NaOCl solution is usually manufactured to-day with 14—15% of "available" Cl (actually 7.5% Cl as NaOCl)

by passing  $\text{Cl}_2$  into a solution containing 22–24% of  $\text{NaOH}$ . A packed tower is used over which the  $\text{NaOH}$  solution is circulated, the temp. must not rise above 35–40°, and any local excess of  $\text{Cl}_2$  must be avoided.  $\text{NaCl}$  is pptd. during the reaction and the finished liquor is settled and filtered. Units must not be too large.  $\text{Ca}(\text{OCl})_2$  solution containing 7–8% of available  $\text{Cl}$  is usually made in a similar manner, but towers with  $\text{Fe}$  or concrete baffles are employed. This solution can be stored in tanks lined with tar-asphalt mixture.  $\text{NaOCl}$  containers require a rubber lining. C. IRWIN.

**Deterioration of hypochlorites.** R. H. AGUILAR (Philippine J. Sci., 1932, 47, 235–241).—Curves are given showing the deterioration of bleaching powder and aq.  $\text{NaOCl}$ . The available  $\text{Cl}$  of bleaching powder was reduced from 29.5% to 23.3% during 14 months' storage in wooden boxes and to 25.1% in coloured vials, at 8–12°; or to 0.02% in wooden boxes and to 0.12% in coloured vials, at 29°. The available  $\text{Cl}$  in aq.  $\text{NaOCl}$  made from (a) pure  $\text{NaOH}$  and distilled  $\text{H}_2\text{O}$ , and (b) commercial  $\text{NaOH}$  and tap  $\text{H}_2\text{O}$ , was reduced from 4.49% to 4.05% during 16 months' storage at 8–12°; vals. for storage at 29° were (a) 2.6%, (b) 1.98%.

D. K. MOORE.

**Chemical nature and solubility of ammoniated superphosphates and other phosphates.** K. D. JACOB and W. H. ROSS (J. Amer. Soc. Agron., 1931, 23, 771–787).—Addition of 2% of  $\text{NH}_3$  to ordinary superphosphate results in conversion of  $\text{CaH}_4(\text{PO}_4)_2$  into  $\text{CaHPO}_4$  and  $\text{NH}_4\text{H}_2\text{PO}_4$ ; larger quantities increase the amount of  $\text{Ca}_3(\text{PO}_4)_2$ . The official method of analysis should be modified by using 1 g. instead of 2 g. and digesting for 1 hr. instead of 0.5 hr. The (similar) citrate-solubilities of bone meal, basic slag, and  $\text{Ca}_3(\text{PO}_4)_2$  are markedly affected by the size of sample employed. The citrate-solubility of  $\text{P}_2\text{O}_5$  in bone ash and ground phosphate rock is only 10–20% of that in  $\text{Ca}_3(\text{PO}_4)_2$ , bone meal, and basic slag. The citrate-solubility of  $\text{Ca}_3(\text{PO}_4)_2$  in a mixed fertiliser may be considerably diminished by addenda. CHEMICAL ABSTRACTS.

**Available phosphoric acid content of ammoniated superphosphate.** F. G. KEENEN (Ind. Eng. Chem., 1932, 24, 44–49).—2.4–3.0%  $\text{NH}_3$  (on wt. of superphosphate) may be added to a fertiliser containing 8–10%  $\text{P}_2\text{O}_5$  with a reversion of approx. 0.5%  $\text{P}_2\text{O}_5$  as tested by the U.S. Dept. Agric. official test; or 4.25%  $\text{NH}_3$  with the same reversion when the control is exerted by extracting a 1-g. sample of the fertiliser with neutral  $\text{NH}_4$  citrate for 1 hr. (modification of official test). The time for ammoniated superphosphate containing 6% moisture to reach equilibrium is 1 week at 80°, 1 month at 60°, 4 months at 50°, 6–12 months at < 40°; less moisture decreases the rates of attaining equilibrium. D. K. MOORE.

**Decomposition of Chibin apatite-nephelines by sulphuric acid.** S. I. VOLFKOVICH, L. BERLIN, A. VINOKUROVA, and A. SALOVA (J. Chem. Ind. Russ., 1931, 8, Nos. 15–16, 1–8).—The velocity of decomp. in aqua regia or 96%  $\text{H}_2\text{SO}_4$  is in the order: nepheline > apatite > titanomagnetite > egirine. 1.08, 1.14, and 0.37 g. of 96%  $\text{H}_2\text{SO}_4$ , respectively, should be taken per g. of nepheline, titanomagnetite, or egirine.

The solubility of titanomagnetite falls with increasing concn. of  $\text{H}_2\text{SO}_4$ , whilst that of egirine and of nepheline is independent of concn. of acid. No advantage is gained by allowing the reaction to proceed for 10 hr. instead of 1 hr. When nepheline and apatite are present together, the requisite quantity of  $\text{H}_2\text{SO}_4$  is greater than theoretical, whilst when egirine (< 6%) and apatite are present together the amount of  $\text{H}_2\text{SO}_4$  necessary for apatite alone suffices. For mixtures of titanomagnetite and apatite the amount of acid should be calc. for each separately; superphosphate obtained from such mixtures is contaminated with basic  $\text{Fe}^{II}$  and  $\text{Fe}^{III}$  sulphates. R. TRUSZKOWSKI.

**Fluorine in natural phosphates.** H. L. MARSHALL, K. D. JACOB, and D. S. REYNOLDS (Ind. Eng. Chem., 1932, 24, 86–88).—Analyses of 137 samples of phosphate rock from different parts of the world shows the presence of  $\text{F}$ , the ratio  $\text{F}/\text{P}_2\text{O}_5$  being in most cases higher than that required for fluorapatite. D. K. MOORE.

**Calcium fluoride method for determination of fluoride, with special reference to analysis of nickel-plating solutions.** S. G. CLARKE and W. N. BRADSHAW (Analyst, 1932, 57, 138–144).— $\text{F}$  is most accurately determined as  $\text{CaF}_2$ . It is unnecessary to employ  $\text{CaCO}_3$  or other co-precipitant, but it is essential to use a paper-pulp filter to collect all the  $\text{CaF}_2$ ; the filter is ignited first at 400–600° and finally at 800°. The presence of  $\text{NH}_4\text{Cl}$  is without effect on the pptn. and is necessary to increase the solubility of  $\text{CaSO}_4$ .  $\text{Fe}^{III}$ , if present in small amount, may be pptd. by aq.  $\text{NH}_3$  and filtered, or may be reduced to  $\text{Fe}^{II}$  by  $\text{N}_2\text{H}_4$ .  $\text{HCl}$  in the presence of  $\text{AcOH}$ . As wash liquor 5% aq.  $\text{NH}_4\text{NO}_3$  alone gives high results unless 1% of  $\text{AcOH}$  is added;  $\text{H}_2\text{O}$  alone is used finally.

T. McLACHLAN.

**Determination of iron and manganese in natural carbonates.** S. V. POTANENKO (J. Chem. Ind. Russ., 1931, 8, No. 20, 48–50).—1 g. of substance (dolomite, limestone, magnesite, etc.) is calcined at red heat during 45 min., and the residue is, for determination of  $\text{Fe}$ , dissolved in 100 c.c. of boiling  $\text{H}_2\text{O}$  and 20 c.c. of conc.  $\text{HCl}$ . The vol. is made up to 250 c.c., and  $\text{Fe}$  is determined colorimetrically. For the determination of  $\text{Mn}$ , the calcined residue is dissolved in 50 c.c. of  $\text{H}_2\text{O}$  and 50 c.c. of 50%  $\text{HNO}_3$ , with the addition of  $\text{H}_2\text{O}_2$  in those cases in which the  $\text{Mn}$  content exceeds 0.3%, and 1 g. of  $\text{PbO}_2$  is added to the solution, which is boiled for a further 5 min., after which 50 c.c. of  $\text{H}_2\text{O}$  are added, the solution is cooled and diluted to a known vol., and  $\text{Mn}$  is determined colorimetrically in an aliquot part.

R. TRUSZKOWSKI.

**Preparation of anhydrous magnesium chloride from magnesium oxide and hydrogen chloride.** V. P. ILJINSKI, V. P. LAPIN, and T. V. KOROBOTSKINA (J. Chem. Ind. Russ., 1931, 8, No. 20, 1–5).—The optimal temp. for the prep. of  $\text{MgCl}_2$  from  $\text{MgO}$  and  $\text{HCl}$  is 450°. The reaction proceeds to completion in 1 hr. with  $\text{MgO}$  prepared from  $\text{Mg}(\text{OH})\text{HCO}_3$  or by hydrolysis of  $\text{MgCl}_2$ , whilst with natural  $\text{MgO}$  (magnesite) or  $\text{MgO}$  prepared by hydrolysis of magnesite cement the reaction is considerably slower. It is also retarded by the presence of  $\text{H}_2\text{O}$  in the  $\text{HCl}$  used, according to the equation

$\text{MgCl}_2 + 2\text{H}_2\text{O} \rightleftharpoons \text{Mg}(\text{OH})_2 + 2\text{HCl}$ . Using HCl containing 9.7%  $\text{H}_2\text{O}$ , the product contains 97.6% of  $\text{MgCl}_2$  and 3.12% of  $\text{Mg}(\text{OH})_2$ ; with 18% of  $\text{H}_2\text{O}$ , the product consists of 98.63% of  $\text{MgCl}_2$ , 0.42% of  $\text{Mg}(\text{OH})_2$ , and 0.95% of  $\text{H}_2\text{O}$ ; whilst with 27% of  $\text{H}_2\text{O}$ , 88% of  $\text{MgCl}_2$  and 12% of  $\text{Mg}(\text{OH})_2$  are present. R. TRUSZKOWSKI.

**Determination of ozone in ozonised air.** P. KRAIS and H. MARKERT (Angew. Chem., 1932, 45, 226—227).—The air is passed at a known rate through 0.1% aq. KI and the liberated I is titrated with  $\text{Na}_2\text{S}_2\text{O}_3$  and starch. E. S. HEDGES.

**Gas from coal. S from gas. Natural gases from Apsheron.**—See II. **Alkali-resistant metals.**—See X. **Electrolytic  $\text{H}_2$ .**—See XI. **Granular fertiliser.**—See XVI. **Glycerin of boric acid. Neutral Ca glycerophosphate.**—See XX.

#### PATENTS.

(A) **Production of ferric and chromic chlorides.** (B, c) **Chlorination of ferrochromium.** (A, B) J. K. BERRESFORD, (B) M. C. TAYLOR, and (B, c) F. S. LOW, Assrs. to F. S. LOW and A. W. BERRESFORD (U.S.P. 1,814,360 and 1,814,392—3, 14.7.31. Appl., 7.1.29).—(A) A fused mixture of  $\text{FeCl}_2$  and  $\text{CrCl}_2$  is treated with  $\text{Cl}_2$  at 800—900°, whereby  $\text{FeCl}_2$  is volatilised and a residue of  $\text{CrCl}_3$  obtained. (B) Finely-divided ferrochromium is suspended in a fused mixture of  $\text{FeCl}_2$  and  $\text{CrCl}_2$  at 820° and  $\text{Cl}_2$  is passed into the mixture until the metal is converted into the two lower chlorides; chlorination to the higher chlorides is effected in a separate chamber as in (A). (c) Chlorination of Fe—Cr to  $\text{FeCl}_3$  and  $\text{CrCl}_3$  is effected in a bath of fused  $\text{FeCl}_2$  and  $\text{CrCl}_2$ , using a "regulated current of  $\text{Cl}_2$ ." A. R. POWELL.

**Manufacture of aluminium chloride.** A. McD. MCAFEE, Assr. to GULF REFINING Co. (U.S.P. 1,814,397, 14.7.31. Appl., 1.6.27).—A mixture of finely-ground calcined bauxite and coking coal is briquetted and the briquettes are heated at 700—800° to expel volatile matter. The resulting coke is charged hot into a closed vessel lined with heat-insulating material and subjected therein to a rapid current of  $\text{Cl}_2$  sufficient to maintain the exothermic reaction. The vessel is recharged with coked briquettes when the  $\text{Cl}_2$  in the effluent gases exceeds 1%. A. R. POWELL.

**Making and shaping solid [from liquid] carbon dioxide.** DRY ICE CORP. OF AMERICA, Asses. of R. P. RUST and C. L. JONES (B.P. 368,364, 28.11.30. U.S., 17.12.29).

[Apparatus for] hydrogenations. Automatic control system.—See I.  $\text{NH}_3$  and  $\text{H}_2\text{S}$  from gases.—See II.

#### VIII.—GLASS; CERAMICS.

**Recent developments in optical glass manufacture.** W. M. HAMPTON and W. N. WHEAT (J. Soc. Glass Tech., 1931, 15, 306—320 r).—The introduction of better refractory materials and a knowledge of the extent of volatilisation during founding have enabled Ba crowns with  $n_D = 1.614$  and  $v = 59.8$  to be produced, and this has rendered possible the production of the modern large-aperture lenses. In extreme cases a dense Ba crown glass might take up 5% of its wt. of

pot material during melting. At 1400° in a covered pot the loss of  $\text{PbO}$  is 0.014% of the wt. of glass for each 1%  $\text{PbO}$  present, and of  $\text{K}_2\text{O}$  is 0.12%. Different pot mixtures are desirable to give the max. resistance to corrosion to different types of glasses. Highly acidic glasses such as the ordinary crowns need the  $\text{Al}_2\text{O}_3$ — $5\text{SiO}_2$  type of mixture, whilst highly basic ones, as the dense flints and Ba crowns, need a mixture with 10% less  $\text{SiO}_2$ . The transmissions of the glasses has been improved and the Fe contents reduced (e.g., from 180 pts. of Fe per 10<sup>6</sup> for a "B.S.C." in 1920 to 50 pts. in 1930). Purification of sand by treatment at high temp. with reducing gases and  $\text{Cl}_2$  has reduced the  $\text{Fe}_2\text{O}_3$  content to 0.0025%. For best transmission the use of cullet is not permissible. Resistance to weathering is now tested, not in the autoclave, but by exposing polished surfaces at atm. pressure to 80°, which process gives results in accordance with service. A new "D.B.F." glass ( $n_D$  1.6437,  $v$  48.3) has been developed and an "L.F." ( $n_D$  1.5825,  $v$  39.8), a "D.F." ( $n_D$  1.6218,  $v$  36.0), and an "E.D.F." ( $n_D$  1.6510,  $v$  33.4) have been put on the market in the form of blown sheet glass for the use of opticians. M. PARKIN.

**Recent progress in thermal treatment of glass.** J. T. LITTLETON (J. Soc. Glass Tech., 1931, 15, 262—306 r).—A review of researches published since the paper by Zschimmer (B., 1929, 246). It was established by several workers that repeated remelting was necessary to produce homogeneous glass. To calibrate viscosity apparatus it is suggested that a few carefully-prepared and accurately measured glasses be used as standards instead of org. liquids. Six points, viz., the strain, annealing, warping (upper annealing), and softening points, and the working and melting temperatures are sufficient to define the viscosity region of practical interest. For the  $\text{Na}_2\text{O}$ — $\text{CaO}$ — $\text{SiO}_2$  glasses the max. rate of crystallisation is proportional to the reciprocal of the viscosity. Further work is needed to obtain complete viscosity and thermodynamic data for the ranges of  $\text{Na}_2\text{O}$  (or  $\text{K}_2\text{O}$ )— $\text{CaO}$ — $\text{SiO}_2$  glasses of technical importance, and also for similar glasses with additions up to 5% of  $\text{Al}_2\text{O}_3$ ,  $\text{MgO}$ ,  $\text{B}_2\text{O}_3$ , or  $\text{BaO}$ . Study of crystallisation problems such as the effect of  $\text{SO}_3$  or  $\text{H}_2\text{O}$  content of the glass, or of crystallisation deterrents, on the rate of growth is necessary. The expansion of two glasses, P/122 and 814 H of Turner and Winks (B., 1930, 767), is shown to follow the equation  $dl = \alpha + \beta t^2 + \gamma t^3$ , where  $dl$  is the change in length ( $l$ ) for a change  $t$  in temp. No exact method for computing expansion coeffs. is yet available. M. PARKIN.

**Influence of ferrous oxide content on light transmission of a soda-lime-silica glass.** D. STARKIE and W. E. S. TURNER (J. Soc. Glass Tech., 1931, 15, 365—372 r; cf. B., 1928, 404).—Transmission curves are given for glasses containing 0.005—1.0% of  $\text{FeO}$  added to the parent glass  $\text{SiO}_2$  75,  $\text{CaO}$  10,  $\text{Na}_2\text{O}$  15%, the Fe being added as  $\text{FeC}_2\text{O}_4$  to give most of the Fe in the  $\text{Fe}^{++}$  state. Analysis showed 80—90% to be thus present. The ferrous glass with 0.005% Fe transmitted down to 2550 Å., whilst the previously prepared ferric glass of similar composition transmitted only to 2600 Å. A difference of 90 Å. was observed

for the glasses with 0.5% and of 40 Å. for those with 1.0% FeO. The max. transmission occurred at 4800 Å. as against 5500 Å. in the case of the ferric series. The first glass to show colour contained 0.035% FeO (0.045% for ferric series). Transmission was reduced considerably more at the red end by FeO than by Fe<sub>2</sub>O<sub>3</sub>.

M. PARKIN.

#### Specific volumes of some two-component glasses.

S. C. WATERTON (J. Soc. Glass Tech., 1931, 15, 354—360 T).—The Massen equation employed by Scott (A., 1931, 1122) is applied to the Na<sub>2</sub>O—SiO<sub>2</sub> and the B<sub>2</sub>O<sub>3</sub>—SiO<sub>2</sub> glasses. Evidence of the existence of Na<sub>2</sub>O, 2SiO<sub>2</sub>, Na<sub>2</sub>O, 4SiO<sub>2</sub>, and of B<sub>2</sub>O<sub>3</sub>, SiO<sub>2</sub> was obtained.

M. PARKIN.

**Testing of ampoule glass.** E. UBRIG (Pharm. Ztg., 1932, 77, 227—228).—The glass is pulverised and the particles are graded by sieving. Washing with cold H<sub>2</sub>O removes surface contaminants due to dirt present before blowing. Traces of acid due to HCl-washing and alkali dissolved on autoclaving the glass in presence of H<sub>2</sub>O are subsequently detected by the use of a "universal" indicator.

F. O. HOWITT.

#### Refractories for work at high temperatures.

E. RYSCHKEWITZCH (Chem. and Met. Eng., 1932, 39, 85).—Zr silicate is made mouldable by adding ZrO<sub>2</sub> and SiO<sub>2</sub> and burning the pieces in an oxidising atm. at 1600—1700°. The product can be used up to 1750° and has a low coeff. of expansion. Al<sub>2</sub>O<sub>3</sub> burned at 1700—1950° has considerable strength, is resistant to slag, and has a high electrical resistance. Spinel, MgO, Al<sub>2</sub>O<sub>3</sub>, is gastight when burned in an oxidising atm. at above 1800°. It has an even higher m.p. than Al<sub>2</sub>O<sub>3</sub>, but is less hard. BeO when quite pure has m.p. above 2500°. It is suitable for melting Be and its alloys. Very highly burned ZrO<sub>2</sub> is exceedingly resistant, though slightly affected by C. MgO (m.p. 2800°) is stable in an oxidising atm., but has a high coeff. of expansion. ThO<sub>2</sub> (m.p. 3000°) has similar properties. A surface-combustion furnace consisting of two concentric cylinders with gas and air fed separately to the space between them allows temp. of 1800—2000° to be readily obtained.

C. IRWIN.

**Effect of iron oxide on dead-burning [of magnesite] and on some important properties of magnesite refractories.** O. KRAUSE and W. KSINSIK (Feuerfest, 1932, 8, 6—8, 21—25).—Experiments were carried out on four types of magnesite and one siderite to determine the effect of FeO on the dead-burning process and on the refractoriness at high temp. and the structure of magnesite bricks. Twelve specimens were made from each material and fired at different temp. ranging from 600° to 1700°. The results of porosity, sp. gr., and refractoriness-under-load determinations indicate that the effect of FeO on the dead-burning process is less than that of other foreign oxides such as CaO, Al<sub>2</sub>O<sub>3</sub>, and SiO<sub>2</sub>; on the other hand, there is a certain relation between the FeO content and softening-under-load behaviour. The nature of the kiln atm. has an important influence on the structure of magnesite refractories, but is of secondary importance as regards the dead-burning process.

F. SALT.

**Tower packings. Pachimeter.**—See I.

#### PATENTS.

**Lehrs.** J. E. POLLAK. From HAZEL-ATLAS GLASS Co. (B.P. 367,671, 4.6.31).—The upper and lower runs of the conveyor are supported on the flanges of channel-steel longitudinal members which are supported, through insulating slabs, on transverse beams which are shorter than the width of the brickwork of the furnace.

B. M. VENABLES.

**Tunnel-kiln roofs. Tunnel kilns with multiple conveyor tracks.** F. M. HARTFORD and S. M. KIER (B.P. 367,396—7, 15.9.30).—In (A), the roof is suspended from steel cross-members so that it can be removed bodily and an upper roof is provided, forming an air duct. In (A, B), fuel burners are provided extending through the roof(s) over the longitudinal spaces between the goods. In (B) a longitudinal flue is provided between the carriers for the purpose of admitting cooling air or withdrawing gases.

B. M. VENABLES.

**Manufacture of glassware [e.g., milk bottles of standard weight].** ROCKWARE GLASS SYND., LTD., and T. WARDLEY (B.P. 368,335, 1.12.30).

**Production of patterned glass and apparatus therefor.** PILKINGTON BROTHERS, LTD., and R. K. UTHOFF (B.P. 368,073, 13.3.31).

#### IX.—BUILDING MATERIALS.

**Concrete and ballast therefor.** ANON. (Ingeniörvidensk. Skr., A, No. 29, 1931, 27 pp.).—The characteristic properties of concretes made from normal Portland cement and "Velo" cement mixed with various Danish sands and ballasts are shown in a series of tables and graphs.

A. R. POWELL.

**Cement-water ratio.** G. A. SMITH (Eng. News-Rec., 1932, 108, 298).—The composition of a concrete mixture as well as the quantity of H<sub>2</sub>O are factors of the strength obtained. Richer mixtures were influenced to a greater degree by an increase in H<sub>2</sub>O than leaner mixtures, and higher strengths for a given H<sub>2</sub>O-cement ratio were obtained with the lean mixtures. In cases in which variations in ratios and compositions of the mix are small a straight-line strength graph will give a reasonable idea of the effect of varying the quantity of H<sub>2</sub>O or cement.

C. A. KING.

**Cool-room cement testing.** J. W. POWERS (Eng. News-Rec., 1932, 108, 297).—The temp. of a room constructed of hollow gypsum tiles is maintained at 70° F. ±2° F. by means of cooling coils. The humidity of a small inner compartment is kept almost at saturation point by a H<sub>2</sub>O spray.

C. A. KING.

**Woods used by the ancient Egyptians.** K. P. OAKLEY (Analyst, 1932, 57, 158—159).—Photomicrographs are given of transverse sections of *Ficus sycomorus* (2000 B.C.) and *Cedrus libani*, Barrel (2200—2000 B.C.). More modern woods used were *Tamarix nilotica* (?) (1500 B.C.), *Acacia seyal* or *nilotica* (?) (1st cent. B.C.), *Burus sempervirens*, *Tilia* sp., and *Fagus sylvatica* (all 3rd—4th cent. A.D.).

T. McLACHLAN.

**Change in composition of wood during decay.**  
I. Pinewood. J. KAWAMURA and M. TANIGUCHI.  
II. Decay of [wood of] *Cryptomeria* by dry-rot. J. KAWAMURA and M. SHOJINO (J. Cellulose Inst.,

Tokyo, 1932, 8, 25—26, 27—29).—I. The composition of the wood of *Pinus Thunbergii* impregnated with *Terado* sp. was compared with that of the untreated wood. In general, very little change was observed, the most notable being an increase in the hot-H<sub>2</sub>O extract from 2.5 to 5.2%.

II. The wood of *Cryptomeria japonica* decayed in varying degrees by dry-rot was compared with the unattacked material. The outstanding change in composition was the fall in polysaccharide content. With progressive decay the hot-H<sub>2</sub>O, EtOH-C<sub>6</sub>H<sub>6</sub>, and alkali extracts rose rapidly, whilst the lignin content also showed slight increase.  
V. E. YARSLEY.

**Preservation of wood.** II. C. G. SCHWALBE (*Angew. Chem.*, 1932, 45, 223—226; cf. B., 1927, 189).—Impregnation of fir or pine wood with NaF solution under pressure does not succeed in causing the NaF to reach the core. By soaking the tree trunks in aq. NaF the preservative penetrates to the core and less NaF is required to protect green wood from bacterial decomp. than when it is applied by pressure impregnation. The treatment has a favourable influence on the strength of the wood.  
E. S. HEDGES.

**Preservative treatment of fence posts, with particular reference to Western Australia.** J. E. CUMMINS (*Counc. Sci. Ind. Res.*, Australia, 1932, Pamphlet No. 24, 34 pp.).—Creosote with fuel oils is better for use in wetter localities than are H<sub>2</sub>O-sol. preservatives, which, however, are quite suitable under drier conditions. A mixture of NaF (or ZnCl<sub>2</sub>) and As<sub>2</sub>O<sub>3</sub> when used as a poison for termites gives satisfactory results.  
C. A. KING.

**Sorption and natural penetration of electrolytes into wood.** R. RICHARDSON (*Pulp and Paper Mag.*, 1932, 32, 160—162).—Curves illustrating the diffusion of H<sub>2</sub>O and electrolytes into chips of white spruce (*Picea alba*) of const. wt. but of varying dimensions are given and discussed. Further work is in progress.  
D. K. MOORE.

**Forced penetration of liquids into wood, and its relation to structure, temperature, and pressure.** J. W. SUTHERLAND (*Pulp and Paper Mag.*, 1932, 32, 163—167).—The const. rate of penetration of H<sub>2</sub>O under pressure into seasoned spruce, unseasoned red pine, and unseasoned balsam sapwoods, attained after a time, increases with the pressure differential, decreases with the thickness of the specimen, is greater in the longitudinal than in the transverse direction, and increases with rise of temp. For wood which has been cooked for 1 hr. in H<sub>2</sub>O at temp. above 60° and then cooled the rate of penetration is higher than for the uncooked specimen. N-HCl gave a higher initial but lower const., N-NaOH a lower initial but higher const., rate of penetration than did H<sub>2</sub>O. Wood dried at 60° in vac. gave higher initial and const. rates of penetration than did air-dried wood. Aq. sucrose gave relatively low rates of penetration.  
D. K. MOORE.

**Effect of chemical treatment on permeability of wood.** A. J. STAMM (*Ind. Eng. Chem.*, 1932, 24, 51—53).—Treatment of Coast Douglas fir and Sitka spruce with Cl<sub>2</sub>, in some cases followed by NH<sub>3</sub>, increased their permeability to H<sub>2</sub>O. When Sitka spruce was

subjected to prolonged treatment with Cl<sub>2</sub> followed by NH<sub>3</sub> the permeability was increased to 134 times its original val., but the strength of the wood was almost completely destroyed.  
D. K. MOORE.

**Composition of Philippine woods.** II. Anubing, balakat, malaikmo, balakat-gubat, bolongeta, and santol. F. M. YENKO, L. BAENS, A. P. WEST, and H. M. CURRAN (*Philippine J. Sci.*, 1932, 47, 343—348).

[Cements for] towers. Pachimeter.—See I.

#### PATENTS.

**Baking of sludgy material such as cement.** G. POLYSIUS A.-G. (B.P. 367,505, 30.12.30. Ger., 30.12.29).—The slurry is sprayed on to a number of vertical chains hanging from a rotating frame in the path of the exhaust gases from a cement kiln, into which the fragments of dried material drop directly.  
B. M. VENABLES.

[Weather-proofed] shingles for general building purposes. INTERNAT. COPPERCLAD CO., Assecs. of W. MACI. SHAKESPEARE (B.P. 368,463, 17.1.31. U.S., 18.1.30).

**Priming or coating of timber with creosote, paint, fire-proofing or other liquids.** R. FLETCHER, and HORSLEY, SMITH & CO., LTD. (B.P. 367,778, 17.11.30).

**Grinding cement materials.** Automatic control system.—See I.

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

**Blast-furnace smelting with peat coke at Verkhnje Vuiksunsk plant.** M. A. PAVLOV (Domez, 1930, No. 12, 89—99).—The coke (S 0.22—0.24, ash 8—9.5, H<sub>2</sub>O 4—4.5%) was successfully used in a cylindrical furnace.  
CHEMICAL ABSTRACTS.

**Use of peat coke in blast furnaces.** I. I. GRANIKOV (*Vestn. Metalloprom.*, 1931, 11, No. 1, 105—116).—Peat coke was successfully used for the production of Fe low in S. The S content of the coke was 0.2—0.3% and of the slag 0.05%.  
CHEMICAL ABSTRACTS.

**Substituting anthracite for coke in the cupola furnace.** E. BABICH (Domez, 1930, No. 12, 125—166).—Conditions are specified. The ratio between fuel and cast Fe is approx. the same as when coke is used.  
CHEMICAL ABSTRACTS.

**Practical experience of the Thomas [steel] process** (*Stahl u. Eisen*, 1931, 51, 1561—1569).—Replies obtained to a questionnaire addressed to German steelworks using the Thomas process are summarised and critically reviewed. The points covered include mixer and mixer practice, shape, lining, and operation of the converter, nature of charge and method of charging, the reactions occurring during blowing, quantity and composition of slag, deoxidation process, details of casting, composition and yield of metal. Special attention is given to the factors governing the N content of the finished steel; this is increased by prolongation of the period of blow and by high temp., especially in the dephosphorising period. The most complete deoxidation is obtained by addition of pre-heated Fe-Mn to the converter followed by a smaller proportion of liquid Fe-Mn to the ladle. A. R. POWELL.

**Internal stress produced by heat-treatment of steel.** H. BÜHLER, H. BUCHHOLTZ, and E. H. SCHULZ (Arch. Eisenhüttenw., 1931—2, 5, 413—418).—The magnitude of the internal stress produced by hardening mild steel increases with the diam. of the specimen and with the rate of cooling. Case-hardening produces intense local stresses, complete hardening much smaller stresses. In both cases the internal stress may be removed by appropriate annealing, but if the metal is quenched after this treatment still higher stresses may be produced. When such quenching is unavoidable, the article should be reheated at 480° for 6—10 hr., whereby all stress is removed without affecting the hardness. A. R. POWELL.

**Caustic embrittlement in boilers.** H. E. WALLSOM (Fuel Economist, 1932, 7, 163—166).—The previous stressing of steel is a vital factor in the corrosion and embrittlement of, e.g., boiler plates by H<sub>2</sub>O containing NaOH. The embrittlement may be inhibited by the maintenance of a definite relative concn. of Na<sub>2</sub>SO<sub>4</sub>, the ratio varying with the pressure and temp. As interaction would result in deposits of CaSO<sub>4</sub> it is preferable that other precipitants, e.g., Na<sub>3</sub>PO<sub>4</sub>, should also be added. C. A. KING.

**Loss of carbon from iron and steel when heated in decarburising gases.** A. BRAMLEY and K. F. ALLEN (Engineering, 1932, 133, 92—94, 123—126, 229—231, 305—306).—A systematic study of the effect of decarburising gases on steel showed that both moist H<sub>2</sub> and a 1:1 mixture of CO<sub>2</sub> and CO had more influence than the dry gases, depending up to a limit on the proportion of H<sub>2</sub>O vapour present. The results are discussed in relation to the laws of diffusion. Because of an inflexion in the curves with the CO<sub>2</sub>-CO mixture a 2% C steel was decarburised in this mixture under varying conditions. In the range 950—1100° a more marked inflexion than before was observed, and the character of the metal changed after a certain depth had been reached. The turnings were dull grey, short, and brittle, and at the greatest depths resembled grey cast Fe; analysis indicated that a considerable amount of C had been pptd. as graphite. Micrographic measurement of the depth of graphitisation confirmed the depth at which the inflexion in the curve began. C. A. KING.

**Segregation in steel.** J. H. ANDREW and D. D. HOWAT (J. Roy. Tech. Coll., Glasgow, 1932, 2, 608—612).—From trials on small ingots containing an excess of impurities, no segregation occurred when the ingot was stirred just before solidification. This indicates that differential solidification does not influence segregation, as is usually assumed, but that insol. impurities tend to float upwardly if the molten steel is quiescent. So-called sol. impurities, e.g., P and C, appear to form an insol. complex with S. C. A. KING.

**Segregation in steel ingots.** J. H. ANDREW (J. Roy. Tech. Coll., Glasgow, 1932, 2, 613—620).—A theory of segregation is advanced. It is suggested that both liquid and solid inclusions which are insol. in steel tend to rise to the surface of an ingot entirely by reason of their lower sp. gr. (cf. preceding abstract). C. A. KING.

**Non-metallic inclusions in steel.** J. C. BOOTH (J. Inst. Fuel, 1932, 5, 216).—The origin of oxide and sulphide inclusions and their effects on the physical properties of steel are discussed. C. B. MARSON.

**Physical properties of steel after plastic and yield-point extension.** J. MUIR and co-workers (J. Roy. Tech. Coll., Glasgow, 1932, 2, 571—586).—The considerable difference between the elastic properties of steel stretched by successive yield points or by a single loading suggested a possible wide difference in other physical properties. No appreciable variation in magnetic or thermo-electric properties, or in electric resistance or density, was observed. C. A. KING.

**Welding cast iron with bronze.** A. F. VORONIN (Avtogennoe Delo, 1931, No. 6, 11—12).—Compositions are specified. CHEMICAL ABSTRACTS.

**Effect of chromium on white cast iron.** C. D. FOULKE (Iowa State Coll. J. Sci., 1931, 5, 335—338).—Cr retards the graphitisation of cast Fe at 1700°. Sufficient Si (2.35%) can be added to cast Fe containing up to 0.184% Cr to effect complete graphitisation in 5—10 hr. at 927° followed by 5—10 hr. at 704°. Care must be taken not to add enough Si to cause the separation of primary graphite. CHEMICAL ABSTRACTS.

**Rustless iron alloy.** R. P. DE VRIES (Met. & Alloys, 1932, 3, 49—51).—The alloy described (Nevastain RA) has max. C 0.10%, Cr about 16%, Cu 1%, Mn 0.40%, and max. (P + S) 0.03%. Instructions for hot and cold working, soldering, brazing, welding, riveting, pickling, grinding, and polishing are given. C. W. GIBBY.

**Technically economic methods for flotation of compact intergrown ores.** M. MORTENSON (Tids. Kjemi, 1931, 11, 110—111).—In the case of ores in which the mineral to be extracted occurs finely-divided and intimately mixed with other components, it is better not to crush the ore too finely at the start, but to separate and concentrate the grains of pure mineral by flotation, and then regrind and retreat the compound grains which have been accumulated as an intermediate product. The fact that a certain proportion of the metal in an ore is more easily separated by flotation than the remainder is frequently due to its occurrence in two forms in the ore, e.g., Zn as sphalerite and marmatite. Ores of this type are also advantageously treated by the above method; as flotation agents the higher xanthates of K are suitable, at least for certain Cu-bearing pyritic ores. H. F. HARWOOD.

**Analyses of old bronzes.** J. SEBELIEN (Avh. Norske Vid.-Akad. Oslo, 1931, No. 3, 3—9).—A bronze nail from the gates in the palace of Shalmanesir II contained 81.1% Cu, 11.4% Sn, 0.47% Pb, 0.51% Fe, 0.19% Zn, and 0.12% As. Old Chinese bronzes generally contain a high proportion of Pb with little or no Zn. Knife coins of the Ming series contained 47% Cu, 1.5% Sn, 1% Zn, 43.5% Pb, and 1% As. Analyses of many old Norwegian bronzes gave 3—17% Sn and no evidence was found of a Cu Age preceding the Bronze Age. The compositions of 10 bronze coins of various countries minted between 90 B.C. and 1828 A.D. are tabulated. A. R. POWELL.



**Properties of heat-resistant chromium steel.** M. SCHMIDT and O. JUNGWIRTH (Arch. Eisenhüttenw., 1931—2, 5, 419—426).—The behaviour at high temp. of steels containing 22 and 30% Cr with 0.1—1.7% C has been examined; below 1000° steel with 22% Cr and 0.3—0.55% C shows the highest tenacity in the forged state, but above 1000° all the steels become brittle. Addition of small quantities of W, Mo, V, or Co does not improve the tensile properties at high temp. Cast Cr steels, on the other hand, retain their tenacity above 1000°, and in some cases repeated annealing at 1100° improves the bending strength. Micrographic examination of steel with 22% Cr shows that when the C is low, so that the  $\alpha$ - or  $\delta$ -structure is retained at high temp., coarse grain growth occurs on prolonged heating, whereas with 0.3—0.6% C the austenite formed in the transformation zone tends to restrain grain growth and hence assists in retaining the original tenacity. With  $>0.7\%$  C the strains set up by the hardening effect of rapid cooling induce brittleness and produce a tendency to crack. As cast Cr steels tend to scale more readily than similar steels after forging, it is recommended to use steel with 22% Cr for forged articles and with 30% Cr for cast articles for high-temp. work. A. R. POWELL.

**Roasting of zinc ores. II. Sulphatising actions and the effects of impurities.** Y. OGAWA (Tech. Rep. Tôhoku, 1931, 10, 27—56; cf. B., 1930, 866).—The formation of  $ZnSO_4$  in roasting native ZnS is shown to proceed chiefly through the three stages  $2ZnS + 3O_2 = 2ZnO + 2SO_2$ ,  $2SO_2 + O_2 = 2SO_3$ , and  $2ZnO + 2SO_3 = 2ZnSO_4$ ; it is therefore favoured by the presence of catalysts which promote the formation of  $SO_3$ . It follows, therefore, that pyrites, and more particularly Cu pyrites, in admixture with the ZnS favours increased yield of  $ZnSO_4$ , especially as Fe and Cu sulphates are readily decomposed by ZnO. A. R. POWELL.

**Metals that resist alkali corrosion.** J. L. EVERHART (Chem. and Met. Eng., 1932, 39, 88).—The degree of resistance of various structural metals to the different liquors handled in the ammonia-soda process is tabulated. Electrolytic caustic liquor carries entrained NaCl and is erosive. Ni alloys give best resistance in this case, but cast Fe when practicable is probably economical. The only alloy found to give good resistance to  $NH_4Cl$  had the composition 25% Cr, 35% Ni, 5% Mo, 35% Fe. It is obtainable only as castings. C. IRWIN.

**Ageing and tempering of duralumin.** R. HAY (J. Roy. Tech. Coll., Glasgow, 1932, 2, 601—608).—The progress of age-hardening was studied by means of variation in hardness and resistivity. At room temp. a gradual but uniform increase in hardness occurs which is accelerated at 30°, and still more so at 70° and 100°, though at 100° the final val. was lower than the val. at lower temp. The change can be explained by the deposition of the particles of the separating phase in a highly disperse state, though an actual pptn. may not necessarily occur. Changes at higher temp. involve the assumption of coalescence and the pptn. of the conc. phase at the grain boundaries. The latter occurs in a series of steps rapidly reaching equilibrium for each

temp. of tempering. During the first stage of tempering from 20° to 250° the separating phase is  $Mg_2Si$  and the rate is much greater than in the later stage in which  $CuAl_2$  separates. The equations of the tempering curves of duralumin and of steel are identical.

C. A. KING.

**Measuring the mechanical properties of metals.** L. H. HOUNSFIELD (S.C.I. Chem. Eng. Group, Feb., 1932, 16 pp.).—Attempts to work an automatic miniature tensile machine having a magnifying lever mechanism failed owing to the damage to the levers when the specimen broke, and a machine was designed with autographic recording on a Hg column. The force acting through the test-piece is transmitted to the centre of a spring beam and the deflection is measured by the spring acting on a piston in a cylinder of Hg which displaces Hg into a calibrated glass tube. When the specimen breaks, the shock is received by rubber buffers, but the Hg column is usually broken. The usual properties of metals with the exception of the modulus of elasticity may be deduced from the graphs obtained.

C. A. KING.

**Magnetostriction of cold-drawn wire.** J. S. RANKIN (J. Roy. Tech. Coll., Glasgow, 1932, 2, 587—589; cf. A., 1931, 416).—As a  $\frac{1}{4}$ -in. diam. wire was cold-drawn in successive stages to  $\frac{1}{8}$ -in. diam. the magnetostriction showed a continuous decrease. C. A. KING.

**Protection of light alloys against corrosion.** M. PUBELLIER (Rev. Aluminium, 1931, 8, 1601—1608).—The mechanism of the corrosion of Al alloys in salt  $H_2O$  is discussed and methods for their protection (coating with pure Al, plating with Zn and Cd, anodic oxidation, and painting) are described.

A. R. POWELL.

**Deposition of brass from thiocyanate solutions.** N. THON and J. PINILLA (J. Chim. phys., 1931, 28, 651—652).—Yellow deposits of brass may be obtained by electrolysis with a c.d. of 0.3 milliamp. per sq. cm. a solution containing (in g.-mol. per litre)  $Zn(CNS)_2$  1.5, KCNS 6.0, and  $CuCNS$  0.003—0.01. An excess of  $CuCNS$  gives a red deposit. If a brass anode is used it is unnecessary to add  $CuCNS$  to the electrolyte. A sample of the yellow brass contained Cu 57 and Zn 43%. E. S. HEDGES.

**Electrolytic extraction of magnesium from carnallite.** I. G. STSCHERBAKOV, S. V. KARPACHEV, O. I. POLTORATSKAYA, M. A. UMOVA, and G. I. SMIRNOV (J. Chem. Ind., Russia, 1930, 7, No. 31—33, 1900—1904).—Even when the  $MgCl_2$  in the bath ( $MgCl_2$ , NaCl, and KCl) is  $<0.5\%$  Na does not enter the Mg, which contains an appreciable quantity of K when the  $MgCl_2$  is decreased to 20%. At an average cathode c.d. of 20—40 amp. per sq. cm., the  $MgCl_2$  content can be lowered from 53 to 12% without introducing  $>0.1\%$  of K into the metal; addition of NaCl is important.

CHEMICAL ABSTRACTS.

**Potassium flux in electric welding.** P. N. ESMONT (Avtogennoe Delo, 1931, No. 9, 16—17).—K compounds are used; Na salts are avoided because they are occluded and cause brittleness and flows. The flux should have a coeff. of expansion different from that of the metal. CHEMICAL ABSTRACTS.

**Analysis of roaster gases. Mechanical handling of materials. Use of the W-Mo thermocouple.**—See I. F' in Ni-plating solutions.—See VII. **Refractories.**—See VIII. **Steel electric furnaces.**—See XI.

## PATENTS.

**Manufacture of pure iron.** J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 366,635, 27.11.30. Addn. to B.P. 269,345 and 318,499, B., 1927, 682; 1929, 923).—C-containing Fe powder obtained by decomp. of  $\text{Fe}(\text{CO})_5$  is partly oxidised with steam at 120—140° and the product is mixed with unoxidised powder in such ratio that on heating the mixture at 600—1200° in vac. a sintered mass of pure Fe is produced. A. R. POWELL.

**Manufacture of iron and steel.** J. A. CARSON, Assr. to UTAH METALS FLUX CO. (U.S.P. 1,813,437, 7.7.31. Appl., 4.3.30).—The metal obtained by heating 40 pts. of 50%  $\text{Fe}_2\text{O}_3$  ore with 6 pts. of a Utah shale to 1650° for 3 hr. is claimed. A. R. POWELL.

**Production of [steel] articles with a high notched-bar tenacity and resistance to scaling.** H. J. SCHIFFLER (B.P. 367,377, 13.8.30. Ger., 13.4.29).—Seamless tubes which are resistant to scaling and can be rolled at high temp. are made from a ferritic-pearlitic non-nitrogenised steel containing < 5% Cr, 0.8—2.5 (0.8—1.2)% Si, and 0.5—0.9% Al, with  $\geq$  1% Mn, and optionally with  $\geq$  1% Mo, V, or Ti and/or  $\geq$  0.9% W. A. R. POWELL.

**Heating steel for hardening.** M. WINTER, Assr. to SENTRY CO. (U.S.P. 1,812,837, 30.6.31. Appl., 16.5.30).—The steel is heated in a container made of compressed blocks of 10—30% graphite and 90—70% hard C surrounded by refractory material to prevent too rapid burning away of the external walls. A. R. POWELL.

**Case-hardening [of steel with ammonia].** R. J. COWAN and P. W. MCCOY, Assrs. to SURFACE COMBUSTION CORP. (U.S.P. 1,813,028, 7.7.31. Appl., 8.3.30).—The articles are passed continuously through a chamber heated at about 550° while a slow current of  $\text{NH}_3$  is passed in the same direction through the chamber. A. R. POWELL.

**Hardening of steel and alloy steels.** POMOSIN-WERKE G.M.B.H. (B.P. 367,630, 24.4.31. Ger., 2.5.30).—The steel is quenched in a solution of pectin or similar plant colloid. A. R. POWELL.

**[Case-]hardening of alloys of iron, steel, and cast iron by nitrogenising.** F. KRUPP A.-G. (B.P. 366,838, 27.5.31. Ger., 2.6.30).—The steel is coated with a thin film of  $\text{CaF}_2$ ,  $\text{CaCl}_2$ ,  $\text{NH}_4\text{Cl}$ , or  $\text{Ca}(\text{OCl})_2$  and heated in  $\text{NH}_3$  at 500° for 48 hr. A. R. POWELL.

**Manufacture of stainless iron.** A. L. FELD, Assr. to REPUBLIC STEEL CORP. (U.S.P. 1,812,941, 7.7.31. Appl., 18.12.26. Renewed 14.1.31).—A bath of molten Fe containing C is heated with  $\text{Fe}_2\text{O}_3$  sufficient to remove all the C, a high-C ferrochromium is added together with more  $\text{Fe}_2\text{O}_3$ , and the temp. is maintained at 1800° until the C content of the bath falls to 0.12%. Cr is then reduced from the slag by adding ferrosilicon and CaO sufficient to free the slag from Fe and Cr. A. R. POWELL.

**Tough stable surface [nickel-chromium] alloy steel.** F. B. DEHN. From STOODY CO. (B.P. 367,347,

12.11.30).—Rust-resisting steel for cutlery etc. comprises an alloy of Fe with 1—4 (2)% C, 25—35 (31.75)% Cr, 5—15 (10)% Ni, and 3.5—8 (4.75)% Si. When used as a welding rod the preferred C content is increased to 3.5—4%.

A. R. POWELL.

**Corrosion-resistant [chromium-iron] alloys.** ELECTRO METALLURG. CO., Asses. of F. M. BECKET (B.P. 366,511, 5.9.30. U.S., 29.4.30).—Alloys of Fe with 16—22% Cr, 6—16% Mn, 1.5—14% Co, and  $\geq$  0.3% C are claimed. The alloy with 18% Cr, 8% Mn, 5% Co, and 0.12% C has good deep-drawing properties and may be readily drawn into tubes which are suitable for use in oil-cracking apparatus. A. R. POWELL.

**Cold-drawing of metal [non-rusting steel].** J. J. V. ARMSTRONG. From ELECTRO METALLURG. CO. (B.P. 367,198, 6.3.31).—After every annealing operation during the drawing of Ni-Cr steel wire the wire is descaled, dried, and painted with a suspension of finely-divided Al in amyl acetate containing a small proportion of a cellulose ester, which is allowed to dry before the wire is drawn further. A. R. POWELL.

**Magnetic [nickel-iron] alloy in particular for compressed iron powder cores.** SIEMENS & HALSKE A.-G. (B.P. 367,452, 22.11.30. Ger., 23.11.29).—Molten Fe-Ni alloys are mixed with 0.1—5 (1)% of a metal which is insol. in the alloy, e.g., Pb, Tl, Bi, or Ag, and, if desired, with Si or Al for increasing the sp. resistance, and/or with Sb or S for increasing the brittleness, and the resulting castings are broken up and ground to a fine powder for the manufacture of dust cores. A. R. POWELL.

**[Reagents for] froth flotation [of minerals].** O. D. CUNNINGHAM, Assr. to P. C. REILLY (U.S.P. 1,813,342—3, 7.7.31. Appl., [A] 10.9.28, [B] 7.11.29. Renewed [A, B] 19.2.31).—(A) The reaction product of a hydrogenated hydroxy-aromatic derivative, e.g., cresol, an alkali hydroxide, e.g., NaOH, and  $\text{CS}_2$  is claimed as a combined frother and collector. (B) Compounds ("org. phosphites") of the type  $\text{P}(\text{OR})_3$  are claimed in which R is aryl, aralkyl, or an alkyl group below  $\text{C}_5$ . A. R. POWELL.

**[Reagents for] ore flotation.** I. H. DERBY and O. D. CUNNINGHAM, Assrs. to P. C. REILLY (U.S.P. 1,813,345—6, 7.7.31. Appl., [A] 17.9.30, [B] 16.12.30).—(A) The reaction product of  $\text{P}_2\text{S}_5$  with a crude coal-tar pyridine base in the presence of EtOH or PhOH is claimed. (B) The reagent is made by heating  $\text{P}_2\text{S}_3$  or  $\text{P}_2\text{S}_5$  with an aliphatic or aromatic nitrite. A. R. POWELL.

**Casting of metals [copper] and alloys therefor.** W. C. SMITH, Assr. to ALLIED PROCESS CORP. (U.S.P. 1,812,992, 7.7.31. Appl., 12.10.27).—To obtain sound castings of Cu the metal is treated, at 1100—1250° just prior to pouring, with 0.00018—0.04% Li in the form of a 6% Li-Cu alloy. A. R. POWELL.

**Separating and recovering metals [from scrap bronze or brass].** M. and H. LISSAUER and B. GRIESMANN (M. LISSAUER & CIE.) (B.P. 366,628, 20.11.30. Ger., 19.12.29).—The molten scrap is blown in a reverberatory or tilting furnace or in a converter with a reducing gas, e.g., coal gas or  $\text{H}_2$ , while a reducing atm. is maintained above the charge until all the Zn has

been volatilised. Cu or Fe pyrites or other material containing S is then added and blowing continued with the reducing gas, but with an oxidising atm. above the surface of the charge, until all the Sb, Pb, and Sn have been removed, leaving a bath of almost pure Cu.

A. R. POWELL.

**Recovery of tin from stanniferous materials low in gangue.** "BERZELIUS" METALLHÜTTEN GES.M.B.H. (B.P. 367,611, 31.3.31. Ger., 2.4.30).—Ores or metallurgical products containing little gangue and a high content of SnO<sub>2</sub> with some ZnO are mixed with carbonaceous materials and Na<sub>2</sub>CO<sub>3</sub> or similar flux and the mixture is distilled in Zn retorts to recover the Zn. The retort residues contain all the Sn in the form of prills which are separated by grinding and washing, and then melted by immersion in a bath of molten Sn.

A. R. POWELL.

**Separating non-ferrous metals from molten metalliferous materials [e.g., slags].** M. and H. LISSAUER and B. GRIESMANN (M. LISSAUER & CRE.) (B.P. 366,168, 12.11.30. Ger., 27.12.29).—Slags containing Cu, Pb, Sn, or Sb are melted either alone or with admixture of flue dust, poor ore, or the like, and coal gas or H<sub>2</sub> is blown through the molten mass while the atm. in the furnace is maintained neutral or reducing. When most of the Cu, Pb, Sn, and Sb has separated as a regulus, air is blown through the slag and S added to assist in volatilising the remainder of the valuable metals.

A. R. POWELL.

**Lead alloy [of high tensile strength].** R. J. SHOEMAKER, Assr. to S. & T. METAL CO. (U.S.P. 1,813,324, 7.7.31. Appl., 28.11.28).—The alloy comprises Pb with 0.1—0.4 (0.2)% Ca, 0.5—2 (1)% Sn, and 0.1—1 (0.1)% Hg or 0.02—0.1 (0.05)% Al. A. R. POWELL.

**Manufacture of aluminium.** R. G. DEL RIO (B.P. 365,199, 21.10.30).—China clay (60 pts.) is heated at 800—900° with NaCl (10 pts.), K<sub>4</sub>Fe(CN)<sub>6</sub> (1 pt.), and conc. HCl (0.5 pt.) in an Fe crucible in a reducing atm.

A. R. POWELL.

**Treating [degassing] aluminium and its alloys.** W. ROSENHAIN and J. D. GROGAN (B.P. 366,545, 8.9.30).—A stream of N<sub>2</sub>, A, He, or hydrocarbon gases containing the vapour of SiCl<sub>4</sub>, CCl<sub>4</sub>, TiCl<sub>4</sub>, or AlCl<sub>3</sub> is passed through the molten metal. A. R. POWELL.

**Casting of [aluminium] ingots.** VEREIN. ALUMINIUM-WERKE A.-G., and E. ROTH (B.P. 367,615, 8.4.31).—The metal is cast into preheated Fe moulds lined with a thick layer of insulating material, a water-cooled Cu cover is placed on the mould, and the whole inverted so that heat is removed from the molten metal only through the Cu cover and the metal solidifies suddenly and in one direction only. A. R. POWELL.

**Improving the internal structure of metals [e.g., aluminium] and alloys.** W. SMITH, and CALORIZING CORP. OF GT. BRITAIN, LTD. (B.P. 367,081, 10.12.30).—A d.c. of such low heating val. that it does not materially retard the rate of cooling is passed through the metal during the time it is solidifying in the mould. For Al a current of 0.5 amp. per sq. cm. is used.

A. R. POWELL.

**Aluminium[—silicon] alloys.** A. E. E. JONES and A. H. HOBBS (B.P. 366,720, 5.2.31).—An alloy con-

taining 83.5% Al, 15% Si, 0.75% Cu, 0.5% Sn, and 0.25% Cr is claimed. The molten alloy is treated with a small quantity of ZnCl<sub>2</sub> and a little Na just prior to casting.

A. R. POWELL.

**Aluminium—silicon alloys.** ALUMINIUM, LTD., Asses. of T. D. STAY (B.P. 366,654, 12.12.30. Appl., 30.1.30).—Alloys of Al with 3—15% Si and 0.1—0.5% Ti are claimed. The structure of the castings may be modified in the usual way by addition of small quantities of Na or K to the alloy just prior to pouring.

A. R. POWELL.

**Aluminium[—lead—magnesium] alloys.** Soc. DES BREVETS BERTHELEMY DE MONTBY (B.P. 366,483, 28.10.30. Fr., 29.10.29).—An alloy of Al with 0.8—1% Mg and 2% Pb is claimed. The Mg and Pb are added to the Al as a Mg—Pb alloy.

A. R. POWELL.

**Accelerating the reaction in aluminothermic processes especially in their application to welding.** T. GOLDSCHMIDT A.-G. (B.P. 367,361, 17.11.30. Ger., 16.11.29).—Small quantities of Ca, Mg, Na, or other metal having a greater affinity for O<sub>2</sub> than Al are added to the aluminothermic mixture preferably in the form of an alloy with Al.

A. R. POWELL.

**Electrolytes and amalgamating baths for production of metallic coatings.** I. G. FARBENIND. A.-G. (B.P. 366,813, 24.4.31. Ger., 24.4.30).—Plating baths for the deposition of bright deposits of Ag, Ni, Zn, or Pb comprise a solution of a sol. salt of the metal, e.g., nitrate, sulphate, or acetate, containing 2—4% of CS(NH<sub>2</sub>)<sub>2</sub>. For quickening a metal surface prior to plating, a solution containing 1% of CS(NH<sub>2</sub>)<sub>2</sub> and 0.5% of HgCl<sub>2</sub> is used.

A. R. POWELL.

**Coating of materials [with metals by cathodic disintegration].** M. KNOLL (B.P. 367,074, 4.12.30).—Uniform coatings of metal by the cathode sputtering process can be produced on paper, celluloid, cellophane, or textile materials which evolve large quantities of gas in a high vac., by passing H<sub>2</sub> or N<sub>2</sub> at, e.g., 10 litres per sec. at 0.01 mm. pressure through the chamber during the cathodic treatment.

A. R. POWELL.

**Facing compositions for metal-casting sand moulds.** B. F. WALLACE (B.P. 367,042, 18.11.30).—A dry powder comprising a mixture of finely-divided graphite coated with dextrin and 10—40% of a colloidal clay, e.g., bentonite, is claimed.

A. R. POWELL.

**Lining and coating of metal pipes, receptacles, etc. with a bituminous, tarry, or other rust-preventing composition.** W. KUNST (B.P. 367,387, 13.11.30. Ger., 4.1.30).

**Heat-treating furnace. Roasting of ores etc. [Apparatus for] hydrogenations. Cleaning gases.**—See I. Metallurgical coke.—See II.

## XI.—ELECTROTECHNICS.

**Application of Soderberg electrodes to steel electric furnaces.** B. S. BARAKI and S. N. LEVANDOVSKI (Domez, 1930, No. 8—9, 65—119).—Soderberg pressed, self-baking electrodes can be employed; material containing 75—80% C was satisfactory.

CHEMICAL ABSTRACTS.

Metal electrodes for arc welding. G. MAGNITZKI (Avtogennoe Delo, 1931, No. 5, 3—4).—Compositions of electrodes for various purposes are specified.

## CHEMICAL ABSTRACTS.

Electrolytic hydrogen with the Pechkranz electrolyser. R. T. ELWORTHY (Chem. and Met. Eng., 1931, 38, 714—715).—The Pechkranz electrolyser consists of up to 150 cells, requiring 2—2.5 volts per cell, with circular sheet-Fe electrodes 6 ft. in diam. Ni-plated on the anode side, with a Ni sheet perforated with 5000—6000 holes (diam. < 0.004 in.) per sq. in. as diaphragm. The several electrodes and diaphragms are bolted up tightly between two cast-Fe end-plates which form end electrodes. Channels along the length of the battery carry the H<sub>2</sub> and O<sub>2</sub> to their respective reservoirs each consisting of a gas separator, gas washer, and electrolyte cooler. The electrolyte is 25% aq. KOH operated at 80°. Leakage of electrolyte is prevented by using as packing between the electrodes and diaphragms a plaited mineral fibre impregnated with a special unsaponifiable hydrocarbon. The make-up H<sub>2</sub>O required is 5—7.5 gals. per 1000 cu. ft. of H<sub>2</sub>. The purity of the H<sub>2</sub> is 99.5—99.9% and of the O<sub>2</sub> 98.5—99.0%. A battery of 140 cells absorbs 875 kw. and yields 5500 cu. ft. H<sub>2</sub> at 20°/760 mm. Where power is dear a battery requiring 127—140 kw. per 1000 cu. ft. of H<sub>2</sub> should be used, and where cheap one requiring 150—170 kw.

D. K. MOORE.

Structure and electrical properties of insulating materials. J. W. WILLIAMS (J. Physical Chem., 1932, 36, 437—443).—A review. M. DOLE (c).

Remote control of boilers.—See I. Desulphurising gas.—See II. Ni-plating solutions.—See VII. Refractories.—See VIII. Mg. Protecting Al. Electro-brass. Welding.—See X.

## PATENTS.

Gas-exchange system [for immersion transformers]. O. H. ESCHHOLZ, Assr. to WESTINGHOUSE ELECTRIC & MANUFACTURING CO. (U.S.P. 1,811,462, 23.6.31. Appl., 6.8.27).—In an oil-filled transformer, the absorption of O<sub>2</sub> from the air enclosed is promoted by heating a localised portion of the oil to a higher temp. than that produced by the heat from the transformer.

B. M. VENABLES.

[Wedge cell container for] electrolytic cells. ELEKTRIZITÄTS A.-G. VORM. SCHÜCKERT & CO. (B.P. 368,514, 2.3.31. Ger., 1.3.30. Addn. to B.P. 350,639).

[Sealing of] electric dry cells. C. P. DEIBEL (B.P. 367,914, 29.11.30. U.S., 15.3.30).

[Wrapping for cores of] electric dry-battery cells. H. A. BUMKE GES.M.B.H. (B.P. 368,534, 20.3.31. Ger., 26.1.31).

[Cover for] electric accumulators. BRITANNIA BATTERIES, LTD. (B.P. 368,438, 24.12.30. Ger., 24.12.29).

Electrical glow-discharge devices [for sound-recording purposes, television systems, etc.]. ELECTRICAL RESEARCH PRODUCTS, INC., Asses. of H. W. WEINHART (B.P. 367,891, 27.11.30. U.S., 31.12.29).

Electric insulators. INTERNAT. GEN. ELECTRIC CO., INC., Asses. of ALLGEM. ELEKTRIZITÄTS-GES. (B.P. 368,072, 11.3.31. Ger., 11.3.30).

Cooling of heat-treatment chambers. Automatic control system.—See I. Magnetic Ni-Fe. Improving Al etc. Coating of materials with metals. Metallic coatings.—See X. Drying varnished surfaces.—See XIII. Alkaloids.—See XX. Purifying water or sewage.—See XXIII.

## XII.—FATS; OILS; WAXES.

Preparation of cheap toilet soaps. R. KRINGS (Allgem. Oel- u. Fett-Ztg., 1932, 29, 72—74).—Satisfactory soaps can be made by the cheap cold process if good-quality (refined) fats are used; the stability may be increased by use of anti-oxidants (cf. B., 1932, 312).

E. LEWKOWITSCH.

Purification of aqueous glycerin liquors. E. SCHLENKER (Chem. Umschau, 1932, 39, 28—30).—A rational procedure for refining the glycerin waters from fat-splitting liquors or soap lyes is outlined.

E. LEWKOWITSCH.

Malayan palm kernels. C. D. V. GEORGI (Malay. Agric. J., 1932, 20, 53—60).—The oil content of Malayan kernels is slightly above the African average, and the free acidity of the oil somewhat lower. The colour of the testa can be correlated with the temp. employed for sterilisation of the fruit and for drying the kernels, but under the best conditions tends to be rather darker than that of W. African kernels. The flesh of the nuts tends also to be discoloured owing to the high temp. (140—150°) used in sterilising; low-temp. steaming of the fruit yields white fleshed kernels, but is probably not practicable under current conditions.

E. LEWKOWITSCH.

Bleaching of palm oil. F. GUICHARD and C. AUBERT (Bull. Mat. Grasses, 1931, 15, 370—377. From Bull. de la Chambre de Commerce de Douala, Sept., 1931).—Fresh palm oil is blown with air at 110—115° until it assumes a dirty green colour; on filtering off the brownish insol. pigment formed (apparently not xanthophyll) a clear lemon-yellow oil is obtained which sets to a pale fat of good flavour. The rate of decolorisation is independent of the intensity of the original red colour, but depends on the free acidity of the oil (optimum at 16.1% free fatty acids). Similarly, if the colouring matter is separated from the oil and dissolved in vaseline oil, oxidative bleaching can be effected only if fatty acids (oleic or stearic) are present. For bleaching purposes the heated crude oil is poured repeatedly through coarse cloth strainers to subdivide the oil; this produces a pale dry oil suitable for fish-canning or white soap manufacture.

E. LEWKOWITSCH.

Vegetable oils of the Union of S.S.R. IX. Oils from the genus *Paeonia*. S. L. IVANOV and A. F. JICHAREVA (Chem. Umschau, 1932, 39, 33—36; cf. B., 1929, 825).—Seeds of *Paeonia* (5 sp.) yielded 20—40% of soft brown fats (oils in the case of *P. albiflora* and *P. peregrina*); a crude solid brown pigment (contaminated with solid fatty matter) could be removed from the fresh seeds, or the crude Et<sub>2</sub>O extract, by extraction with 95% EtOH, and thus pale oils were obtained having sap. vals. 188—196, I vals. 135—157, and giving positive hexabromide tests (except with *P. albiflora*, I. val. 107). Oil from *P. anomala* contained

7–8% of unsaponifiable matter and about 2.2% of saturated acids. (Cf. B., 1932, 30.) E. LEWKOWITSCH.

**Hydnocarpus oils in Malaya.** C. D. V. GEORGI, T. A. BUCKLEY, and G. L. TEIK (Dept. Agric. Straits Settlements and Federated Malay States, 1932, No. 9, 18 pp.).—Oil (18%) expressed from seeds of *H. anthelmintica*, Pierre, had characteristics closely similar to those previously recorded (B., 1929, 784). The Et esters, prepared directly from the oil, on fractional distillation yielded approx. 62% of hydnocarpic and 29% of chaulmoogric esters; the former were contaminated with appreciable amounts of a saturated acid (probably palmitic) and the latter with small quantities of a more unsaturated acid. The oil appears to contain also non-glyceride substances (? carbohydrates). Seeds of *H. Wightiana*, Blume, yielded 41% of oil having  $d_{20}^{25}$  0.9534,  $n_D^{27}$  1.4770, sap. val. 202.1, I val. (Wijs) 99.9, acid val. 0.1,  $[\alpha]_D^{25}$  +58.5°, titer 40.5°. The hydnocarpic ester (about 63%) was purer and did not contain a lower homologue or palmitic acid, but the chaulmoogric fractions (37%) retained an ester of an optically inactive acid of high b.p. Mixtures of hydnocarpic and chaulmoogric acids cannot be resolved satisfactorily by recrystallisation. E. LEWKOWITSCH.

**Drying process of linseed oil. Abnormal drying.** P. SLANSKY (Kolloid-Beih., 1932, 35, 49–88).—When linseed oil, containing Co oleate or other catalyst commonly used in paint, dries in an evacuated desiccator to which air has very slow access, the increase of wt. is only 6–7% instead of the usual 12%. The same abnormal drying is observed in an indifferent gas containing O<sub>2</sub> at a low partial pressure and is due to an increased concn. of the disperse phase caused by the breaking of the double linkings of the unsaturated triglycerides. This change can be followed by a comparison of the I val.–wt. increment curves for normal and abnormal drying. Only small amounts of volatile substances are formed during the first stages of drying. It is probable that the drying of the interior of a thick layer of paint follows the abnormal course. The relation between the abnormal drying of linseed oil and the drying of wood oil is indicated. E. S. HEDGES.

**Synthetic substitute for thickened cedar-wood oil.** B. A. BRODSKI (Pharm. Ztg., 1932, 77, 243–244).—A brownish-yellow immersion oil ( $d_{20}^{20}$  1.066,  $n_D^{20}$  1.517–1.519) which can substitute cedar-wood oil is made by adding 25 pts. of C<sub>10</sub>H<sub>7</sub>Br to 75 pts. of polymerised castor oil which has been preheated with 10–15% of rosin. S. MARKS.

**Determination of oil and fat-soluble vitamins in cod-liver oil emulsions.** ANON. (Pharm. Ztg., 1932, 77, 227).—Biological assays show that whilst vitamin-D is unchanged, -A is partly destroyed by emulsification. Emulsification in an atm. of CO<sub>2</sub> does not entirely obviate this loss. The use of gum arabic introduces peroxidase, which is inactivated only by prolonged heating at 100°. Essential oils used in such emulsions should be freshly distilled in order to avoid oxidation by peroxides. (Cf. B., 1932, 152.) F. O. HOWITT.

**Examination of oils by the iodine value of the solid fatty acids separated by the Twitchell method.** S. C. L. GERRITZEN and M. KAUFFMAN (Chem.

Weekblad, 1932, 29, 136–137).—This val. is characteristic for oils, being high for rape-seed oil; when the val. is < 65, the rape-seed oil is adulterated. An oil, other than hazel-nut oil, which yields acids of I val. > 6 has been admixed with rape-seed oil. S. I. LEVY.

**West African oil palm and the production of palm oil.** (MISS) E. E. JONES (Chem. & Ind., 1932, 269–271).

**Pachimeter.**—See I. Lubricating greases.—See II. Oil in flax seed and soya beans. Fat in fodder.—See XIX.

#### PATENTS.

**Rendering of fats.** W. T. BIRDSALL, Assr. to B.B. MACHINE CORP. (U.S.P. 1,813,226, 7.7.31. Appl., 20.11.24).—Apparatus suitable for very small or large units is described, whereby the chopped fat is passed (1–2 min.) through a narrow annular space (e.g.,  $\frac{1}{8}$  in.) between a heated surface and a rotor grooved with a non-positive screw-thread, revolving so as to provide a feed with slipping abrasive action. Hoppers, filters, etc. are fitted. E. LEWKOWITSCH.

**Making [bleached] soap.** J. E. RUTZLER, JUN. (U.S.P. 1,813,512, 7.7.31. Appl., 28.9.28).—White soaps are prepared directly by treating dark, low-grade soap stocks with H<sub>2</sub>O<sub>2</sub> in excess of alkaline solution under saponifying conditions (e.g., cold or boiling process). The soap formed is dissolved in alkaline H<sub>2</sub>O and salted out as usual. E. LEWKOWITSCH.

**Manufacture of olive oil.** E. T. MEAKIN (U.S.P. 1,814,005, 14.7.31. Appl., 14.12.25).—Olives are disintegrated in a press, yielding a solid residue of pits and skins and an emulsion of H<sub>2</sub>O, colloidal solids, and oil which is separated by centrifuging etc. The olives may advantageously be partly dehydrated under vac. before expression. E. LEWKOWITSCH.

**Antioxidant for soap.**—See II. Alcohols from waxes.—See III.

#### XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

**Opacity of white paints.** A. V. BLOM (Farben-Ztg., 1932, 37, 839–841).—Existing methods for determining relative opacities are summarised and typical results quoted. A new method is described in which a known wt. of paint at a standard brushing consistency is brushed out over a given area of a contrasted black and white undercoat showing a difference in brightness of at least 80%. The relative brightness of the paint under test is measured over each section by means of a Pulfrich photometer, using a BaSO<sub>4</sub> standard. "Opacity" is expressed as 100 × brightness over black/brightness over white, and "contrast" as difference in brightness over white and black. Vals. for typical pigments and applications of the method, e.g., increase in opacity due to an additional coat of enamel, change in opacity on adding ZnO to white lead, etc., are given. S. S. WOOLF.

**Light-resistance of lithopone.** M. REICHERT (Farbe u. Lack, 1932, 132–133).—Recommendations made by Schultz and Tichonov (B., 1931, 983) are discussed. Too much attention has been paid to the pigment, the effect of linseed oil in producing yellowing,

when the paint film is left in the dark, being neglected. Chlorides and sol. Zn compounds do not render lithopone more sensitive to light. Ultra-violet light produces free Zn and S. The original colour is restored by oxidation, but if metals, *e.g.*, as driers, are present, sulphides are formed which are not oxidised and discoloration persists.

S. MARKS.

**Permanence of artists' materials.** N. HEATON (*J. Soc. Arts*, 1932, 80, 411—435).—A general account is given of the historical development of artists' pigments, vehicles, varnishes, and painting grounds and of the factors which affect their durability. Inorg. materials are more durable than org.; hence a technique for the application of Si ester paints is desirable. S. MARKS.

**Fractionation of American gum spirits of turpentine and evaluation of its pinene content by optical means.** S. PALKIN (*U.S. Dept. Agric., Tech. Bull. No. 276*, Jan., 1932, 13 pp.).—Apparatus found satisfactory for fractional distillation *in vacuo*, comprising a gauze-plate bubbling column with electrically-heated jacket, pressure regulator, dephlegmating condenser, etc., is described and illustrated. Details of procedure and data of optical rotation, dispersion,  $n_D^{25}$ ,  $d$ , and composition (content of  $\alpha$ - and  $\beta$ -pinene and "tailings") are given. The effect of change from "longleaf pine" to "slash pine" as a source of turpentine is discussed at length.

S. S. WOLFF.

**Preparation of Congo copal ester.** G. DANTLO (*Peint. Pig. Ver.*, 1932, 9, 23—24).—An account is given of the manufacture and some properties of the glyceride ester.

S. MARKS.

**Properties of plasticisers for nitrocellulose lacquers.** A. KRAUS (*Farbe u. Lack*, 1932, 121—122, 135—136).—The following plasticisers have been examined: tritoyl phosphate (I), diamyl phthalate (II), Bu<sub>2</sub> phthalate (III), Bu<sub>3</sub> phosphate (IV), Bu stearate (V), castor oil (VI), "casterol" (VII), "ricol 242" (VIII), "sipalin special" (IX), "sipalin M.O.M." (X). The volatility (vals. tabulated) increases from I to IV. III and IV possess the greatest solvent power for nitrocellulose, the solubility being increased by the presence of small quantities of alcohols; V—VIII are non-solvents. After exposure to ultra-violet light for 24 hr. the odours of these plasticisers are variously affected and all the liquids become yellow. When present in nitrocellulose films I and Ph<sub>3</sub>PO<sub>4</sub> produce considerable yellowing, whilst IV, V, and X cause min. yellowing. The viscosity of nitrocellulose solutions in BuOAc is reduced by I—VI, IX, and X; the reduction is usually greatest with low-viscosity plasticisers, but viscous plasticisers may produce an increase.

S. MARKS.

**Drying of some oil varnishes.** C. K. KRAUZ and F. J. FISCHMANN (*Chem. News*, 1932, 144, 161—163).—Varnishes were made from linseed oil and either crude rosin, purified rosin, or dammar and the effect on their rates of drying produced by varying the temp. to which the mixture was heated, the duration of heating, and the concn. of the drier was observed for each of the following driers: PbO, PbO<sub>2</sub>, Pb<sub>3</sub>O<sub>4</sub>, CoO, Co<sub>2</sub>O<sub>3</sub>, FeO, Fe<sub>2</sub>O<sub>3</sub>, Mn<sub>2</sub>O<sub>3</sub>. The optimum conditions for each drier for most rapid drying are tabulated. Each drier usually

required the same optimum temp. and duration of heating. The higher the temp. used the shorter usually was the optimum duration and the thinner was the resulting varnish. Co<sub>2</sub>O<sub>3</sub> gave the thinnest and CoO the thickest varnishes. The I val. of the resin is not an index of the rate of drying of the varnish. The rosins gave varnishes having lower acid val. and sap. val.; dammar gave varnishes with varying acid val. and decreased sap. val. The most efficient drier was CoO; the least efficient was PbO. FeO and Fe<sub>2</sub>O<sub>3</sub> were both good driers. (Cf. B., 1928, 902.)

S. MARKS.

**Bee-resin (propolis).** R. JUNGKUNZ (*Chem. Umschau*, 1932, 39, 7—9, 30—33).—Examination of two Swiss samples of propolis agreed on the whole with the results of Dieterich (*cf. B.* 1911, 1222). The material gave volatile matter and H<sub>2</sub>O 6.5%, wax 19.3%, balsam 4.0%, crude resin 68.9%, dirt (vegetable fibres, pollen grains, etc.) 4.3%. The crude resin was separated into tannins 11.4%, propopresene 1.8%,  $\alpha$ -propopresin traces,  $\beta$ -propopresin 0.6%, pure resin (acid val. 127) 86.2%. Neither balsam nor resin gave the Storch-Morawski reaction, and conifer resins are definitely excluded. The wax (m.p. 60—61°, unsaponifiable matter 55%) was not identical with beeswax; propolis seems therefore to be a natural vegetable material, specially collected by the bee from certain plants.

E. LEWKOWITSCH.

**Manufacture of linoleum.** A. EISENSTEIN (*Oesterr. Chem.-Ztg.*, 1932, 35, 40—44).—A lecture, describing the Walton process and its modifications.

S. MARKS.

**Pachimeter.**—See I. **Protecting Al.**—See X. **Thickened cedar-wood oil substitute.**—See XII. **Chlorinated rubber.**—See XIV.

## PATENTS.

**Curing or drying varnished surfaces on articles of manufacture.** TURNER TANNING MACHINERY CO., LTD. From A. S. HUBBARD (B.P. 366,571, 6.11.30).—The tackiness is removed from patent leather by subjecting it, for 5—25 min., to the action of ultra-violet rays from a quartz-Hg-vapour lamp at a distance of about 5 in.

B. M. VENABLES.

**Method of manufacturing moulded parts, particularly applicable for moulding operations using as bases ligneous materials, moulding powders, etc.** "LE BOIS BAKÉLISÉ" SOC. ANON (B.P. 368,623, 11.6.31. Fr., 12.5.31).

Grinding pigments.—See I.

## XIV.—INDIA-RUBBER; GUTTA-PERCHA.

**Chlorinated rubber and its applications.** J. C. FOL and A. B. BIJL (*Chem. Weekblad*, 1932, 29, 162—167).—An examination of the solubilities and physical properties of Tornesite, the viscosities of its various solutions, and the chemical and physical properties of films of the material, alone and admixed with various other materials, has been made. The commercial product contains 72.76  $\pm$  0.13% Cl, of which 19.4% is attributable to CCl<sub>4</sub> retained; the chlorinated rubber freed from CCl<sub>4</sub> corresponds closely to the composition C<sub>10</sub>H<sub>14</sub>Cl<sub>8</sub>. The resistance to all reagents, other than

those with which it gives solutions, is exceedingly high; changes in wt. when treated for several hr. on the water-bath with conc. acids and alkalis are very small.

S. I. LEVY.

#### PATENTS.

**Vulcanisation of rubber and rubber-like substances.** IMPERIAL CHEM. INDUSTRIES, LTD., M. JONES, and W. J. S. NAUNTON (B.P. 367,901, 28.11.30).—Tendencies to pre-vulcanisation, especially with accelerators of the 2-mercaptoarylenethiazole type, are overcome by incorporating in the rubber mixture an acid condensation product of the polyhydric alcohol-polybasic aromatic acid class, e.g., a "glyptal" resin of acid val. 100—150.

D. F. TWISS.

**Preservation of rubber latex.** NAUGATUCK CHEM. Co., Assees of J. MCGAVACK (B.P. 368,193, 12.8.31. U.S., 27.8.30).—By treating latex with  $\text{CH}_2\text{O}$  (e.g., 0.2%) and subsequently adding  $\text{NH}_3$  (e.g., 0.5% after 24 hr.), satisfactory preservation is effected, and the rubber eventually obtained, probably because of the tanning of the latex protein by the  $\text{CH}_2\text{O}$ , exhibits improved qualities, particularly with respect to low  $\text{H}_2\text{O}$  absorption.

D. F. TWISS.

**Making of dipped rubber articles.** J. R. GAMMETER (B.P. 368,295, 24.11.30. U.S., 20.1.30).

### XV.—LEATHER; GLUE.

**Removal of hair.** E. B. CARMICHAEL (Science, 1932, 75, 136—137).—Details are given for the prep. of a depilatory consisting of a solution of  $\text{H}_2\text{S}$  in excess of  $\text{Ba}(\text{OH})_2$ .

L. S. THEOBALD.

**Depilation of skins by "sweating."** P. CHAMBARD and J. AZEMAR (J. Soc. Leather Trades' Chem., 1932, 16, 27—39).—The reaction of skins during the "sweating" process is practically neutral. An acid or alkaline condition in skins which are brought into the sweating chambers is first neutralised by bacterial action before the hair can be loosened, since the latter requires a neutral condition. Generally, the amount of hide substance hydrolysed during sweating is increased by all substances which retard the depilation. The further hydrolysis of the decomposed hide substance, as measured by a determination of the  $\text{NH}_3$ , amines, and  $\text{NH}_2$ -acids, varies with each variation of the sweating conditions, but no general rule can be formulated. The sweating process differs from the unhairing of skins by alkaline depilating agents in that the former results in the absence of formation of sol. sulphides and the total dissolution of the epidermal layer and pigment without the hair or wool being attacked. The results obtained by renewing the air in the sweating chamber were better than when the air was stagnant.

D. WOODROFFE.

**Bating experiments with a mixture of enzymes from fish intestines.** F. STATHER and H. MACHON (Collegium, 1931, 721—732).—Keratin decomp. products, collagen, and elastin were hydrolysed by a mixture of enzymes derived from fish intestines in a manner similar to that effected by pancreatic enzymes. Optimum effects were shown at  $p_{\text{H}}$  8.0 and 50—55°, and the curves showing the effects of concn. of the mixed and the pancreatic enzymes were similar. The lipolytic

activity of the enzyme preps. of warm-blooded animals was greater than that of the fish enzymes.

D. WOODROFFE.

**New theory of bating [of hides and skins].** E. LENK (Collegium, 1931, 732—738).—Rennase is always present in satisfactory tryptic bates. The coagulatory effect of rennase is of more importance in bating skins than the proteolytic action of the trypsin. Casein solutions were rendered turbid by the addition of tryptic enzyme and a max. turbidity was produced with a small amount of enzyme, which is attributed to the action of the rennase in coagulating the casein particles. In the bating process the collagen is coagulated and the fibres tend to agglomerate, leaving voids, thereby facilitating the removal of the scud and producing the porosity characteristic of a well-bated skin. The depletion of the pelt in bating is really a coagulation of the fibre proteins. If tryptic action sets in, the skins are not depleted, but are actually swollen.

D. WOODROFFE.

**Control of the process of deliming and bating [of skins].** K. KLANFER and E. RÖMER (Collegium, 1931, 738—745).—An apparatus has been devised for the determination of the elasticity of the delimed or bated skin. A metal plate is attached to a lever, the other end of which forms a pointer on a scale. The metal plate is pressed into the piece of skin and the movement on its release is a measure of the elasticity. Measurements were made on different parts of the skin after liming and bating, respectively. The influences of  $p_{\text{H}}$ , enzyme concn., and temp. were each controlled with the apparatus.

D. WOODROFFE.

**Raw hides and skins: salting problems.**  
**Report of the Pan-European Commission No. 5.** M. BERGMANN (Collegium, 1931, 745—751, and J. Soc. Leather Trades' Chem., 1932, 16, 2—5).—New preservative agents have been tested and their effect on anthrax is noted. Practical salting tests have been made in slaughter-houses and the treated hides observed during their manufacture into leather. Information has been collected on the types of salt used, the denaturing of salt with such compounds as alum,  $\text{C}_{10}\text{H}_8$ ,  $\text{Na}_2\text{CO}_3$ , lysol, etc., and the flaying, salting, and storage of hides. Machine flaying is unsatisfactory for warbled hides. Less trouble in preservation was observed with hides brined with liquor of  $d > 1.135$ , but if the brine liquor was too conc. a red discoloration formed on the edges of the hides. Heat is developed on storage of salted hides which have become wet, although they may be heavily salted. Red stains do not develop so readily in hides brined with re-evaporated salt as in those brined with fresh salt.

D. WOODROFFE.

**Action of trypsin on collagen.** R. H. MARRIOTT (J. Soc. Leather Trades' Chem., 1932, 16, 6—16).—The amount of N dissolved by trypsin from collagen is greater as the time for which the collagen has been limed is greater. The order of diminishing effect of different liming agents is:  $\text{Ca}(\text{OH})_2$  and  $\text{Na}_2\text{S}$ ,  $\text{Ca}(\text{OH})_2$ ,  $\text{Ca}(\text{OH})_2$  and  $\text{Ca}(\text{SH})_2$ ,  $\text{NaOH}$ ,  $\text{Ca}(\text{OH})_2$  + hair,  $\text{Na}_2\text{S}$ . Skins which have been limed with  $\text{Na}_2\text{S}$  alone are not bated so easily as those treated with  $\text{Ca}(\text{OH})_2$  alone, and tend to yield a less supple leather. The fibrils are not freed and separated in skins limed with  $\text{Na}_2\text{S}$  alone. The

best bating effects are observed in skins treated with  $\text{Ca}(\text{OH})_2$  and  $\text{Na}_2\text{S}$ .

D. WOODROFFE.

**Stripping of vegetable-tanned leathers.** R. H. MARRIOTT (J. Soc. Leather Trades' Chem., 1932, 16, 16—27).—The tannin in such leathers consists of three portions. One portion is mechanically held by the leather and easily removed by treatment of the leather with  $\text{H}_2\text{O}$ ; the remainder of the tannin is chemically combined, but part of it can be removed only by prolonged treatment with  $\text{H}_2\text{O}$  or by means of dil. alkaline solutions. The residue of the combined tannin cannot be removed with alkalis and is const. for a particular tannage. The product remaining after treatment of the leather with dil. alkali can be dissolved, but not decomposed, with conc. alkaline solutions. The amount of irreversibly fixed tannin appears to be increased by storing the leather. These properties are discussed in their relation to the theories of tannage. D. WOODROFFE.

**Differential characteristics of chestnut tanning extracts obtained from the bark and from the debarked wood.** A. PONTE (Boll. Uff. Staz. sperim. Ind. Pelli, 1932, 10, 42—59).—Inorg. constituents, especially  $\text{CaO}$  and  $\text{Fe}$  compounds, and org. acids (principally polybasic hydroxy-acids) accumulate in chestnut bark. The tannin components vary in nature in the wood and bark, the proportions of pyrocatechol tannins and of colouring matters being the greater in the bark. The bark of seasoned chestnut contains, on the average, 10% of tannins. T. H. POPE.

**Report of the European Commission for quantitative tannin analysis.** E. STIASNY and J. G. PARKER (Collegium, 1931, 760—788).—The Procter extractor may be used in preparing infusions from tanning materials. Hide powder must have ash content  $< 0.3\%$  and  $p_{\text{H}}$  5.0—5.5. Liquid extracts should be weighed in closed vessels and dissolved as quickly as possible. Solid or pasty extracts should be weighed in a beaker, ten times the wt. of boiling  $\text{H}_2\text{O}$  added, and the whole heated on a water-bath and stirred until homogeneous before diluting with boiling  $\text{H}_2\text{O}$  to 900 c.c. Two litres must be prepared from extracts containing  $> 55\%$  tannin. The Riess method (B., 1929, 569) or the Berkefeld filter-candle method of filtration may be employed. If the latter method be used, the candle should be left in the tannin infusion for 10 min. before commencing the filtration. The first 250 c.c. of filtrate must be rejected. If a clear filtrate is not given by this method, the Riess method may be used. Optically clear, unfiltered tannin solutions should not be filtered. The Darmstadt (B., 1929, 140), Keigeloukis (B., 1929, 221), or Jamet apparatus may be used in chroming and washing the powder for detannisation. Colour measurements are to be made on the analytical solution in a 1-cm. cell and the results calc. in units of red, yellow, and blue for a solution containing 0.5% of tannin.

D. WOODROFFE.

**Report [of the International Commission on hides and skins] on the warble fly.** A. GANSSER (Collegium, 1931, 751—760).

**Gas-meter leathers.**—See II.

PATENT.

**Drying varnished surfaces.**—See XIII.

## XVI.—AGRICULTURE.

**Physical properties of Hawaii soils with special reference to the colloidal fraction.** C. RICHTER (Hawaii Agric. Exp. Sta. Bull., 1931, No. 62, 45 pp.).—Detailed examination of a no. of typical soils is recorded. The amount and distribution of org. matter is a controlling factor in the  $\text{H}_2\text{O}$  relationships of these soils. Where the org. content is small, texture and chemical composition are of prime importance in this respect. Considerable differences in the  $\text{SiO}_2$ : sesquioxide ratio of different fractions of any one soil are recorded. Electrical stirring is much more effective than are shaking or rubbing methods in dispersing soils for mechanical analysis. Pretreatment with 0.05N-HCl is sufficient to remove Ca. Destruction of org. matter with  $\text{H}_2\text{O}_2$  is unnecessary.  $\text{Na}_2\text{CO}_3$  is the most satisfactory deflocculating agent. The  $\text{H}_2\text{O}$ -vapour adsorption method for determining soil colloids gives higher results than does the pipette or hydrometer method, differences being due to the effect of org. matter and the disparity in chemical composition of the inorg. phase. The detailed hydrometer method (corrected for sp. gr. and temp.) records mechanical composition similar to that given by the pipette method. The rapid hydrometer method is less accurate, but sufficiently useful for routine classification purposes. A. G. POLLARD.

**Dynamics of oxidation-reduction potentials in podsol soils.** N. P. REMEZOV (Trans. Sci. Inst. Fertilisers, Russia, 1930, No. 77, 45—63).—Increase in the swampy condition or depth of the soil decreases the oxidation-reduction potential. In sandy soils the variation is greater than in clay soils. Meteorological conditions affect the potential more than methods of culture or vegetation. Manure increased the potential of clay soils only when limed; on sandy soils manure increased, whilst manure and lime decreased, the potential.

CHEMICAL ABSTRACTS.

**Dependence of soil quality on the degree of dispersion and exchangeable bases.** S. VAJNA (Mezogazd., 1929, 2, 303—319).—The results of a study of forest soil saturated with the absorption complex Ba, Ca, Mg,  $\text{NH}_4$ , Na show a relation between the nature of the saturating material and the dispersion of the soil. The latter is parallel to the hydration of the cation, increasing in the above order. CHEMICAL ABSTRACTS.

**Determination of replaceable hydrogen in manganese dioxide-free Hawaiian pineapple soils.** L. A. DEAN and O. C. MAGISTAD (J. Amer. Soc. Agron., 1931, 23, 832—843).—0.5N- $\text{Ca}(\text{OAc})_2$  (1500 c.c.), adjusted to  $p_{\text{H}}$  6.5, is leached through 20 g. of soil at the rate of 15 drops per min. The extract is boiled to remove  $\text{CO}_2$ , cooled to room temp., and titrated electrometrically with standard  $\text{Ca}(\text{OH})_2$  to the  $p_{\text{H}}$  of the original leaching solution. CHEMICAL ABSTRACTS.

**Biochemical transformation of nitrogen and phosphorus in the soil.** A. Y. LEVITZKI and A. A. LESYUKOVA (Novo-Urensk Selsk. Choz. Oput. Stantz., 1930, No. 13, 1—49).—Under aerobic conditions there was an increase in sol. P in several cases of podsol soils, but under the same conditions no change was observed in chernozem soils. Under anaerobic conditions the citric acid solubility of the P is greater than under aerobic



conditions; sol. N and  $p_H$  are also increased in anaërobic conditions. CHEMICAL ABSTRACTS.

**Examination of liming materials [for soils].** M. POPP and J. CONTZEN (Landw. Versuchs-Stat., 1932, 113, 247—271).—Basic materials (total) are determined by treating a 2-g. sample with 0.5N-HCl (100 c.c. for limestones, 150 c.c. for quicklimes). When all action has ceased at room temp. the mixture is slowly heated to boiling, the action being stopped before vapour escapes from the flask. The cooled, filtered liquid is titrated with 0.25N-NaOH, using phenolphthalein. In Mg-rich limestones a separate determination of Mg is necessary for the accurate calculation of results. Various classes of liming materials may be distinguished by their solubility in 0.025N-AcOH. Limestones containing much hydrated  $\text{SiO}_2$  improve the permeability of soils to  $\text{H}_2\text{O}$  as effectively as do  $\text{SiO}_2$ -free materials. A. G. POLLARD.

**Rôle of magnesium in agriculture.** C. BRIOUX (Chim. et Ind., 1932, 27, 263—277).—Application of  $\text{MgO}$ ,  $\text{MgSO}_4$ , or  $\text{Mg}(\text{NO}_3)_2$  to soils poor in Mg increased the yields of mustard and maize and the Mg content of these crops, grown in pot cultures. In richer soils, dry-matter yields were increased by dressings up to 250 kg. per hectare. The Mg content of the crops was not affected, but the contents of Ca and N declined. Heavier applications reduced crop yields, but no increase in the Mg content of the crop was observed with dressings < 1000 kg. per hectare. Treatment of soil with materials of varying CaO : MgO ratio had little effect on dry-matter yields, but the Ca and Mg contents of the crops were closely parallel to the ratio of these elements in the fertiliser. The N and P contents of the crops were not appreciably affected by this treatment. With flax,  $\text{MgO}$  and  $\text{MgSO}_4$  decreased yields, but increased the proportion of Mg in the crop. In field trials with potatoes and sugar beet, neither the yield nor the Ca or Mg content was affected by applications of Mg.

A. G. POLLARD.

**New fertiliser process. [Method of preparation as cylindrical granules.]** B. G. KLUGH (Chem. and Met. Eng., 1932, 39, 93—95).—The prep. of compound fertilisers of non-caking character by extrusion of pastes made with their aq. solutions involves paste production in an edge-runner mill with rollers having counterweights. A heavy wt. is required for grinding and a light one for kneading. The mill is enclosed and the ingredients are introduced in the form of solid K salts, liquid  $\text{H}_3\text{PO}_4$ , and gaseous  $\text{NH}_3$ . The paste is removed by a downward screw into a hopper. It is then fed by hand to an extrusion machine, from which the material falls upon a conveyor through which cold air is blown. It then contains 4%  $\text{H}_2\text{O}$ . It is dried in a cylindrical dryer, and the sections of fertiliser are cut and screened. The product has great hygroscopic resistance due to the hard surface of the granules. The process has been worked on an experimental scale for two years, and it is proposed to continue field tests in 1932.

C. IRWIN.

**Significance of some vegetation factors in the productivity of various soils.** O. LEMMERMANN and W. JESSEN (Z. Pflanz. Düng., 1932, 11, B, 76—89).—Soils of varying types when treated with appropriate

fertilisers and maintained at optimum  $\text{H}_2\text{O}$  contents produce crops of approx. the same magnitude. Soil factors other than reaction,  $\text{H}_2\text{O}$ , and nutrient supply are of minor importance in controlling productivity.

A. G. POLLARD.

**Utilisation of intestinal slime.** E. E. ZUSSER (Udobr. Urozhai, 1931, 3, 463—466).—The products obtained in cleaning intestines contain 45—65% of protein and 8—15% of fat. When boiled it may give a fertiliser containing 12% N and 2—2.5%  $\text{P}_2\text{O}_5$ .

CHEMICAL ABSTRACTS.

**Stall manures and green manuring.** P. EHRENBURG (Z. Pflanz. Düng., 1932, 11, B, 49—76).—The nature, use, and merits of the two forms of manures are discussed.

A. G. POLLARD.

**Residual action of various stall manures in field trials, with special reference to hot-fermented manure (Krantz).** R. SAILER (Landw. Versuchs-Stat., 1932, 113, 319—347; cf. B., 1931, 38).—Hot- and cold-fermented manures produced similar crop increases in both first and second crops and were superior to ordinary yard manure. The latter, however, had a greater proportional effect in the second crop. Yield increases due to artificial N fertilisers were similar, irrespective of the nature of the cattle manure applied as a supplement. The residual effect of the liquid drainage from the various types of manure was small. The N efficiency of the three manures on the second crop was approx. the same. The N efficiency of artificial fertilisers was smaller for cereals than for root crops. Krantz's "edelmist" was not appreciably superior to cold-fermented (*i.e.*, wet-compressed) manure.

A. G. POLLARD.

**Chemical composition of rice and its relation to soil fertility in China and Japan.** J. DAVIDSON and C. E. CHAMBLISS (Science, 1932, 75, 294).—Analyses show no marked differences in ash, N, P, K, Ca, Mg, and S contents between Chinese rices grown on a soil cropped presumably for centuries and rices grown under the American method of cropping. L. S. THEOBALD.

**Nitrogen as a limiting factor in sugar-cane production.** J. H. PARDO (Internat. Sugar J., 1932, 34, 15—16).—Experiments carried out on a Peruvian estate lead to the general conclusion that the decisive factor in the production of sugar cane per unit of area is the amount of N applied to the crop. As, however, consistently large tonnages did not result with large applications of N, it is concluded that there are other growth factors of indisputable importance.

J. P. OGILVIE.

**Reduced yield [of plants] due to nitrogen deficiency.** D. MÜLLER (Planta [Z. wiss. Biol.], 1932, 16, 1—9).—The poor growth of plants in N-deficient media is not associated with changes in the stomata or in the intensity of respiration. In  $\text{H}_2\text{O}$  and soil cultures, normal and N-deficient plants have similar assimilation rates. With a restricted N supply, assimilation products are stored in roots and stems and are not utilised for new leaf production. This increase in the proportion of dry matter in root and stem per unit leaf area is the principal immediate cause of reduced growth.

A. G. POLLARD.

**Breaking the dormancy of the seedlings by chemical treatment.** W. C. BRAMBLE (Science, 1932, 75, 193—194).—Ethylene chlorohydrin vapour breaks the dormancy of sugar maple and chestnut seedlings.

L. S. THEOBALD.

**Corticum disease of potatoes. II. Induced dormancy and tuber injury resulting from seed treatment. III. Laboratory and field methods for testing the efficiency of seed treatments.** E. E. CHAMBERLAIN (New Zealand J. Agric., 1931, 43, 350—356; 1932, 44, 42—47).—II. Dipping the tubers in acidified  $HgCl_2$  should be carried out 4 months prior to planting, otherwise treatment should be withheld until immediately before planting.

III. Trials with acidified  $HgCl_2$  are described.

A. G. POLLARD.

**Laboratory-field method for study of the efficiency of codling-moth sprays.** F. H. LATHEROP and R. F. SAZAMA (J. Econ. Entom., 1932, 25, 83—101).—Technique for examining spray efficiency on picked fruit is described. Addition of fish oil increased the efficiency of Pb arsenate sprays. Summer oil sprays are ovicidal rather than larvicidal. Comparative results of Pb arsenate, CaO-S, oil, and nicotine sprays in various combinations are recorded.

A. G. POLLARD.

**Control of codling moth.** S. W. FROST (J. Econ. Entom., 1932, 25, 77—83).—Arsenates of Ca and Mg were as effective as that of Pb. Mg arsenate used in conjunction with CaO-S caused no injury to foliage.

A. G. POLLARD.

**Use of calcium cyanide-raw linseed oil mixture for control of the round-headed apple-tree borer.** C. E. PETCH (J. Econ. Entom., 1932, 25, 121—122).—A reply to Burrill and Parris (*ibid.*, 1931). Injury from this prep. is due to incorrect application.

A. G. POLLARD.

**Superphosphates etc.**—See VII.

#### PATENT.

**Budding and grafting plasters.** JOHNSON & JOHNSON (GT. BRITAIN), LTD. From JOHNSON & JOHNSON (B.P. 368,665 5.9.31).

### XVII.—SUGARS; STARCHES; GUMS.

**Carbonation [of clarifying beet juice] with return of the scums. I. General. II. Influence of contact of juice and lime after carbonation.** L. DOSTÁL (Z. Zuckerind. Czechoslov., 1931, 56, 177—185).—By stirring the unfiltered carbonated juice for 15—20 min. previous to filtration, it is more readily filtered and its quotient of purity is raised. Moreover, the scums are more easily sweetened off, and its colour is better.

J. P. OGILVIE.

**Froth fermentation in table-syrup manufacture.** S. J. SAINT (Rept. Dept. Sci. Agric., Barbados, 1930—31).—Froth fermentation, which is due to reactions between  $NH_2$ -acids and invert sugar with the evolution of  $CO_2$ , occurs only at high temp. It can be prevented by cooling the syrup as it leaves the pan to about 71°, after which the product can be run into tanks to cool further without risk of decomp.

J. P. OGILVIE.

**Deterioration of raw sugar in storage.** N. E. LAMONT (Internat. Sugar J., 1932, 34, 41).—A quantity

of plantation white sugar was inoculated with syrup obtained from badly deteriorated raw sugar, and observations made of its polarisation, glucose content, and wt. during a month. During the first 14 days the polarisation had fallen to 86.75 and the glucose had increased to 5.68%. There was also an increase in wt. of about 4%. After this time, however, the sugar rapidly decreased in wt. The necessity is emphasised of warehousing in stores of modern construction in which especial provision is made for the control of the humidity.

J. P. OGILVIE.

**Molasses as the source of colour in adsorption determinations.** V. MAŠTALÍŘ (Z. Zuckerind. Czechoslov., 1931, 56, 205—219).—Under ordinary laboratory conditions it is impossible to produce a solution of molasses of const. colour val. owing to the application of heat exerting a considerable influence in increasing the total amount of colour and affecting the relative proportions of the primary colours. Solutions containing 25 g. of molasses per litre prepared under apparently identical conditions showed colour vals. from 31 to 49.5 Meade-Harris units. The Pulfrich photometer was found preferable to the Hess-Ives colorimeter for such determinations.

J. P. OGILVIE.

**Production of lævulose.** J. W. EICHINGER, JUN. (Iowa State Coll. J. Sci., 1931, 5, 331—333).—A study of the effect of variation of  $p_H$ , titratable acid, and total solids on the velocity of conversion of artichoke juice into fructose. The amount of fructose destroyed in 1 hr. at temp. up to 80° and  $p_H$  down to 1.12 was insignificant.

CHEMICAL ABSTRACTS.

**Production of lævulose.** J. H. MCGLUMPHY (Iowa State Coll. J. Sci., 1931, 5, 343—348).—Artichokes dried at temp. below 80° (or 125° in the early stages) are superior to fresh artichokes.

CHEMICAL ABSTRACTS.

**Determination of total absorbing power of activated carbons.** M. GARINO (Sacc. Ital., 1931, 24, 339—341).—In the evaluation of activated C for sugar refining, its total absorbing power should be determined separately from its decolorising power. This is done by allowing the C to act on a 10% solution of molasses at 90—98° for 25 min., and afterwards filtering, washing, and drying it.

J. P. OGILVIE.

**Colour, lustre, and appearance of potato flours.** A. P. SCHULZ (Z. Spiritusind., 1932, 55, 35—36).—Lustre is due partly to the direct reflection of light from the surfaces of the starch grains, and partly to certain of the grains acting as lenses and magnifying the high and low lights from the grain immediately behind. A slight alteration in the angle of incidence causes the light from certain bright surfaces to disappear and the converse to occur at other parts of the surface. The angle is modified by the density of the starch, and as the latter is affected by the moisture content, reliable vals. are possible only if the determinations are made with dry starch. Diffused light governs the "appearance," and the starch is termed "glassy" or "chalky" according as the grains are loosely or closely packed. Although the colour is darkened, the determinations of colour and "appearance" are improved if the starch grains are saturated with moisture.

C. RANKEN.

**Determination of colour and appearance in potato flour.** A. P. SCHULZ and G. STEINHOFF (Z. Spiritusind.,

1932, 55, 55—56).—A brass case divided vertically into three compartments without top or bottom is placed on a glass plate and starch flour is compressed into the compartments. A blade is pressed through a horizontal slot at the foot of the case and the case is lifted, leaving on the glass plate three cakes of equal thickness of compressed flour which are examined for lustre. The cakes are gently saturated by immersion in  $H_2O$  to a depth of 1—2 mm. and their tints are determined in direct and transmitted light by comparison with blue, red, and yellow colour-wedges. A grey-coloured wedge is used for the determination of brightness.

C. RANKEN.

**Determination of quality of potato flour for paper-making.** A. NOLL and F. HÖLDER (Papier-Fabr., 1932, 30, 85—88).—The adhesive power of potato flour is best measured by the viscosity of an alkaline sol of the flour, and should be at least 25—30 (Ost) at 20° for a sol prepared in the manner specified. Ash content should not exceed 0.6% nor moisture 20%. Cl compounds may be present as the result of hypochlorite bleaching or the use of activin, causing reddening of unbleached wood pulp. Acidity is better expressed in the form of alkali consumption than as  $[H^+]$ , details of test and limits of tolerance being given.

T. T. POTTS.

**Oxidising ferments in gum arabic and their inactivation.** A. LAURSEN (Dansk. Tidsskr. Farm., 1932, 6, 54—57).—Gum arabic contains oxidising enzymes in the form of both oxidases and peroxidases, the presence of which is objectionable when the gum is used in pharmaceutical preps. They are best detected by the blue colour which develops on adding to 5 c.c. of 1% gum solution 0.2 c.c. of 3%  $H_2O_2$  and 0.2 c.c. of a 1% EtOH solution of benzidine, and setting the mixture aside for 10 min. The most suitable method of inactivating a gum solution is by simple heating, but as this also reduces the viscosity and impairs the val. of the material, the min. temp. necessary to bring about complete inactivation has been investigated. The results show that heating for 15 min. at 80° inactivates the oxidases present, but for complete inactivation of the peroxidases heating for 60 min. is required.

H. F. HARWOOD.

[Sugars from] algæ.—See II. Sugar-cane production.—See XVI. EtOH from cane molasses.—See XVIII. Starch in potatoes.—See XIX.

#### PATENTS.

**Preparing, handling, and distributing sugar syrups.** D. V. WADSWORTH and L. WICKENDEN (B.P. 366,525, 31.10.30).—Syrups prepared from raw sugars, preferably after affination at the raw-sugar factory, are adjusted to  $p_H$  7—7.5, e.g., by addition of phosphate, and sterilised by treatment with  $Cl_2$  or hypochlorite for transport to refineries, e.g., in tank steamers. During transport a sterile atm. is maintained in the tanks, and sterilisation of the syrup may be repeated if necessary.

J. H. LANE.

**Manufacture of viscous sugar preparations.** R. H. FORESHEW (B.P. 366,487, 3.11.30 and 27.1.31).—Sugar in fine cryst. form is kneaded with 1—1.5% of a fused salt mixture preferably made from KOAc and NaOAc in mol. ratio 1 : 14 without loss of  $H_2O$  of

crystallisation. The product may be used as an ingredient in various forms of chocolate and coffee confectionery.

J. H. LANE.

**Refining of sugar and the like.** J. J. NAUGLE (B.P. 366,138, 31.10.30).—A method for combining raw-sugar manufacture with refining, in which affination syrups and inferior run-offs from the refined sugars are worked up with raw sugar juices and syrups to produce additional raw sugar, is outlined. Schemes of operations and layout of plant for the production of refined cane sugars are described, with flow-sheets.

J. H. LANE.

**Manufacture of hydrate dextrose.** INTERNAT. PATENTS DEVELOPMENT Co. (B.P. 366,974, 7.11.30. U.S., 26.11.29).—About 3—7% of a syrup batch is cooled rapidly to 38° or below to produce a thick magma of crystals without regard to their size or form, and the rest of the hot syrup is added to this magma, preferably in several portions, and cooled slowly in motion to obtain finally a purgeable masseccuite.

J. H. LANE.

#### XVIII.—FERMENTATION INDUSTRIES.

**Colorimetric method for determination of  $p_H$  of wort and beer.** P. KOLBACH (Woch. Brau., 1932, 49, 81—85).—1 c.c. of indicator and 5 c.c. of 0.1M-NaCl are mixed with 10 c.c. of the liquid and the  $p_H$  is judged approx. Similar mixtures are prepared in which 0.1M-buffer solutions, of known  $p_H$  vals. differing successively by 0.2 unit, replace the NaCl. The  $p_H$  of the wort or beer is estimated by matching the colour of the test with those of the nearest buffered mixtures. Details are given for the prep. of 3 sets of 5 buffer solutions, one for use with each of the indicators bromocresol-purple, Me-red, and bromocresol-green, and covering the range  $p_H$  6.4—4.0. They are based on Na H tartrate with addition of NaOH or HCl, and in their prep. allowances are made for changes due to dilution by the test liquid and for the salt errors of the indicators. Tables are given for corrections to be made for different concns. of worts and degrees of fermentation of beers, and also for the dilution of highly coloured liquids. It is claimed that results within 0.05 unit of those of the electrometric method are generally obtained.

F. E. DAX.

**Alcohol production from cane molasses using pure cultures.** S. D. LABAYEN (Sugar News, 1931, 12, 632—634).—Conditions are outlined for cane-molasses fermentation to EtOH under the most advantageous conditions. Generally 6—9 lb. of  $H_2SO_4$  ( $d$  1.065—1.070) per 1000 gals. of mash are used as antiseptic, but  $NH_4F$  may be used instead, adding, e.g., 1 lb. per 1000 gals. of mash. If no antiseptic reagent is used a very poor grade of EtOH will result. Using adventitious fermentation without antiseptics the yield may be 40—60% of the theoretical, but with antiseptic reagents and pure yeast cultures 85—95% may be expected.

J. P. OGILVIE.

**Rectification of raw spirit.** K. R. DIETRICH (Z. Spiritusind., 1932, 55, 53—55).—Before rectification of 85 wt.-% spirit to 94 wt.-% the raw spirit is diluted to 50 vol.-% with  $H_2O$ , thus ensuring that the ratio of the content of impurities in the EtOH distillate to that of the impurities in the alcoholic liquid, or the

rectification quotient, is  $> 1$ . Under these conditions the impurities are eliminated easily in the first runnings. With the continuous rectification processes, the full advantage of dilution by  $H_2O$  cannot be obtained. In Guillaume's process, although  $H_2O$  is introduced into the upper portion of a column, the concn. of the EtOH increases from floor to floor and the rectification quotient becomes  $< 1$  with imperfect elimination of the impurities. In Guinot's method, the entry of EtOH vapour from the mash to meet boiling  $H_2O$  at the top of a column retains the rectification quotient  $> 1$ , but the spirit is so dil. that the amount of heat required for concn. is high. With 39 floors 35 wt.-% EtOH requires 255 kg. of steam to produce 94.6 wt.-% EtOH, whereas with 32 floors 85 wt.-% requires 235 kg. of steam. Accordingly, unless sufficient floors are available, the extra purification obtained by dilution to 35 wt.-% is more than counterbalanced by the extra heat consumed.

C. RANKEN.

**Purification of raw spirit with active carbon.** FRITZWEILER and K. R. DIETRICH (Z. Spiritusind., 1932, 55, 53).—Raw spirit is rectified and is passed through six filters charged with active C, one of which is replaced every third day by a fresh filter. The filtrate is distilled over a rectification column and yields EtOH free from impurities. The exhausted filters are drained and steamed, and provide low-grade spirit which is added to the raw spirit to be worked up. The treatment with C after, instead of before, rectification gives improved purification with the use of only 5% of the active C required for the second process. One furnace suffices in place of four for the regeneration of the C; fewer filters and filter changes are necessary, and the production of low-grade EtOH requiring recovery is consequently smaller, whilst the consumption of heat is correspondingly less. The amount of heat required for the second distillation, which is not part of the former process, is negligible.

C. RANKEN.

**Accuracy of the areometric determination of alcohol.** C. LUCKOW (Z. Spiritusind., 1932, 55, 62).—Provided the scale is adjusted accurately on the stem, the vals. of EtOH as determined by the areometer agree closely with those given by a pycnometer. The stem must be clean and dry and the areometer allowed to sink slowly into the liquid so that the stem above the liquid is not wet. In reading the instrument, the eye is gradually raised from below towards the surface of the liquid until the elliptical section around the stem becomes a straight line, which fixes the point on the scale. The temp. of the liquid should be taken at the same time. Of five determinations of EtOH made by pycnometer and by areometer, the results were identical in four cases and differed in the fifth by 0.09 vol.-%.

C. RANKEN.

**Consumption of heat in the manufacture of absolute alcohol.** H. GUINOT (Z. Spiritusind., 1932, 55, 55).—The author insists on the accuracy of his calculation which shows that abs. EtOH is produced by his azeotropic method from a molasses mash containing 10% of EtOH with a consumption of 280–300 kg. of steam per hectolitre of EtOH, provided use is made of the heat from the slop in addition to the usual preheating

of the mash. The latter with his plant reaches only  $60^\circ$  instead of  $70^\circ$  with the usual rectification process. Without heat from the slop 340–350 kg. of steam are required. The saving of heat is inherent in the process and does not depend fundamentally on the application of heat from the slop.

C. RANKEN.

**Detection of MeOH in EtOH.**—See III. **Ferments in gum arabic.**—See XVII. **Determining saccharin in beer.** **Food casein.**—See XIX.

## XIX.—FOODS.

**Nutritive value of cereals and its relation to processing.** T. B. PARKS (Iowa State Coll. J. Sci., 1931, 5, 349–350).—Puffing of wheat destroys vitamins- $B_1$  and  $-B_2$ . The relative vals. of wheat and oat products are recorded.

CHEMICAL ABSTRACTS.

**Protein tests for wheat and oil tests for flax seed and soya beans.** ANON. (U.S. Dept. Agric. Misc. Pub., 1932, No. 140, 45 pp.).—The significance of these tests in the market valuation of the crops is examined.

A. G. POLLARD.

**Soya-bean meal.** K. MEYER (Landw. Versuchs-Stat., 1932, 113, 349–358).—Foreign matter including weed seeds occurring in extracted soya-bean meal is described.

A. G. POLLARD.

**Salicylic acid reaction with rye bread.** J. J. HANSMA and L. C. E. KNIPHORST (Chem. Weekblad, 1932, 29, 140–142).—The violet coloration with  $FeCl_3$  obtained with extracts of rye bread and rye flour was found to be due to formation of derivatives of 3-hydroxy- $\gamma$ -pyrone during baking. Millon's reagent is suitable to differentiate the pyrone compounds from salicylic acid.

S. I. LEVY.

**Baking tests with rye flour treated with benzoyl peroxide.** O. ECKARDT (Mühlenlab., 1932, 1–2).—Preliminary tests showed that treatment of rye flour with the normal amount of  $Bz_2O_2$  (10 g. per 100 kg. of flour) necessitates a longer fermentation period, but is not otherwise disadvantageous; treatment with larger amounts may emphasise deficient fermentation. Objections to the minute quantity of residual  $BzOH$  in the bread are groundless.

W. J. BOYD.

**Evaluation of baking tests.** W. BECHER (Mühlenlab., 1932, 9–10).—A scheme is outlined for saving time and giving greater clarity in tabulation of observations on the dough and the finished product in baking tests.

W. J. BOYD.

**Relationship of the specific gravity of potatoes to the contents of dry substance and starch.** C. VON SCHEELE and G. SVENSSON (Z. Spiritusind., 1932, 55, 47–49).—The amounts of dry substance and the sp. gr. of potatoes have a definite relationship to the starch content and to each other. The content of non-starch dry substance, which is obtained by deducting the % of starch from that of dry substance, varies as the total amount of dry substance, and the amount is not a const. (= 5.8) as stated by Maercker. Maercker's tables, which permit the calculation of the starch content from the sp. gr. of the potatoes, are based on this inaccuracy and, accordingly, require revision.

C. RANKEN.

**Manufacture of diabetic and milk chocolates.** A. LAESSIG (Food Manuf., 1932, 7, 12—14).—Fructose may be used in diabetic chocolate, instead of sucrose, but it is suspect therapeutically and is expensive. Proteins of animal or vegetable origin, particularly peptone and  $\text{NH}_3$ -casein, are tolerated and enable the cacao mass to be kept down to 60%. Saccharin (0.5—1.0%) is added. "Conching" affects proteins and must be avoided during manufacture. In order to combine max. conching effect with least damage to milk proteins, milk chocolate is best prepared in three stages. Pastes containing 32% each of total fat are prepared separately and consist of (1) full milk powder, cacao butter, and sucrose, and (2) cream powder, cacao butter, and sucrose, and aliquot portions of each are blended with desired amounts of chocolate mass.

T. McLACHLAN.

**Manufacture of food casein.** H. C. BRYSON (Food Manuf., 1932, 7, 67—70).—Food casein may be produced from separated milk by pptn. by  $\text{AcOH}$  or  $\text{HCl}$ , or by coagulation by rennin. The optimum temp. for acid pptn. is  $65.5^\circ$ , and for rennin coagulation  $38^\circ$ . The curd produced by  $\text{AcOH}$  is firm and cannot be washed; that given by  $\text{HCl}$  or rennin is flocculent and may be washed readily. The addition of 0.01% of  $\text{CaCl}_2$  to the milk before the addition of rennin improves the yield and the texture of the curd. Drying must take place below  $63^\circ$ .

T. McLACHLAN.

**Examination of eggs.** J. J. J. DINGEMANS (Chem. Weekblad, 1932, 29, 138—140; cf. Waegeningh and Heesterman, B., 1928, 138).—The catalase content of the white of fresh eggs is generally considerably higher than that of refrigerated eggs, whilst for eggs preserved in  $\text{CaO}$  the val. is very low. Very fresh eggs may also give a low val.

S. I. LEVY.

**Differentiation of fresh eggs and of eggs preserved by cold storage, lime, and water-glass.** J. E. HEESTERMAN (Chem. Weekblad, 1932, 29, 134—136; cf. Dingemans, B., 1931, 740).—Fresh and refrigerated eggs have an outer layer of albuminous tissue which can be stained by a solution of fuchsin in dil.  $\text{AcOH}$ ; the stained tissue can be detached with the original coherent structure. When eggs have been preserved in  $\text{CaO}$  this structure is destroyed, and the stained layer falls to powder when rubbed. Eggs preserved in water-glass give irregular results in this respect, but  $\text{H}_2\text{O}$  in which they have been placed for 1 hr. gives silicate reactions. The white of refrigerated eggs gives a stronger fluorescence in ultra-violet light than does that of fresh eggs.

S. I. LEVY.

**Use of sodium nitrite in the curing of meats.** T. C. WALSH (Food Manuf., 1932, 7, 49—51).—The law forbidding the use of  $\text{NaNO}_2$  for pickling meat is illogical, since meat imported into the country has been treated with  $\text{NaNO}_2$ , and the colour of cured meat is due to the formation of "NO-hæmochromogen." Whereas 0.2% of  $\text{KNO}_3$ , which is without action until part of it has been reduced, is allowed in meat, only 7—17 p.p.m. of  $\text{NaNO}_2$  are required. Both  $\text{KNO}_3$  and  $\text{NaNO}_2$  are without action on the bacterial flora of the meat in the proportions in which they are employed. Meat is usually cured hot by  $\text{NaNO}_2$  after cooking, and, in

order to cure hot with  $\text{KNO}_3$ , a portion of it must be reduced artificially to  $\text{KNO}_2$  before adding to the brine.

T. McLACHLAN.

**Refrigeration applied to preservation and transport of Australian foodstuffs.** J. T. VICKERY (Counc. Sci. Ind. Res., Australia, 1931, Pamph. No. 23, 40 pp.).—A survey is made of the economic aspects, previous research work, and investigations urgently required to be carried out in connexion with the meat, fish, dairy, and fruit industries, with special reference to refrigerated transport. A scheme for a suitable research organisation is outlined.

W. J. BOYD.

**Determination of saccharin in food and potable liquids, especially in beer.** J. E. HEESTERMAN (Chem. Weekblad, 1932, 29, 130—134).—The saccharin is extracted by means of a 1:1 mixture of  $\text{Et}_2\text{O}$  and light petroleum, the residue after evaporation hydrolysed with  $\text{HCl}$ , and  $\text{NH}_3$  distilled off after addition of  $\text{KOH}$ . Titration with 0.001N- $\text{HCl}$  is more convenient than colorimetric determination, and permits of detection of 1 mg. of saccharin in 1 litre of beer.

S. I. LEVY.

**Determination of raw fat in fodder.** E. S. TOMULA and (Miss) E. TAKALA (Suomen Kem., 1932, 5, 1—4).—With the exception of palm cake, which requires 6 hr., the extraction of fat is complete in 4 hr., and usually in 3 hr., by means of the Twisselmann apparatus (cf. A., 1923, ii, 850). In the determination of  $\text{H}_2\text{O}$ , heating for 3 hr. at  $95^\circ$  gives approx. the same figures as heating for 2 hr. at  $98$ — $100^\circ$ , although dehydration is not completed by either method.

T. McLACHLAN.

**Spray-drying [of milk]. Pachimeter.**—See I. **Bleached palm oil. Vitamins in cod-liver oil emulsions.**—See XII. **Potato flour.**—See XVII.

## PATENTS.

**Making leguminous flakes.** F. R. BACHLER (U.S.P. 1,813,268, 7.7.31. Appl., 1.8.27).—Flakes are made from leached, steamed, and creamed legumes. The creamed mass is flavoured with sugar and  $\text{NaCl}$ , either added as such or produced *in situ* by adding  $\text{HCl}$  to the starchy mass and then  $\text{Na}_2\text{CO}_3$ . The mass is flaked by causing it to adhere to a rotating heated drum from which it is scraped off and baked.

E. B. HUGHES.

**Preserving of fresh fruits [by freezing].** W. T. COMER (B.P. 368,013, 26.1.31. U.S., 27.1.30).—An apparatus is described to freeze fruit at  $-50^\circ$  to  $-70^\circ$  so that the very small ice crystals formed will not injure the cell walls.

E. B. HUGHES.

Viscous sugar preps.—See XVII.

## XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

**Glycerin of boric acid made under reduced pressure.** G. R. MILNE and R. M. TODD (Pharm. J., 1932, 128, 186).—A water-white glyceroboric acid may be obtained by the addition of a slight excess of glycerin and concn. in vac. Less time is required and the product is readily sol. in  $\text{H}_2\text{O}$ .

T. McLACHLAN.

**Officinal neutral calcium glycerophosphate: stability of its aqueous solutions.** G. NOBILI (Boll. Chim. farm., 1932, 71, 133—136).—For therapeutic

use, pure Ca glycerophosphate should be dissolved in cold, recently boiled, distilled or good potable  $H_2O$ , and the solution should be stored in hermetically sealed bottles, quite filled; the action of air lowers the solubility appreciably. No extraneous substance, other than glycerol to increase the stability, should be added. In prescriptions containing vegetable extracts, the peroxidase of such extracts (e.g., gum arabic) hastens decomp. of the glycerophosphate. T. H. POPE.

**Influence of indifferent powders on the alkaloid determination in dry belladonna extract.** J. PERELMANN (Pharm. Zentr., 1932, 73, 145—153).—The D.A.B. VI and U.S.S.R. Pharmacopœia VII methods are unsuitable for the assay of such extracts containing liquorice powder. Reliable results are obtained by the following modification of Fromm's method: 3—5 g. of the dry extract are treated with 10—15 c.c. of  $H_2O$  at  $100^\circ$ , cooled, shaken with 150 c.c. of  $Et_2O$  and 5 c.c. of 10% aq.  $NH_3$  for 15 min., and then 1.0 g. of tragacanth is added and the mixture shaken. 100 c.c. of the  $Et_2O$  extract are filtered off and evaporated, 5 c.c. of  $Et_2O$  are added and again distilled off. This is twice repeated and the residue, dissolved in 15 c.c. of neutral  $Et_2O$ , is washed into a separator with 5 c.c. more of  $Et_2O$ ; 30 c.c. of 0.01N-HCl are added and, after shaking for 2—3 min., the acid layer is separated, the residue washed 2—3 times with 20 c.c. of  $H_2O$ , and the combined filtered aq. extracts are made up to 100 c.c. and an aliquot is titrated with 0.01N- $Na_2B_4O_7$ . E. H. SHARPLES.

**Improvement of the process for obtaining fluid extracts.** H. IHBE (Pharm. Ztg., 1932, 77, 276—278).—A self-regulating, continuous extraction process suitable for quantities of upwards of 50 g. of drug is described. Its use is exemplified by the prep. of fluid extract of ergot satisfying the D.A.B. VI requirements. Breddin's procedure (B., 1930, 439) is adversely criticised.

E. H. SHARPLES.

**Diaphanometry as a means for the recognition and evaluation of tinctures and other galenical preparations.** C. RISCH (Pharm. Ztg., 1932, 77, 302—305).—The application of a modified and inexpensive nephelometer to the examination and control of prep. of tinctures (etc.) is described. E. H. SHARPLES.

**Colour reactions of menthol, eucalyptol, and thymol.** O. CARLETTI (Boll. Chim. farm., 1932, 71, 139—140).—When 0.01 g. of menthol, eucalyptol, or thymol is dissolved in 1 c.c. of conc.  $H_2SO_4$  ( $d$  1.85) and the solution is treated with 1 c.c. of a fresh solution of 1 g. of vanillin in 100 c.c. of conc.  $H_2SO_4$  ( $d$  1.84) and then diluted with 1 c.c. of  $H_2O$  or  $EtOH$ , a rapidly-intensifying coloration appears—violet for menthol or eucalyptol, red for thymol. Very small amounts of the compounds give these colorations. T. H. POPE.

**Examination of essential oils. IV. Solubility in alcohol. V. Acid and ester values.** L. W. WINKLER (Pharm. Zentr., 1932, 73, 98—101, 181—185; cf. B., 1932, 287).—Solubilities, at  $15^\circ$ ,  $20^\circ$ , and  $25^\circ$  in 70% and 90%  $EtOH$ , of the oils previously described are given and the val. of this determination is emphasised. Acid vals. and ester vals. (saponification with 0.5N-KOH in  $Pr^oH$ ; no reflux condenser necessary) determined in

the hot ( $\frac{1}{4}$  hr. and 1 hr.) and cold (24 hr.) of the same oils are described and the methods are discussed.

E. H. SHARPLES.

**Sicilian essences.** A. H. BENNETT (Perf. Ess. Oil Rec., 1932, 23, 39—41).—A revue of the 1931—2 season's Sicilian lemon oils. The characteristics of 8 samples described varied within the following limits: citral 3.9—4.6%,  $\alpha^{15.5} +63.10^\circ$  to  $67.35^\circ$ ,  $d^{15.5}$  0.8559—0.8572, non-volatile residue 1.78—2.28%. The prep. of machine oils and causes for their frequent rapid deterioration (i.e., loss in citral and increase in resinous matter and free alcohols) are discussed. Two methods by Neuberg, based on the solubility of salicylic acid and the use of the Grignard reagent, for the determination of alcohols have been applied to the examination of lemon oil. Machine oils prepared by an improved centrifuging process have: citral 4.80—5.05%,  $\alpha +58.50^\circ$  to  $66.25^\circ$ ,  $d$  0.8566—0.8587, non-volatile residue 2.42—3.36%. E. H. SHARPLES.

**Essential oil of *Leptospermum Liversidgei*, var. B., and the occurrence of isopulegol.** I. A. R. PENFOLD (J. Proc. Roy. Soc. New South Wales, 1932, 65, 185—193).—Steam-distillation of leaves and terminal branchlets of *L. Liversidgei* gave 0.4—0.64% of oil having  $d_{15}^{20}$  0.8831—0.8985,  $\alpha_D^{20} +9.4^\circ$  to  $+13.4^\circ$ ,  $n_D^{20}$  1.4609—1.4665, ester val. 43.0—47.0, ester val. after acetylation 244—260, solubility in 70%  $EtOH$  (by wt.) 1 in 1.2—1.6 vols., aldehyde content (modified Holtappel method) 33—41.4%. Citronellal,  $d$ - $\alpha$ -pinene, isopulegol (naphthylurethane, m.p. 112—113°), and a sesquiterpene alcohol were present in the oil.

E. H. SHARPLES.

**Ampoule glass.**—See VIII. **Cod-liver oil emulsions.**—See XII. **Ferments in gum arabic.**—See XVII. **Diabetic chocolate.**—See XIX. **Pine oil disinfectants.** **Testing disinfectants.**—See XXIII.

#### PATENTS.

**Obtaining hormones.** SOC. CHEM. IND. IN BASLE (B.P. 368,928, 30.1.31. Switz., 30.1.30).—Aq. liquids containing sex hormones and suitably conc. are saturated with one or more sol. alkali, alkaline-earth, Mg, or  $NH_4$  salts and the ppt. is separated, washed, and purified, e.g., by extraction with anhyd. org. solvents. If the hormone of the anterior lobe of the pituitary gland is also present this may be removed from the ppt. with an aq. org. solvent and then the sex hormone extracted with the anhyd. solvent. E. H. SHARPLES.

**Preparation of antigens.** J. M. SCHAFFER, Assr. to A. M. HYDE (U.S.P. 1,816,026, 28.7.31. Appl., 25.11.30).—The prep. is composed of a heavy suspension of pathogenic bacteria and a bacteria-staining dye, with or without an org. preservative; e.g., for detecting pullorum disease in fowl, a suspension of *Salmonella pullorum* in a saline solution, an excess of crystal-violet, and  $CH_2O$  in an amount sufficient to kill the bacteria forms a prep. which when mixed with blood or serum of infected fowls rapidly agglutinates into deeply stained clumps.

E. H. SHARPLES.

**Production of alkaloids.** A. HOGSTAD, JUN., Assr. to NORTHWEST PAPER Co. (U.S.P. 1,815,302, 21.7.31. Appl., 17.3.26).—Crude alkaloid-containing materials

(such as bark, leaves, roots, seeds, etc. suitably treated to insure free access of liquid) or crude alkaloid extracts are introduced into the compartment of an electrolytic cell, using suitable confining diaphragms if necessary, and a current is passed through the cell. The material is suspended in an aq. electrolyte and by adjustment of the  $p_H$  and the c.d. in the liquor either one pure alkaloid or the total alkaloids may be recovered at the cathode. Quinine may thus be separated from cinchona bark, ergotoxine and ergotinine from ergot, nicotine from tobacco, etc. E. H. SHARPLES.

**Fermentation of tobacco.** K. VIERLING, Assr. to I. G. FARBENIND. A.-G. (U.S.P. 1,812,459, 30.6.31. Appl., 17.2.28. Ger., 24.2.27).—Tobacco leaves are treated with a buffer mixture capable of producing  $p_H$  5–6 during the fermentation. *E.g.*, the leaves are sprayed with a solution of 9 pts. of  $KH_2PO_4$  and 1 pt. of  $K_2HPO_4$  in 100 pts. of  $H_2O$  and left for 24 hr. before being fermented in the usual manner. H. ROYAL-DAWSON.

**Surgical dressings [for wet or dry use].** JOHNSON & JOHNSON (Gt. BRITAIN), LTD. From JOHNSON & JOHNSON (B.P. 368,079, 16.3.31).

## XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

**Practical sensitometry.** H. BAINES (Chem. and Ind., 1932, 175–179).—The exposure and processing of the photographic material are discussed and various densitometers described. C. W. DAVIES.

**Spicer-Dufay colour-film process.** T. T. BAKER (Phot. J., 1932, 72, 109–117).—The new process consists of a 2- or 3-coloured screen ruled on the film base and separated from the emulsion by a gelatin and nitrocellulose varnish layer. The colours have considerable spectral overlap. Copying of reversed negative stock on to negative stock (subsequently reversed) can be done simply and satisfactorily. J. LEWKOWITSCH.

**Reducing and intensifying solutions for motion-picture film.** J. I. CRABTREE and L. E. MUEHLER (Brit. J. Phot., 1932, 79, 106–108, 122–124, 151–153, 169–172, 184–186).—A comprehensive practical investigation of formulæ and methods has been made. In all cases preliminary hardening is recommended. Practical recommendations for Cr, Hg, and Ag intensifiers are given. Belitzski's reducer is modified, using citrate instead of oxalate. Two-solution Farmer's reducer is better than the one-solution. Ferric alum solution is the best proportional reducer, if the film is free from thiosulphate. Sound records can be satisfactorily treated without loss of quality. J. LEWKOWITSCH.

### PATENTS

**Production of photographic images.** L. CRISTIANI (B.P. 367,386, 12.11.30).—Dichromated regenerated cellulose may be used instead of dichromated gelatin as light-sensitive material, a colouring material being incorporated. The colour can be washed out from the unexposed portions by dil. chemical baths, but the cellulose is not dissolved. The process may be applied to 3-colour photography etc. [Stat. ref.] J. LEWKOWITSCH.

**Correction of photographic dye-colour transparencies.** R. J. POMEROY, and PARAMOUNT PUBLIX CORP. (B.P. 367,401, 14.8.30).—The incomplete transparency of a dye image to light of its own colour is corrected by placing in registration with it a corresponding relatively negative image in transparent dye of a colour other than that of the first colour and preferably intermediate between it and its complement. J. LEWKOWITSCH.

**[Multi-screen] printing in colours.** R. G. CAVE (B.P. 367,480, 2.12.30).—The component pictures in a multi-screen colour-printing process may be printed on each other immediately when the colouring matter is an aq. solution of a dye thickened with a suitable  $H_2O$ -sol. thickening agent, *e.g.*, gum tragacanth, wheat starch, etc. The solution may contain a proportion of EtOH. J. LEWKOWITSCH.

**[Movable camera-back] colour photography.** COLOUR PHOTOGRAPHS (BRIT. & FOREIGN), LTD., and L. W. OLIVER (B.P. 368,260, 24.11.30).

**Reproduction of multiple images in colour photography.** W. THORNER (B.P. 368,370, 1.12.30).

## XXII.—EXPLOSIVES; MATCHES.

**Presence [determination] of alkali nitrites in certain smokeless powders.** A. ANGELI and Z. E. JOLLES (Giorn. Chim. Ind. Appl., 1932, 14, 65–68).—The following procedure gives more satisfactory results than those obtained with either Griess' reagent or *m*-phenylenediamine: 2 g. of the powder, scraped off with a piece of glass, are left for 24 hr. in contact with 100 c.c. of  $H_2O$  in a 250-c.c. flask with ground stopper. The liquid is filtered and 20 c.c. of the filtrate are treated with 4–5 drops of aq.  $NH_2Ph.HCl$  (2.3 g.  $NH_2Ph$ , 5 c.c. conc.  $HCl$ , 60 c.c.  $H_2O$ ) and, at once, with 1 c.c. of 12%  $NaOAc$  solution. Addition of 1 c.c. of 12%  $HCl$  after 90 min. gives a bright red coloration. The comparison solution is prepared by dissolving about 3 g. of  $NaNO_2$  in 1 litre of  $H_2O$ , determining the titre of the solution with 0.1*N*- $KMnO_4$ , and diluting to give a 1:1000 concn. of  $NaNO_2$ . The comparison is made in a Duboseq colorimeter. Results obtained with a no. of powders are compared with those of stability tests. T. H. POPE.

### PATENT.

**Cartridges for shot guns.** P. BELL (B.P. 368,393, 22.4.31).

## XXIII.—SANITATION; WATER PURIFICATION.

**Insecticidal action in the nitrogen heterocyclics.** L. C. CRAIG (Iowa State Coll. J. Sci., 1931, 5, 327–330).—Toxicity of heterocyclic N compounds to *Tribolium confusum* increases as the base becomes weaker. CHEMICAL ABSTRACTS.

**Testing of antiseptics and disinfectants.** G. L. A. RUEHLE and C. M. BREWER (Soap, 1932, 8, 99–103, 119–121, 80).—Methods for the determination of phenol coeffs. are compared and a modification which is accepted as the official method of the Food and Drug Administration of the U.S. Dept. of Agriculture is described in detail. Wet and dry filter-paper methods and three agar-plate methods for testing insol. and immiscible products are given. E. H. SHARPLES.

**Important factors in pine oil disinfectants.** E. V. ROMAINE (Soap, 1932, 8, 105—109, 80).—The phenol coeff. increases with the % of *tert.* alcohols in a pine oil; generally, the higher is the alcohol content, the poorer is the emulsifiable property of the oil. The magnitude of the phenol coeff. is dependent on the emulsifiable properties of the oil, the emulsifying properties of the base, and the content of germicidal compounds of the oil. E. H. SHARPLES.

**Dilution of sewage in the sea.** D. ELLIS (J. Roy. Tech. Coll., Glasgow, 1932, 2, 698—707).—From determinations of the dilution of sewage carried out to sea made at radial points of 10, 30, 70, and 150 yds. from the outlet it is considered that the outlet pipe should reach at least 175 yds. from low-water mark in order that the margin of safety for exceptional dilutions should be reached. No reasonable cause for complaint should exist if sewage is discharged 250—300 yds. from the shore. C. A. KING.

**Contamination of ground water by impounded garbage waste.** C. K. CALVERT (J. Amer. Water Works' Assoc., 1932, 24, 266—270).—Liquor produced from the disposal of garbage by cooking in steam-jacketed pressure cookers was impounded with the intention of releasing it to the stream during floods. The impounding pit proved leaky and the liquor polluted two wells which were used to supply boiler and condenser water and rendered them unfit for use because of the high org. content and hardness. The increase in the latter is almost all temporary, and it is suggested that it is due to the action of org. acids on limestone and a subsequent change in condition by bacterial action. C. JEPSON.

**Development of the Delmenhorst waterworks and practical experience on the precipitation of iron and humic acid.** G. FRANKE (Gas- u. Wasserfach, 1932, 75, 41—46).—The H<sub>2</sub>O contains, before purification, 9.4 mg. Fe, 0.4 mg. Mn, and 278.6 mg. of residue per litre, together with a high content of free CO<sub>2</sub> and a hardness of 8.3°. Reducing compounds present correspond with a consumption of 34.5 mg. KMnO<sub>4</sub> per litre. Purification is effected by spraying the H<sub>2</sub>O over coke filters, adding 8 g. KMnO<sub>4</sub> per cub. m., and filtering through sand; the effluent is free from Mn and humic acid and contains < 0.1 mg. Fe per litre. Attempts to purify the H<sub>2</sub>O by addition of Fe<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub> to give an excess of Fe<sup>+++</sup> over that required to ppt. the humic acid, followed by filtration through sand and then through marble to remove SO<sub>4</sub><sup>—</sup> and free CO<sub>2</sub>, failed to give satisfactory results on a production basis. The layout of the recently reconstructed works is described and illustrated. A. R. POWELL.

**Sterilisation of sand filters [in waterworks].** F. MEYER (Gas- u. Wasserfach, 1932, 75, 29—30).—Complete removal of *B. coli* from sand filters requires prolonged treatment with a high concn. of Cl<sub>2</sub>. In an example quoted, the sand became sterile after treatment with 1500 g. Cl<sub>2</sub> per hr. (= 35 g. per cu. m. of wash H<sub>2</sub>O or 100 g. Cl<sub>2</sub> per cu. m. of sand). Such severe treatment destroys the layer of algæ on the walls of the container, which layer, according to some authorities, serves to protect these walls from attack by the H<sub>2</sub>O. A. R. POWELL.

**Taste and odour removal [from public water supplies].** L. F. WARRICK and O. J. MUEGGE (J. Amer. Water Works' Assoc., 1932, 24, 242—248).—A general review of the causative processes and of the usually adopted preventative measures. C. JEPSON.

**Use of ammonia at Tampa water-purification plant.** J. E. LYLES (J. Amer. Water Works' Assoc., 1932, 24, 271—276).—This plant, which deals with 12 million gals. per day from the Hellsborough river, has been troubled with an unpleasant taste and odour in the finished water. Since June, 1930, 2 lb. of NH<sub>3</sub> per 10<sup>6</sup> gals. have been introduced just after filtration and enough ahead of chlorination to ensure adequate mixing, with a subsequent addition of CaO to maintain the pH at 7.8, whereby taste and odour were eliminated, sterilisation was rendered more effective, and after-growths were prevented. The Cl<sub>2</sub> dose has been reduced from 14 to 2.4 lb. per 10<sup>6</sup> gals. with an estimated net annual saving of \$2000. C. JEPSON.

**Necessity of *B. coli* tests in addition to counts of total organisms in the examination of drinking water.** R. HEY (Gas- u. Wasserfach, 1932, 75, 182—185).—Instances are given where reliance on total counts alone would have led to misleading conclusions as to the suitability of H<sub>2</sub>O for drinking. The presence of *B. coli* is a certain evidence of pollution, and the two tests should be used to supplement each other. It is advisable to test cultures for *B. coli* both at 37° and at 45—46°. Waterworks should test regularly both the crude and the treated H<sub>2</sub>O in this way. C. IRWIN.

#### PATENTS.

**Sterilising compositions.** PARKER, WHITE & HEYL, INC., Assees. of L. C. HIMEBBAUGH and P. P. GRAY (B.P. 368,123, 20.4.31. U.S., 2.5.30).—A sterilising solution for surgical instruments etc. is claimed in which the germicide and solvent are readily volatile and contain a min. amount of H<sub>2</sub>O, the corrosive action of which is further reduced by the addition of a small amount of KNO<sub>2</sub>. Suitable proportions are: formalin 8 c.c., EtOH 92 c.c., KNO<sub>2</sub> 0.1 g. in 1 c.c. of H<sub>2</sub>O, and NaOH 0.02 g. in 0.2 c.c. of H<sub>2</sub>O. C. JEPSON.

**Indicating and regulating the content of chlorine or similar water-purifying agents in flowing water or sewage.** G. ORNSTEIN (B.P. 367,821, 19.9.30).—The process is applicable to cases in which the purifying agents are altered by the constituents of the H<sub>2</sub>O. The difference of potential produced between two electrodes, immersed in the treated and the untreated H<sub>2</sub>O, is used to indicate the free Cl<sub>2</sub> content and to regulate its rate of application. The electrodes need not be dissimilar, but the one in the treated H<sub>2</sub>O should lie on the positive side of an electromotive series in which H is zero. They may be placed in the main conduit, above and below the point of treatment, or in an electrolytic cell through which streams of treated and of untreated H<sub>2</sub>O are passed, and are connected together through a galvanometer the needle of which operates the device regulating the addition of the purifying agent. C. JEPSON.

**Water-softening apparatus.** W. P. REYNOLDS (B.P. 368,297, 25.11.30).

**Hardness tester for water.**—See I.