

# BRITISH CHEMICAL ABSTRACTS

## B.—APPLIED CHEMISTRY

DEC. 7, 1928.

### I.—GENERAL; PLANT; MACHINERY.

**Pulverising hard substances.** H. VON WARTENBERG [with B. STRZELCZYK and G. BORRIS] (Chem. Fabr., 1928, 617—619).—The degree of contamination of samples of alumina, fused zirconia, quartz, and glass after grinding to an "impalpable" powder in mortars of various materials has been determined. Least contamination is obtained in mortars of "Widia" metal (tungsten carbide in cobalt), but thickly chromium-plated steel and 12% manganese steel behave almost as well and have the advantage that the contamination is readily removed by treating the comminuted sample with hydrochloric acid. Agate mortars lost twice as much and porcelain mortars six times as much in weight as manganese steel mortars. Hammering in "diamond-steel" mortars of non-splitting manganese steel, using heavy blows, will reduce up to 30% of the sample through a screen with 0.1 mm. holes without introducing any appreciable contamination.

A. R. POWELL.

**Efficiency and economics of so-called "colloid mills."** F. HEBLER (Chem. Fabr., 1928, 581—582).—Experiments are recorded which show that colloid mills of the type of the Plauson mill are very inefficient both as regards fineness of the product and power consumption. On the average only about 25% of the substance is comminuted into particles having a diameter smaller than  $100\mu$  in 30 min., and this percentage increases only very slowly with more prolonged treatment. The power consumption to obtain 25% smaller than  $100\mu$  in 30 min. is of the order of 80 kw.-hr./100 kg., and to obtain 30% smaller than  $100\mu$  in 45 min. it is about 275 kw.-hr./100 kg.

A. R. POWELL.

**Filtration apparatus for washing nickel catalyst.** Y. SOSENSKI (Oil Fat Ind. Russia, 1926, No. 7—8, 68—70).—An open container is provided with a discharge pipe and valve leading to a second container. Close to the bottom of the first container are two perforated plates carrying a filtering cloth, the catalyst and solution above the plates being mechanically agitated. The drum-container, provided with a level-gauge, is connected to a vacuum pump and discharges into a third container (Russ. Pat. 2364 of 1925). CHEMICAL ABSTRACTS.

**Prevention of frothing during vacuum evaporation.** R. KUMMER (Pharm. Ztg., 1928, 73, 1246—1248).—Two forms of apparatus are described for the evaporation of froth-forming solutions under reduced pressure. The principle used in each case is the repeated destruction of the froth by admitting periodically a small volume of air into the heating vessel. In one modification this is effected by means of a motor-driven eccentric disc which opens and closes a valve through which a

regulated volume of air is admitted to the heating vessel. The regulator in the other modification comprises a mercury valve consisting of two tubes, one inside the other, terminating at their upper ends in splash traps, the lower end of the outer tube being closed and filled with mercury into which the lower end of the inner tube dips. The upper parts of the traps are connected to one another by means of a horizontal tube carrying a stopcock. The whole is arranged as a manometer to the distillation vessel so that the pressure in the heating vessel may be maintained at any desired value.

A. R. POWELL.

**The Cottrell-Moeller process [for precipitation of dust from gases].** P. VER EECHE (Bull. Féd. Ind. Chim. Belg., 1928, 7, 293—305, 341—364).—The theory and history of the precipitation of mist and dust by the electrostatic field is summarised. There are three main types of precipitator: (A) That in which the electrodes are respectively a metallic tube and a wire hung axially. This is heavy, but permits of slow gas speeds and a maximum potential difference as the field is uniform. It is important in the metallurgy of non-ferrous metals and in blast-furnace gas purification. (B) The type with curved sheets arranged between the discharging points. This is lighter, permits of higher gas velocity, and gives less current loss, but the purification is not so good. The later forms provide for a horizontal gas flow and vertical collecting surfaces. (C) Type consisting of screens of fine wire netting. This is cheap and light, but only gives moderate yields. It is suitable for the recovery of dusts of low value from large gas volumes. The degree of purity required for any gas is determined by economic considerations. Fractional precipitation may be arranged. The transformers usually work at 50,000—60,000 volts, but should be capable of resisting a 50—100% overload in case of short-circuits in the precipitator. The types of transformers and insulation problems are discussed. The power consumption of a Cottrell plant is 3—35 kw./1000 m.<sup>3</sup> of gas. In the cement industry the Cottrell process has rendered recovery of potash possible. For complete volatilisation a temperature of at least 1100° is necessary. Chlorides accelerate volatilisation, but sulphates retard it. From 59% to 98% of the potash is recovered in a soluble form. In some cases it has been profitable to increase the output of potash by adding felspar. In metallurgy Cottrell plants have application in the recovery of dusts, in the drying of slimes, and in the recovery of arsenic, copper, tin, mercury, lead, and zinc from roaster gases. These and other metals are also recovered from the gases from converters, cupelling furnaces, from the preparation of alloys, etc. A Cottrell plant serving for the lead, copper,



zinc, and other dusts from a Belgian metal works is described in detail. It treats 20 m.<sup>3</sup> of gas per sec. at 70° containing 2–3 g. of dust per m.<sup>3</sup>. The gases are humidified to 30–40%.  
C. IRWIN.

**Carbon dioxide foam in fire extinguishers.** J. BRANDL (Kolloid-Z., 1928, 46, 145–148).—A discussion on fire extinguishers.  
E. S. HEDGES.

See also A., Nov., 1180, **Thermal conductivity of gas mixtures** (GRÜSS and SCHMICK). **Determination of concentration of solutions** (JAEGER). 1183, **Permeability of colloidal substances to gases** (KANATA). 1190, **Distillation of liquid mixtures** (TSUKAMOTO). 1195, **Crystallisation velocity in binary mixtures** (RAWITZER). 1205, **Micro-elementary analysis** (GOUBAU). 1208, **Pipette viscosimeter** (FERRIS). **Resistance thermometer** (MICHELS and GEELS). **Thermostat** (NOYES).

**Tintometer.** PARKER.—See XV.

#### PATENTS.

**Furnaces for steam boilers, retorts, etc.** R. HICKTON, W. W. BAGGULEY, G. BIRKS, and R. G. HICKTON (B.P. 297,395, 18.3.27).—The air for combustion is preheated in the hollow walls of the furnace, the bricks are so laid that there is no straight-through joint through which gases might percolate through the walls. A suitable form of brick or block is described in B.P. 296,033.  
B. M. VENABLES.

**Heat exchangers.** COMP. DES SURCHAUFFEURS (B.P. 292,070, 5.6.28. Fr., 11.6.27).—In a heat exchanger with vertical flow, the outer fluid is exhausted through a siphon pipe with substantially equal legs, the height of the whole siphon being adjustable so that more or less of the heat-interchanging surface is effective. The position of the siphon may be controlled by a thermostat.  
B. M. VENABLES.

**Heat exchangers** S. ROBSON (B.P. 297,509, 28.6.27).—A heat exchanger of the bundle of tubes type is made suitable for gases which may deposit corrosive liquid (e.g., sulphur dioxide or trioxide in the "contact" sulphuric acid process) by arranging the tubes vertically and dishing the tube plates so that any liquid can be drained away through pipes provided from the outside of the upper tube plate and from the inside of the lower. The side entry and outlet for the outer fluid is also arranged as a trunk surrounding a large arc of the shell with numerous inlets thereinto, giving an even distribution of the gas.  
B. M. VENABLES.

**Heat exchangers.** J. HEIZMANN (B.P. 297,643, 7.3.28).—A heat exchanger is constructed in the form of a column built up to any height from interchangeable units, which permit one fluid to flow horizontally and the other vertically. Different forms of connecting passages and baffles are provided, so that the horizontally-flowing fluid may pass many times through paths of narrow cross-section or fewer times through those of larger cross-section.  
B. M. VENABLES.

**Heat-exchange or sterilising apparatus.** R. SELIGMAN (B.P. 297,589, 3.11.27).—In heat exchangers or sterilisers consisting of a number of plates assembled as in a filter press, to cause the liquid to pass over the

plates in a uniform layer, a groove is formed in the inlet side of the plate, which gets shallower as it extends across the edge of the plate from the inlet port, and at the outlet side is another groove, which gets deeper in the same direction towards the outlet port at the corner opposite to the inlet. The grooves may have ridges of varying height alongside them.  
B. M. VENABLES.

**Grinding mills.** MACAO-WALZENMÜHLENGES. M.B.H. (B.P. 291,803, 9.6.28. Ger., 9.6.27).—A number of planetary grinding discs rotate against a plane disc, the planetary discs are preferably eccentric to the axes of their gear wheels, and may be oval or other shape not circular. The disc mill may be combined with a planetary roller mill, the latter performing some of the grinding and forcing the material into the former.  
B. M. VENABLES.

**Whirling mill for the production of finely-divided powder.** E. PODSZUS, Assr. to HARTSTOFF-METALL A.-G. (HAMETAG) (U.S.P. 1,685,956, 2.10.28. Appl., 8.10.23. Ger., 21.9.23).—Within a casing which is normally closed, two propellers facing each other revolve in opposite directions producing currents of air and powder which thrust against each other while whirling. Recesses are formed in the walls of the casing behind the propellers.  
B. M. VENABLES.

**Elutriators for testing finely-divided, pulverulent, or like materials.** L. ANDREWS (B.P. 297,369, 14.6.27).—An elutriator, arranged for rapid working and with provision for subjecting the inflowing pulp to impact to break up agglomerations, is described.  
B. M. VENABLES.

**Producing homogeneous mixtures of pulverulent materials.** M. VOGEL-JORGENSEN (B.P. 273,768, 4.7.27. Denm., 2.7.26).—The production of a perfect mixture of dry materials of constant composition though the constituents may vary is effected as follows. Each constituent is "homogenised" separately by aeration and stirring, then proportions of each to give the required final composition are mixed together by similar means. The final homogenising is performed in one of the vessels in which one of the constituents was homogenised, and may be done before the final grinding. The method is suitable for the production of cement by the dry process. [Stat. ref.]  
B. M. VENABLES.

**Separation of solid materials of different sp. gr.** G. RAW (B.P. 297,757, 26.5.27).—The material is stratified by the action of air coming up through a pervious shaking table, and flows in a longitudinal path which is alternately parallel and tapering. At the constrictions or tapered portions the deck has a steeper slope and should not be perforated for air currents. Skimmers for removing the upper strata are provided in the parallel zones just before the constrictions.  
B. M. VENABLES.

**Separation of dry materials.** H. M. SUTTON and W. L. and E. G. STEELE (B.P. 297,876, 30.6.27).—Various forms of a shaking table with deck pervious to air currents and provided with riffles are described.  
B. M. VENABLES.

**Mixing solids with liquids.** W. EVANS, Assr. to NAT. ALUMINATE CORP. (U.S.P. 1,686,076, 2.10.28.



Appl., 6.6.27).—A continuous stream of pulverised solids is projected at high speed against the surface of the liquid with which it is to be mixed.

H. ROYAL-DAWSON.

**Stabilisation of disperse systems with coherent liquid phases.** H. RINDERKNECHT (Swiss P. 121,097, 4.12.25).—Systems such as a clay soil are converted into a reversible product by the addition of salts of organic acids of high mol. wt., *e.g.*, weakly ammoniacal "noriganth" mucilage, followed by an organic acid capable of decomposing the previously added salt, *e.g.*, oxalic acid. A gelatinous product is obtained which can be liquefied by mechanical shock. L. A. COLES.

**Pulp-straining machines.** J. WHITE (B.P. 297,649, 31.3.28).—In a machine of the type where a pervious drum rotates in a bath of the pulp and a diaphragm is reciprocated near the surface of the drum, the diaphragm is extended from the usual quarter circumference to embrace three quarters of the circumference in three sections, the middle and lower ones being reciprocated as usual and causing the upper sections to swing so that all parts of the diaphragm move in an approximately radial, and therefore efficient, path.

B. M. VENABLES.

**Thickening apparatus [for hot pulp].** H. S. COE (U.S.P. 1,686,203, 2.10.28. Appl., 9.1.25).—The feed flows over a horizontal baffle down the outside of a "heat-transferring wall" or cylindrical container suspended within the tank, and the clear overflow is withdrawn from the interior of the heat-transferring wall.

B. M. VENABLES.

**Presses for the treatment of moist materials.** F. KRUPP GRUSONWERK A.-G. (B.P. 284,694, 20.1.28. Ger., 5.2.27).—In an extraction press of the type in which a worm presses the material through a passage of diminishing size, the passage is formed in alternate parallel and tapering zones and the blades of the worm are omitted in the tapering zones. B. M. VENABLES.

**Continuous countercurrent treatment [filtration] of liquids and solids.** F. W. MANNING (U.S.P. 1,686,092—4, 2.10.28. Appl., [A] 20.3.26, [B] 11.4.27, [C] 21.6.27).—In (A) a treating solid is added to the liquid and the liquid filtered through the solid. In (B) and (C) the filter surface is continuously renewed by unwinding a strip of fabric. B. M. VENABLES.

**Filter.** H. WITTENBERG (G.P. 450,388, 15.7.26).—In a continuously operated filter, sludge is forced forward without turbulence into a channel formed between more or less parallel porous plates, and is washed by percolation of washing fluid through the mass.

J. S. G. THOMAS.

**Apparatus for mixing and spraying liquids.** F. E. SMITH, A. P. H. DESBOROUGH, W. T. THOMSON, H. F. REYNOLDS, and E. W. BLAIR (B.P. 297,558, 26.8.27).—The liquids are admitted separately into an outer tube and pass up to the closed end within which a whirling cup is situated; the liquids pass tangentially into the cup and out downwards through an inner tube.

B. M. VENABLES.

**Filters or separators [for liquids]. Apparatus for separating liquids.** B. D. COMYN and L. ROTTENBURG (B.P. 247,936 and 297,551, [A] 25.8.27, [B]

10.8.27).—(A) An emulsion of liquids, *e.g.*, oil and water, is passed through screens of filamentary material, at least partly composed of wire, the disperse phase being thereby caused to coalesce, and the two liquids are then separated by gravity, *e.g.*, in apparatus as described in (B) in which the mixture of liquids of different density is fed to the axis of a vertical cylindrical tank and passes outwards between spiral guides without eddies or oscillation and with gradually decreasing velocity, the separated lighter and heavier liquids being drawn off near the periphery through adjustable outlets at the top and bottom respectively. B. M. VENABLES.

**Centrifugal separators.** SUNDERLAND FORGE & ENGINEERING Co., LTD., and G. BLAIR (B.P. 297,914, 26.7.27 and 11.1.28).—A centrifugal separator which operates by density has a cylindro-conical bowl and horizontal axis; the pulp is fed well into the wider cylindrical end by means of a distributor, and does not pass through a hollow shaft. The separated liquor overflows at the wide end over an adjustable lip, whilst the solids are caused to travel in the opposite direction by means of an internal worm rotating at a speed slightly different from that of the bowl. B. M. VENABLES.

**Centrifugal separators.** AKTIEBOLAGET SEPARATOR (B.P. 292,594, 11.6.28. Swed., 23.6.27).—In a separator provided with a number of conical discs, the feed holes are formed through the inner non-conical flanges bounding the discs, and the caulks for separating the discs are also between the flanges. B. M. VENABLES.

**Hydro-extractors and like centrifugal machines.** K. F. G. VENZKE (B.P. 297,616, 5.1.28).—In a centrifugal machine having a horizontal shaft, a perforated basket, and mechanical means for continuously removing the collected solids, baffles and guides are provided to prevent flow of liquid into the wrong outlet of the machine. B. M. VENABLES.

**Horizontal evaporator.** E. SCHLEGEL (G.P. 446,659, 13.6.22).—Horizontal boiling tubes, partly filled with liquid, are arranged in sequence above one another, and liquid to be evaporated overflows from the tubes over hoods placed in the tubes below. J. S. G. THOMAS.

**Purifying air or other gases.** W. H. TAYLOR and C. SHAW (B.P. 297,510, 29.6.27).—Air or other gas leaving air compressors or other blowers is caused to change its direction several times and finally passes through a fabric filter. B. M. VENABLES.

**Extraction of dust from gas.** T. THOMSON and N. NISBET (B.P. 297,543, 23.7.27).—The stream of dust-laden air enters a first separator tangentially to produce a whirling motion, and a first portion of clean air is withdrawn from the axis of that separator. The dust and some air pass downwards and circumferentially into a second separator provided with baffles, where the dust is finally collected and the remaining air is withdrawn, preferably by a fan which returns it to the original ingoing stream of air. B. M. VENABLES.

**Viscosimeter.** J. WOUDHUYSEN and G. ORY (U.S.P. 1,685,896, 2.10.28. Appl., 7.7.27).—The liquid to be tested is placed in a cup-like container in the bottom of which is a nozzle having an internal valve seating co-operating with a valve that forms part of a tubular



fitting containing a thermometer, the bulb of which dips into the liquid. Means are provided for opening and closing the valves and for collecting the liquid which flows through the nozzle. H. ROYAL-DAWSON.

**Apparatus for carrying out chemical reactions between gases, or vapours, or gases and vapours.** H. HARTER (B.P. 298,108, 1.7.27).—See U.S.P. 1,678,778; B., 1928, 697.

[Heating apparatus for] burning of [atomised] liquid fuel. J. N. WETHERILT and T. G. WILLIAMS (B.P. 298,146, 4.7.27).

**Manufacture of containers, or capsules, for liquids, or gases, under pressure.** R. H. CAMPBELL, and SPARKLETS, LTD. (B.P. 298,278, 11.7.27).

**Oil from oil-laden gas** (B.P. 297,622).—See II. **Heat-insulating sheets** (B.P. 274,471).—See IX. **Gas purification** (G.P. 448,034, 447,912, 450,391, 448,505, 450,392, and 448,691).—See XI.

## II.—FUEL; GAS; TAR; MINERAL OILS.

**Composition of coal. Oil-yielding constituents.** R. HOLROYD and R. V. WHEELER (J.C.S., 1928, 2669—2677).—Results of coal distillation experiments are correlated with those of solvent analysis, using a bright coal from the Wigan Six-Foot seam. 250 g. of coal were slowly heated *in vacuo* at successive temperatures from 100° to 550°, in an apparatus similar to that used by Burgess and Wheeler (cf. B., 1914, 191), and the products were collected and examined. Hydrocarbons and resins extractable from the coal by organic solvents yield a high proportion of the oils obtained on distillation, the former being distilled unchanged quantitatively and the latter partly distilled and partly decomposed. The coal has a definite thermochemical decomposition point (318°) unaltered by changes in experimental conditions. This decomposition (of the ulmin constituents) yields water, phenolic substances, and hydrocarbon oils, and once the decomposition point has been passed the character of the coal, as shown by its behaviour towards solvents, its caking power, and reactivity, undergoes a sudden and marked change. These conclusions are confirmed by the examination of a number of bituminous coals. C. B. MARSON.

**Chemical constitution of peat. I. Chemical nature of organic complexes in peat and methods of analysis.** S. A. WAKSMAN and K. R. STEVENS (Soil Sci., 1928, 26, 113—137).—A division into the fractions ether-soluble, soluble in hot and in cold water, alcohol-soluble, hemicelluloses, pentosan, celluloses, lignin, crude protein, and ash accounts for about 90% of the peat and serves to distinguish between peats of different origin. A comparison of different peats and of the plants responsible for their formation is made, and the differences are discussed. H. J. G. HINES.

**Heat of combustion of foundry coke and other varieties of carbon.** W. A. ROTH (Arch. Eisenhüttenw., 1928—9, 2, 245—247; Stahl u. Eisen, 1928, 48, 1442—1443).—The calorific value of coke containing 1% S calculated on an ash- and moisture-free basis is  $7966 \pm 10$  g.-cal./g. The calorific value of  $\alpha$ -graphite,  $d$  2.28, formed at low temperatures under high pressure, is

$7832 \pm 2$  g.-cal./g., that of  $\beta$ -graphite,  $d$  2.22, formed at high temperatures under low pressure, is  $7856 \pm 2$  g.-cal./g., and that of "amorphous" carbon,  $d$  1.86, is 8148 g.-cal./g. The last-named becomes denser and the calorific value becomes lower after heating above 1000° owing to slow transformation into graphite taking place. Carbon deposited from acetylene at a high temperature is almost pure graphite with a calorific value of 7886 g.-cal./g., whereas that deposited on a cold metal plate held in the acetylene flame has a calorific value of 8130 g.-cal./g. Carbon from methane and from carbon monoxide is  $\beta$ -graphite, whereas "temper" carbon is  $\alpha$ -graphite. A. R. POWELL.

**Bunsen flames of unusual structure.** F. A. SMITH and S. F. PICKERING (Ind. Eng. Chem., 1928, 20, 1012—1013).—Mixtures of air or oxygen with propane or acetylene were burnt and the structures of the flame observed. Using acetylene-air mixtures several types were observed, viz., four distinct combustion zones, two zones which merged, and sometimes flame with a hollow dark core. When secondary air was excluded the primary combustion surface of propane-air mixtures became polyhedral and, depending on their composition, could be made to rotate or remain stationary. The number of sides is a function of the burner size and the gaseous composition. Primary zones of certain propane-oxygen mixtures, burning in secondary air, were polyhedral, with luminous streamers rising from the tip and corners of the flame. Mixtures containing more than 33% O<sub>2</sub> caused the flame to rotate, the speed of rotation increasing with oxygen content. Photographs of the flames described above are given. C. B. MARSON.

**Diffusion flames.** S. P. BURKE and T. E. W. SCHUMANN (Ind. Eng. Chem., 1928, 20, 998—1004).—The term "diffusion" flames is applied to flames in which the combustible gas is not mixed with air prior to combustion. The theory is advanced that in these flames the combustion is controlled by the rate at which the gas and air mix by diffusion. An expression is derived theoretically, based on certain assumptions, which enables the physical characteristics of "diffusion" flames to be calculated. In an experimental investigation the flames were produced by passing gas up an inner duct with a definite velocity and burning it in a mixture of oxygen and nitrogen moving up an outer duct with the same velocity. By varying the composition of the mixture the gas was burnt in either an insufficiency (underventilated) or an excess (overventilated) of oxygen. The results obtained by varying different factors individually supported the proposed theory. Keeping the flow of gas and air constant, the height of the flame varied directly as the widths of the ducts for flat flames, but cylindrical flames are not affected. The height varies with the coefficient of diffusion and directly as the velocity of flow. The effect of adding an inert gas or a small amount of oxygen to the combustible gas is to increase the height of underventilated, and diminish that of overventilated, flames. The larger the quantity of oxygen required by a gas for its combustion the taller is the flame if overventilated, and the shorter if underventilated. The



effect of varying the pressure and of preheating the gas and air was small. A method is given for deriving the coefficients of diffusion from analyses of samples of gas taken at points along the axis of the flame.

F. J. DENT.

**Flicker of luminous flames.** D. S. CHAMBERLIN and A. ROSE (Ind. Eng. Chem., 1928, 20, 1013—1016).—The luminous flames of various gases have been filmed. The gas was supplied at constant pressure and known rate to a burner, fitted with a lava tip and having no air ports, situated in a cubical asbestos box provided with a quartz window and an adjustable top opening by means of which the draught was regulated. The flames were photographed, at a distance of 2.29 m., with a moving-picture camera allowing of 32 exposures per sec. Hydrogen, carbon monoxide, and hydrogen sulphide flames were not sufficiently actinic to affect the film under these conditions. The films obtained with the flames of natural gas, ethylene, methyl chloride, ethane, and butane, when developed, revealed a series of flame images which identifies the flicker with an up-and-down motion confined to the upper and middle portions of the flame, and shows the downward movement to be extremely rapid. The lower portion of the flame remains quite steady, but periodically emits another flame which, though of short existence, rises above the main flame. The rate of vibration, flame speed, and amplitude of vibration were determined under different conditions. The rate of vibration for the flames of all the gases investigated was of the order of 10 per sec., and was almost independent of the rate of flow of gas, the atmosphere in which the flame burns, the tip of the burner, and the magnitude of the draught.

A. WILSON.

**Radiant energy from flames.** W. E. GARNER (Ind. Eng. Chem., 1928, 20, 1008—1012; cf. Johnson, A., 1928, 353).—A discussion of the thermal and chemiluminescence theories of radiant energy from flame leads to the conclusion that the emission is very largely chemiluminescence. The effects of the addition of oxygen, nitrogen, and hydrogen on the emissivity from carbon monoxide and oxygen have been investigated. The apparatus used has been described by Garner and Johnson (A., 1928, 375). Oxygen and nitrogen, while decreasing the flame temperature, increase the emissivity; this evidence supports the above conclusion. Hydrogen (2%), while increasing the temperature and accelerating the speed of the flame, diminishes the radiation sevenfold. This conservation of chemical energy within the flame is termed "energo-thermic catalysis." Measurements of the total radiation from, and the speeds of, the carbon monoxide flame show that the decrease in emissivity on the addition of hydrogen takes place in a stepwise manner, the step occurring in the vicinity of 0.03% H<sub>2</sub> (cf. Garner and Roffey, A., 1928, 105). It is concluded that hydrogen acts as a catalyst in the chemical sense when its percentage exceeds 0.02, whereas the energo-thermic effect is present throughout the range of concentrations up to 2%. In the latter case the deactivator is either the proton or the electron; collisions between the products of combustion and protons or electrons conserve the chemical energy within the flame.

A. WILSON.

**Measurement of the temperature of stationary flames.** A. G. LOOMIS and G. ST. J. PERROT (Ind. Eng. Chem., 1928, 20, 1004—1008).—The concept of temperature as applied to flames is discussed. Proposed methods for measuring the temperature of flames are critically reviewed. Methods which depend on the immersion of thermo-couples or wires into flames cannot be used above 1800°, and the possibility of catalytic action makes their results uncertain. The method of Kurlbaum and Féry depending on spectral-line reversal is described and examined in detail. It was adopted by the authors as being the most free from theoretical objections, and the experimental manipulations involved are made easily and rapidly. The flame temperatures of Pittsburg natural gas, methane, propane, and carbon monoxide have been measured by this method for various gas-air ratios. The maximum temperatures observed were 1875°, 1878°, 1935°, and 1960°, respectively. The difference between the observed and the calculated values is explained by radiation from the flame and possible inaccuracy of the specific heat data.

F. J. DENT.

**Some flame characteristics of motor fuels.** G. B. MAXWELL and R. V. WHEELER (Ind. Eng. Chem., 1928, 20, 1041—1044; cf. B., 1928, 511).—In order to ascertain the cause of "pink" or "knock" of motor fuels, a photographic study has been made of the movement of flames, simultaneously with measurements of the development of pressure during the explosion of a charge within a stainless-steel cylinder. Explosions of mixtures of pentane and air, and benzene and air, at various temperatures and pressures, and various blended mixtures of benzene and pentane, and of ethyl ether with pentane, have been studied. In a pinking explosion, e.g., pentane-air mixtures at high initial pressures, combustion is not complete in the flame front, but some additional impetus, such as impact of the flame with the end of the cylinder, appears necessary to cause completion of the reactions, which then take place almost instantaneously with a sudden increase of pressure. Combustion reactions are complete behind the flame front in non-pinking explosions such as those of benzene-air mixtures. The effects of length and shape of cylinder and also the effects of turbulence and the addition of anti-knock compounds are discussed. The action of lead tetraethyl seems to depend on the decomposition products of the compound rather than on the compound itself.

G. CLAXTON.

**Relative rates of reaction of olefines in combustion with oxygen and in oxidation with aqueous potassium permanganate.** H. S. DAVIS (Ind. Eng. Chem., 1928, 20, 1055—1057).—Various mixtures of ethylene and propylene and ethylene and isobutylene were exploded with oxygen and the resulting gases were analysed. In all experiments the ethylene was less readily oxidised than either propylene or isobutylene. Solutions of ethylene and isobutylene in water were oxidised at room temperature with a deficiency of potassium permanganate. After oxidation the dissolved gases were boiled off and analysed. As before the ethylene was less readily oxidised. The ratios of the relative rates of reaction of ethylene, propylene, and isobutylene were: for combustion with oxygen, 1 : 1.7 :



2.8, respectively; for oxidation with aqueous permanganate, 1 : — : 1.6. Analogies between the reaction of olefines with oxygen and bromine are pointed out.

G. CLAXTON.

**Action of accelerators and inhibitors upon the oxidation of liquid hydrocarbons.** T. E. LAYNG and M. A. YOUKER (Ind. Eng. Chem., 1928, 20, 1048—1052. Cf. Moureu, Dufraisse, and Chauv, B., 1927, 243, 512, 692; Callendar, B., 1926, 618; 1927, 272).—An apparatus has been devised and a method described for determining the effect of inhibitors and accelerators of knock on the slow oxidation of hydrocarbon fuels. Data are given to show the effect of various substances on the slow oxidation of *n*-heptane, gasoline, and kerosene at temperatures above 160°. Aniline, diphenylamine, lead tetraethyl, and potassium ethoxide all appear to be inhibitors of gas-phase oxidation, but lead tetraethyl and sodium and potassium ethoxides are accelerators of liquid-phase oxidation when present in extremely small percentages, and exhibit surprisingly similar properties. It would appear that an ideal anti-knock mixture might be obtained by incorporating a powerful inhibitor of only vapour-phase oxidation with another of only liquid-phase oxidation.

G. CLAXTON.

**Importance of mixture ratio in rating fuels for knock.** J. M. CAMPBELL, W. G. LOVELL, and T. A. BOYD (Ind. Eng. Chem., 1928, 20, 1045—1048).—In knock testing by means of comparisons between some standard fuel and the fuel under test, no satisfactory agreement has been observed between the results obtained using different methods for testing the same fuels. The present authors show that the tendency to knock is very sensitive to changes in the mixture strength, and the use of mixture ratios giving the maximum knock for each fuel is suggested as a convenient means for obtaining more consistent results between different laboratories.

G. CLAXTON.

**Peat tar.** G. STADNIKOV and N. TITOV (Brennstoff-Chem., 1928, 9, 325—326).—The low-temperature tar from a sphagnum peat has been examined. Addition of ether precipitated 6% of a black solid soluble in amyl alcohol and pyridine. Steam distillation, after evaporation of the ether, yielded 15.1% of a volatile fraction, containing 0.48% of basic and 2.4% of acidic constituents (calculated on the dry tar). By treatment of the residue with light petroleum and extraction of the precipitated pitch with benzene, 11.6% of "asphaltene" was obtained. 11.2% of solid paraffins, 13.8% of resins, 0.44% of bases, and 7.1% of tar acids were separated from the fraction soluble in light petroleum. The solid paraffins contained unsaturated compounds and possessed rather high acid and saponification values. The neutral oils consisted principally of unsaturated hydrocarbons and compounds containing oxygen.

A. B. MANNING.

**Theory of the formation of petroleum.** II. **Composition of the low-temperature tar from Mataganski boghead coal.** G. STADNIKOV and Z. VOSSCHINSKAJA (Brennstoff-Chem., 1928, 9, 326—328; cf. B., 1928, 735).—All the tar fractions contain considerable quantities of oxygen compounds. On

oxidation by permanganate they yield principally monobasic aliphatic acids. The highest-boiling fractions contain appreciable quantities of free acids and anhydrides. It is concluded that Mataganski boghead coal, like that of Tschermchovski, consists of polymerised fatty acids.

A. B. MANNING.

**Treatment of Baku lubricating oil distillates by German plant.** K. KOSTRIN (Azerbeid. Neft. Choz., 1928, No. 5, 55—57).—Details of treatment of solar oils with sulphuric acid, sodium hydroxide, and water for the production of transformer oils, medicinal white oil, turbine oils, machine oil, cylinder oils, and spindle oils are recorded.

CHEMICAL ABSTRACTS.

**Determination of aromatic hydrocarbons in petrols by means of the "alcohol value."** K. R. DIETRICH (Auto-Technik, 1927, 16, 7—9; Chem. Zentr., 1927, II, 2528).—The aromatic hydrocarbon content of a petrol can be obtained with sufficient accuracy for practical purposes from its "alcohol value," *i.e.*, the critical dissolution temperature of a mixture of 7 pts. (by wt.) of the petrol with 3 pts. of 96% alcohol. The method cannot be applied to petrols containing an abnormally high content of unsaturated hydrocarbons, but is not appreciably affected by the amounts usually present in straight-run petrols. An approximate idea of the naphthene content of the petrol can be obtained from the "alcohol curve." A relationship exists between the tendency of a petrol to "knock" and its "alcohol value."

A. B. MANNING.

See also A., Nov., 1182, **Wood charcoal as absorbent for gases** (MAGNUS, SAUTER, and KRATZ; LOWRY and BOZORTH; ZEISE). 1193, **Velocity of flame in gaseous mixtures** (YUMOTO). **Gaseous combustion at high pressures** (BONE, TOWNEND, and SCOTT). 1194, **"Explosion limits" of carbonic oxide-air mixtures** (BONE, NEWITT, and SMITH). 1210, **Petroleum and filtering earths** (NUTTING). 1211, **Cholesterol as parent of petroleum** (STEINKOPF).

**Carbides.** FISCHER and BANGERT.—See VII. **Structure viscosity of oils.** OSTWALD and others.—See XII.

PATENTS.

**Manufacture of coal products.** KOPPERS Co., Assees. of H. V. ROSE and W. H. HILL (B.P. 268,372, 25.3.27. U.S., 25.3.26).—A stable homogeneous "solution" of coal may be obtained by heating 1 pt. of coal with 1—10 pts. of water-gas tar, coal-tar oils, or cracked petroleum oils at about 300° under atmospheric pressure or slightly above. The liquid is separated from undissolved matter and the original coal may be recovered substantially freed from ash, mineral charcoal, and inorganic sulphur by removing the solvent or by precipitation by the addition of low-boiling materials such as benzols or light petroleum. The dispersion of coal in oil may be treated with liquid extraction agents, *e.g.*, sulphur dioxide, in order to separate certain constituents, or materials may be added to react with the organic sulphur compounds and effect their removal. By using a mixture of coals differing in character, a composite coal blend may be recovered from the liquid, or by the addition of finely-divided foreign material a solid coal product containing



such material uniformly distributed throughout the mass may be obtained. Furthermore, the coal may be dispersed in a tar, and the product subjected to a sufficiently high temperature to decompose the more volatile constituents of the tar and leave a cokeable blend of coal and pitch.

H. S. GARLICK.

**Distillation of [finely-divided] coal.** A. F. P. PINET and A. DEBOUT (F.P. 626,895, 30.12.26).—The coal particles fall through a narrow preheating chamber, in which partial distillation takes place, into a coking chamber below.

L. A. COLES.

**Distillation of fuel having a high ash content in the form of small particles or dust.** W. SCHWIER (G.P. 450,460, 2.2.24).—The fuel is blown together with air through fused non-combustible and non-volatile material contained in vessels which can be tilted or rotated so that the depth of the delivery tubes below the level of the liquid can be adjusted as required.

L. A. COLES.

**Fractionation of coal, oil, and other hydrocarbons.** SOC. INTERNAT. DES COMBUSTIBLES LIQUIDES (Addn. F.P. 32,045, 1.7.26, Ger., 15.12.25, to F.P. 606,191; B., 1927, 435).—Gaseous products obtained in the prior process are cooled before releasing the pressure to cause condensation of water and benzene.

L. A. COLES.

**Manufacture of montan wax.** A. RIEBECK'SCHE MONTANWERKE A.-G. (B.P. 288,258, 12.3.28, Ger., 8.4.27).—After extracting the wax from dried brown coal by solvents it is separated from the solution by distillation, and solvent from the residual coal is expelled by direct steam. The heat contained in the solvent vapour and steam is utilised for drying further quantities of moist raw coal, after freeing the vapours from dust.

C. B. MARSON.

**Wood carbonising plant.** R. MALBAY (G.P. 446,223, 7.4.26, Fr., 15.4.25).—The retorts are divided into two groups and are heated, on the one hand, by the hot gases from a generator which pass through the retorts of the first group and then through those of the second before their utilisation in a gas engine, and, on the other hand, by the exhaust gases from the engine which likewise pass through the retorts of the first and second groups in succession. As soon as the material in the first group of retorts is carbonised the path of the gases is reversed, so that the process continues without interruption.

A. B. MANNING.

**Coke oven.** E. COPPÉE & CIE. (B.P. 294,561, 16.12.27, Belg., 26.7.27, Addn. to B.P. 253,887; B., 1927, 721).—The oven described in the main patent is modified by the provision of gas regenerators alternating with the air regenerators beneath the ovens, in order to permit heating of the walls with poor gas. The gas regenerators are divided into separate chambers for preheating the gas supplied to the corresponding separate groups of flues. The end groups of flues communicate with the end chambers of the air regenerators, and these in turn with the other chambers. Part of the hot gases is by-passed at the outlet of the last group of flues but one, towards the corresponding gas regenerator in order to heat the latter for the following change of working. The ovens may be heated by rich gas if

desired, ducts being provided leading directly to the inlets of each group of flues.

A. B. MANNING.

**Production of activated carbon.** ALGEM. NORIT MAATSCHAPPIJ (B.P. 273,761, 2.7.27, Holl., 3.7.26).—A mixture of different sized pieces of carbonaceous material is charged into a retort and is subjected to dry distillation followed by activation in a current of gas or steam. The period of activation is limited so that only the smaller pieces and the external portions of the larger pieces are highly activated. After removal from the retort the material is sifted in order to separate the smaller pieces and the remainder is subjected to a further activating process. A vertical retort of elongated cross-section is used, and provision is made for the separate removal from the retort of the vapours evolved in the preliminary drying zone.

A. B. MANNING.

**Eliminating the acidity of acid activated charcoal.** VER. F. CHEM. U. MET. PRÖD. (B.P. 285,386, 14.2.28, Czechoslov., 14.2.27).—Acid activated charcoal is treated under pressure and at above 100° with alkaline substances such as milk of lime, sodium carbonate, or caustic soda. Small quantities of lime produce a neutral charcoal immediately; larger quantities of lime or soda give an alkaline charcoal. Such lime-treated charcoal eventually becomes neutral owing to carbon dioxide in the air, but soda-treated charcoals remain permanently alkaline.

C. B. MARSON.

**Adsorbent medium [carbon].** E. URBAIN (F.P. 626,488, 31.3.26).—An adsorbent mass of carbon and a mineral substance, e.g., a phosphate or silicate, is produced by mixing an organic substance with a mineral substance, both finely divided, drying the mixture, carbonising at 350–400°, and then heating the product to about 1000°.

J. S. G. THOMAS.

**Gas-generating plants.** A. V. TULLY (B.P. 297,568, 12.9.27).—In a gas generator of the type having a superimposed retort for the carbonisation of the charge before its passage into the gasification chamber below, a central poking rod, capable of rotation and/or movement vertically, is provided in order to prevent caking of the charge. The rod may take the form of a tube, and then serves as an inlet either for a carburetting hydrocarbon or for steam.

A. B. MANNING.

**Apparatus for manufacture of gas from oils.** C. CHILOWSKY (B.P. 293,008, 20.10.27, Fr., 27.10.26, Cf. B.P. 255,423, 271,899, and 271,907; B., 1927, 805, 867).—The apparatus comprises two symmetrical units which can function alternately so that while the first unit is in use, carbon deposits produced during the manufacture of the gas in the second unit are removed by combustion in a current of air which has been heated by contact with a catalyst, such air being then used for the atomisation and partial combustion of oil in the first unit. Reversal of the current of air and alternate working of the two halves is ensured by suitable valve devices. At any convenient point steam may be added to the air injected into the apparatus or to the cloud of atomised oil.

C. B. MARSON.

**Drying of fuel gases.** C. COOPER, D. M. HENSHAW, and W. C. HOLMES & Co., LTD. (B.P. 298,097, 2.5.27, Cf. B.P. 248,841 and 285,936; B., 1926, 428; 1928,



325).—High-pressure town's gas which is to be dried by contact with a hygroscopic material is subjected to a higher pressure than that normally necessary, and while thus compressed is treated with the drying agent. The gas is brought into contact with a liquid dehydrating agent under conditions involving its travel in opposition to a counter-pressure due to the hydrostatic head of the liquid. The liquid hygroscopic material is withdrawn continuously or periodically for dehydration, and then returned for the treatment of further quantities of gas.

C. B. MARSON.

**Removal and utilisation of hydrogen sulphide from gas mixtures containing it and simultaneous production of manganese salts.** CHEM. FABR. JOHANNISTHAL G.M.B.H., Assees. of M. Löwy (G.P. 450,230, 29.6.26).—The gases act on material containing manganese dioxide in the presence of dilute hydrochloric acid or sulphuric acid.

L. A. COLES.

**Separation of oil from oil-laden gas.** H. A. FRASER, W. L. PRICE, and J. HETHERINGTON (B.P. 297,622, 12.1.28).—The gas is passed through a compartment packed with short lengths of metal tube on which the oil is deposited. The oil runs down into a collecting chamber at the bottom of which is a valve controlled automatically by a float within the chamber. The apparatus is designed particularly for use with refrigerating plants, to remove entrained lubricating oil from the compressed gas and to return it to the pump.

A. B. MANNING.

**Production of reducing gases.** G. LECOULTEUR and E. BORELS (F.P. 626,044, 9.12.26. Switz., 30.9.26).—Gas mixtures containing oxygen and, e.g., carbon dioxide, nitrogen, hydrocarbons, alcohol vapour, etc. are passed through heated vessels containing wood charcoal, coke, graphite, etc.

L. A. COLES.

**Extraction of hydrocarbon oils from coal.** J. TRAUTMANN (B.P. 272,526, 9.6.27. Ger., 11.6.26).—The coal is distilled and the volatile products, preferably after removal of the sulphur compounds, are passed directly to a hydrogenating plant without being first condensed. Hydrogen, carbon monoxide, or water-gas, and catalysts in the form of powder or vapour may be added to the distillation products before they enter the reaction chamber. A water-gas generator, utilising the coke produced, may be made a constituent part of the retort.

A. B. MANNING.

**Process for splitting hydrocarbons.** J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 297,398, 16.5.27).—Hydrocarbons containing more than four atoms of carbon in the molecule are converted into a mixture of olefines and diolefines by passage over catalysts consisting of difficultly reducible oxides or compounds at 600° or above. E.g., by the passage of cyclohexane through a quartz tube containing calcium aluminate at 600° it is converted principally into ethylene and butadiene.

A. B. MANNING.

**Cracking of hydrocarbons.** F. A. HOWARD, Assr. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 1,681,899, 21.8.28. Appl., 20.3.23).—Crude oil, freed from light constituents, is distilled at 5–150 lb. pressure, tar being run off and the vapours passing through a coil at 400–500° placed in the upper part of the cracking furnace but

screened from direct and radiant heat by the feed coil. The cracked vapours enter a drum maintained at 360–460° in the highest part of the furnace, and pass thence to the rectifier.

C. HOLLINS.

**Treatment [cracking] of [hydrocarbon] oil.** D. G. BRANDT, Assr. to DOHERTY RES. Co. (U.S.P. 1,681,321, 21.8.28. Appl., 23.3.22).—Deposition of carbon and formation of hydrogen, methane, etc. are minimised and the yield of high-boiling gasoline is improved by applying the cracking heat by means of low-boiling cracked gases preheated to about 550°.

C. HOLLINS.

**Cracking of hydrocarbon oils.** H. A. GILL. From GASOLINE PRODUCTS Co., INC. (B.P. 297,949, 5.9.27).—Hydrocarbon oil is heated to cracking temperature in a heating zone and passed to a reaction chamber under sufficient pressure to effect cracking substantially in the liquid phase. The products are passed to an evaporating stage of reduced pressure where cracking and vaporisation of the oil are checked by the introduction of a cooler mass of hydrocarbon oil, either at the actual point where the pressure is reduced, or at a point after the pressure on the oil discharged from the reaction chamber has been released but before the oil has reached the stage of dephlegmation. The contained heat of the mixture permits the distilling off of the lighter products, which are subjected to a refluxing and final condensation action; the heavy unvaporised portions are withdrawn from the system.

H. S. GARLICK.

**Refining of hydrocarbon oils.** H. J. HALLE, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,681,638, 21.8.28. Appl., 12.5.20. Renewed 12.2.27).—The oil is distilled through a column of hot 40–55% sulphuric acid to give gasoline and sludge acids.

C. HOLLINS.

**Apparatus for converting hydrocarbon oils.** O. C. BREWSTER, Assr. to STANDARD OIL Co. (U.S.P. 1,681,658, 21.8.28. Appl., 20.6.25).—Oil, heated to 350° by circulation through a separately fired coil, is aerated, and when conversion by internal combustion has begun oil heated to 400° in a preheater is added through a stripping column. Vapours are collected from the stripping column and the preheater.

C. HOLLINS.

**Method of utilising residue [mineral] oils containing water.** A. H. MALLERY (B.P. 268,814, 1.4.27. U.S., 5.4.26).—Oil residues containing water are heated to a temperature (about 670°) which is sufficient to vaporise the oil and water and bring about combustion of the oil on admitting a sufficient quantity of air.

H. S. GARLICK.

**Treatment of petroleum products.** E. R. WILES (U.S.P. 1,684,426, 18.9.28. Appl., 24.4.23).—Petroleum is treated with a solvent containing about 35% of acetone and 65% of benzol; on cooling the solution amorphous paraffin of high m.p. separates out.

H. ROYAL-DAWSON.

**Gas condensers.** W. BLAKELEY (B.P. 298,143, 28.6.27).

**Gas scrubbers.** S. E. SPENCER (B.P. 298,360, 31.0.27).



Extractor gear for gas retorts. GAS LIGHT & COKE Co., and S. HOLDWAY (B.P. 298,093, 28.3.27).

Gaseous hydrocarbons (F.P. 605,839). Naphthenic compound (U.S.P. 1,681,657).—See III. Esters of silicic acid (B.P. 298,778). Lead tetraethyl (B.P. 280,169).—See VII. Road repairing (B.P. 298,812). Antiseptic for wood (F.P. 608,576).—See IX. Flotation of coal (B.P. 289,848).—See X. Detection of inflammable gas (B.P. 298,767).—See XI. Waterproof paint (U.S.P. 1,684,593). Bituminous paints (B.P. 298,256).—See XIII.

### III.—ORGANIC INTERMEDIATES.

Determination of aniline by Lehmann's method. A. V. PAMFILOV and V. E. KISSELEVA (Z. anal. Chem., 1928, 75, 87—92).—Lehmann's method (Lunge and Berl, "Chem.-techn. Untersuchungsmethoden," 7th ed., I, 657) for the determination of small quantities of aniline is modified as follows: 20 c.c. of the aniline solution are treated with 20 c.c. of 10% sulphuric acid, 20 c.c. of a standard hypobromite solution, and 2—3 g. of potassium bromide. After 2—3 min. potassium iodide is added and the liberated iodine, corresponding with the excess of hypobromite, is titrated with thiosulphate.

A. R. POWELL.

See also A., Nov., 1190, System cresols-amines (PUSHIN and SLADOVIC). 1195, Velocity of esterification of amides in alcohol (TAYLOR and DAVIS). 1196, Nickel catalyst for continuous hydrogenation (SVIZUIN). 1197, Vapour-phase oxidation of furfuraldehyde (SESSIONS). 1198, Photochemical decomposition of diazo compounds (EGGERT and SCHRÖTER). 1229, Determination of carbamide (LUCK). 1233, Oxidation in the benzene series by gaseous oxygen (STEPHENS). 1234, Micro-identification of isomerides and homologues in mixtures (MAGITA). Introduction of the benzyl group into the benzene nucleus (FÖLDI). 1235, Chlorodecalin (FERRERO and FEHLMANN). 1236, Arylamine salts of naphthalene-sulphonic acids (FORSTER, HANSON, and WATSON; FORSTER and MOSBY). Nitration of substituted tertiary aromatic amines (CLEMO and SMITH). 1237, Nitro-derivatives of dibenzylaniline (DESAI). 1238, System phenols-ammonia (BRINER and AGATHAN; BRINER and MORF). 1248, Acylation and alkylation of aromatic compounds (STADNIKOV and BARYSCHEVA). 1255, 6-Aldehydocoumarin and derived dyes (SEN and CHAKRAVARTI). 1267, Micro-determination of sulphur in organic compounds (HANAI).

Combustion of olefines. DAVIS.—See II. Cymene. ASCHAN.—See V.

#### PATENTS.

Production of carbon disulphide. H. SCHULZ (G.P. 450,178, 3.4.25. Addn. to G.P. 407,656; B., 1926, 823).—The charcoal is charged into the furnace through a filling compartment which can be closed at the top and bottom to prevent the entry of air. The charcoal is heated to redness in cylindrical vessels in recesses in the furnace wall, and the vessels are transferred to the filling chamber and discharged by opening them from outside the apparatus. L. A. COLES.

Manufacture of solid, liquid, and gaseous hydrocarbons. J. CAMPARDOU (F.P. 605,839, 2.2.25;

cf. A., 1927, 440).—Suitable organic compounds or their vapours are heated with carbon (wood charcoal) at 500—600° (or at lower temperatures under increased pressure) to give (a) a fuel gas containing carbon monoxide, hydrogen, and gaseous hydrocarbons; (b) liquid and solid hydrocarbons; and (c) a residue of carbon. Alcohols and ethers yield paraffins; acids, ketones, aldehydes, and carbohydrates yield olefines; phenols give alicyclic and aromatic hydrocarbons. The gaseous product may be hydrogenated to give lighting gas, or treated with steam at high temperatures to give fuel gas, carbon dioxide being removed in each case.

C. HOLLINS.

Manufacture of alcohols and liquid hydrocarbons. COMP. DE BÉTHUNE (F.P. 613,541, 27.7.25).—Coal gas, or a suitable mixture of hydrogen, methane, and carbon monoxide, is led at 400—600° under 400 atm. over magnetic iron oxide, and the gaseous products, after condensation of alcohols etc., are converted into oily hydrocarbons, b.p. below 100°, by passage over active carbon at 100—400°.

C. HOLLINS.

Synthesis of methanol [methyl alcohol]. H. H. STORCH, Assr. to ROESSLER & HASSLACHER CHEM. Co. (U.S.P. 1,681,750—1,681,753, 21.8.28. Appl., [A, B] 16.5.27, [C] 27.5.27, [D] 4.6.27).—(A) A copper catalyst for reduction of carbon monoxide to methyl alcohol is prepared by adding sodium hydroxide to a cuprammonium solution, boiling to expel ammonia, and reducing the copper oxide so formed at 150—200° with hydrogen saturated with methyl alcohol vapour. (B) An intimate mixture of reduced copper and a fluoride of calcium, strontium, barium, or magnesium is used as catalyst. (C) The copper catalyst of (A) is prepared in intimate admixture with magnesium oxide. (D) A palladium catalyst intimately mixed with a non-reducible metal oxide (e.g., of chromium, zinc, or cerium) is prepared.

C. HOLLINS.

Catalysts for synthetic methanol [methyl alcohol] production. COMMERCIAL SOLVENTS CORP., J. C. WOODRUFF, and G. BLOOMFIELD (B.P. 271,840 and Addn., B.P. 279,378, 20.4.27. U.S., [A] 26.5.26, [B] 25.10.26).—(A) Methyl alcohol, uncontaminated by by-products, is obtained from oxides of carbon and hydrogen at 130—140 atm. and 340—450° by using a catalyst comprising a difficultly reducible metal oxide (oxide of zinc, magnesium, cadmium, chromium, vanadium, or tungsten) and smaller amounts of a reducible metal oxide (oxide of copper, silver, iron, nickel, cobalt) and a metal halide (zinc chloride). E.g., a catalyst, made by dissolving 225 pts. of nickel nitrate crystals in water, adding 750 pts. of zinc chloride, precipitating nickel hydroxide with ammonia, filtering, drying, adding a solution of 148 pts. of zinc chloride, and drying, yields 2.5 litres per hr. of 56% methyl alcohol from a gas containing 8% CO<sub>2</sub>, 3% CO, and 89% H<sub>2</sub> at a space velocity of 75,000—100,000. (B) An improved catalyst is made by adding an aqueous solution of chromium nitrate, ferric nitrate, and zinc chloride to a suspension of zinc oxide, and drying the paste at 350° in a current of hydrogen. At 200—220 atm. and 400—420° a space velocity of 20,000—40,000 gives a yield of 1.5—2.5 litres per hr. of 93—97% methyl alcohol. C. HOLLINS.



**Manufacture of concentrated acetic acid (or a mixture of acetic acid and acetic anhydride) with simultaneous production of unsaturated hydrocarbons.** HOLZVERKOHLUNGS-IND. A.-G. (B.P. 274,076, 1.7.27. Ger., 6.7.26).—Ethyl acetate vapour is passed through a quartz tube charged with a catalyst (copper, silver, or a phosphate other than iron phosphate) at 600°; 98% yields of acetic acid (99%) and ethylene are obtained. Contact with iron compounds must be avoided. C. HOLLINS.

**Production of acetic acid [from wood].** F. G. RAWLING (U.S.P. 1,681,684, 21.8.28. Appl., 12.2.26).—Wood is impregnated with sodium sulphite and enough sodium carbonate or hydrogen carbonate to combine with the acetic acid formed and prevent production of bisulphite. The wood is drained, and steamed at 110–160° in a closed vessel. The residue is used for pulping, dry distillation, etc.; the aqueous liquid is acidified and acetic acid distilled off. C. HOLLINS.

**Halogenation of organic compounds.** I. G. FARBENIND. A.-G. (B.P. 283,877, 18.1.28. Ger., 18.1.27).—The hydrogen halide produced during halogenations is utilised in the same or consecutive operations for the conversion of methyl alcohol into methyl halide. The process is useful in the chlorination of methane or methyl chloride, the mixed gaseous products being passed into boiling methyl alcohol or with methyl alcohol vapour over a catalyst. C. HOLLINS.

**Catalytic oxidation of organic and inorganic substances.** O. Y. IMRAY. FROM MONSANTO CHEM. WORKS (B.P. 298,142, 25.5.27).—A vanadium pentoxide complex silicate catalyst, intended especially for manufacture of sulphuric acid by the contact process, is made, for example, by adding acid to mixed solutions of potassium vanadate, silicate, and borate; the gel is pressed and dried at 100°, broken up, acidified, and, after oxidation with hydrogen peroxide, dried at 300°. Such a catalyst is unaffected by the usual catalyst poisons, and is also suitable for oxidation of toluene to benzaldehyde and benzoic acid. C. HOLLINS.

**Heating of catalysts for pressure-synthesis of gas mixtures.** G. L. E. PATART (F.P. 618,439, 2.7.26).—In order to secure uniform temperature the catalyst is mixed with a conducting material and heated electrically. *E.g.*, for ammonia synthesis silica, asbestos, magnesia, or alumina is added to the iron catalyst; for alcohols, acids, etc. from carbon monoxide and hydrogen copper, silver, aluminium, coal, coke, or graphite is added to the zinc oxide–chromium oxide catalyst. C. HOLLINS.

**Production of aldol.** J. Y. JOHNSON. FROM I. G. FARBENIND. A.-G. (B.P. 298,349, 19.9.27).—A mixture of acetaldehyde (2 pts.) and 1.25% sodium hydroxide solution (1 pt.) is passed through successive spirals at 3°, 8°, 15°, and 20°, respectively. The alkali is then neutralised and water and acetaldehyde are removed by passage through towers at 40° and 70° under reduced pressure. Aldol suitable for reduction to butylene glycol is obtained. C. HOLLINS.

**Manufacture of glycol.** CHEM. FABR. KALK, G.M.B.H., and H. OEHME (F.P. 612,825, 16.3.26).—Ethylene chloro-

hydrin is hydrolysed with calcium carbonate or calcium hydrogen carbonate solution and the metal removed as sulphate or phosphate. C. HOLLINS.

**Preparation of alkali alcoholates [alkoxides] or of compounds containing alcoholic hydroxyyl groups.** C. VAN LOON (U.S.P. 1,681,600, 21.8.28. Appl., 20.7.27. Holl., 21.7.25).—A solution of glycol in concentrated aqueous sodium hydroxide (1 mol. or 2 mols.) is evaporated to dryness in a vacuum and the product is dried in a current of hydrogen under reduced pressure at 110–115°. C. HOLLINS.

**Manufacture of dioxan.** A. KNORR and G. STEIMMIG, ASSRS. to I. G. FARBENIND. A.-G. (U.S.P. 1,681,861, 21.8.28. Appl., 6.8.26. Ger., 23.12.24).—A mixture of ethylene glycol (25 pts.) or  $\beta\beta'$ -dihydroxydiethyl ether or its monoethyl ether and concentrated sulphuric acid (1 pt.) is heated, more glycol being added to replace the dioxan which distils off. C. HOLLINS.

**Production of thiourea.** J. Y. JOHNSON. FROM I. G. FARBENIND. A.-G. (B.P. 297,999, 9.11.27).—Calcium cyanamide, ammonium hydrogen carbonate, and a solution of ammonium sulphide are stirred into water at 70°, calcium carbonate is filtered off, and the solution is evaporated after decolorisation with animal charcoal. C. HOLLINS.

**Manufacture of non-dyeing thio-derivatives of phenols.** I. G. FARBENIND. A.-G., and A. THAUSS (B.P. 298,280, 11.7.27. Addn. to B.P. 173,313; B., 1922, 139 A).—Phenols, other than those containing nitrogen, are heated at 180–210° with sulphur in presence of a neutral (to phenolphthalein) salt of an organic or a weak inorganic acid, *e.g.*, 1% of sodium formate, nitrite, sulphite, or hyposulphite. C. HOLLINS.

**Compounds of arylenediamines.** IMPERIAL CHEMICAL INDUSTRIES, LTD., and A. RILEY (B.P. 297,989, 17.10.27).—Diamines of the benzene or naphthalene series may be isolated by means of the sparingly soluble compounds of the bases with chlorides or bromides of zinc, cadmium, or mercury. *Compounds* of zinc chloride with *p*-phenylenediamine, m.p. above 250°, *p*-aminodiphenylamine, m.p. 165–170°, *p*-aminodiphenylamine, m.p. 245°, *p*-aminoacetanilide, m.p. 205°, *m*-phenylenediamine, m.p. above 300°, 4-chloro-*m*-phenylenediamine, m.p. 239°, *o*-phenylenediamine, m.p. above 300°, and 1:2-naphthylenediamine; of mercuric chloride with *p*-phenylenediamine, m.p. 206–208°; and of cadmium bromide with *m*-phenylenediamine, m.p. 280°, are described. The zinc chloride compounds usually have the formula  $B_2ZnCl_2$ . C. HOLLINS.

**Manufacture of compounds of the morpholine series.** IMPERIAL CHEMICAL INDUSTRIES, LTD., J. B. PAYMAN, and H. A. PIGGOTT (B.P. 298,336, 1.9.27).—An alkylene or aralkylene halogenohydrin is warmed with *p*-toluenesulphonamide, and the product is heated in concentrated sulphuric acid at 160–200° with production first of a *p*-toluenesulphonylmorpholine which is then hydrolysed to a morpholine. Morpholine and its *C*-derivatives are thus prepared from the chlorohydrins of ethylene, propylene, and cinnamic chloride). C. HOLLINS.



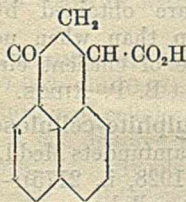
**Sulphonation of aromatic compounds.** L. GAY, P. MIOU, and M. AUMÉRAS (F.P. 619,436, 24.6.26).—The water formed during sulphonation is removed by entrainment in the vapour of an organic solvent which is bubbled through the hot reaction mixture. The solvent must be substantially insoluble in water and in the sulphonation mixture, and must be unattacked by sulphuric acid. C. HOLLINS.

**Emulsifying agents.** I. G. FARBENIND. A.-G. (Swiss P. 121,099, 23.12.25. Ger., 18.9.25).—The material contains emulsifying agents, e.g., alkyl-substituted aromatic sulphonates, and colloidal material of high mol. wt., e.g., glue or water-soluble rubber products. L. A. COLES.

**Manufacture of 6-nitro-2-amino-1-benzoic [6-nitroanthranilic] acid.** I. G. FARBENIND. A.-G. (B.P. 286,694, 8.3.28. Ger., 9.3.27. Addn. to B.P. 285,877; B., 1928, 847).—6-Nitroanthranilic acid, m.p. 184—185° (decomp.), is obtained by heating 2-chloro-6-nitrobenzoic acid with ammonia and copper at 120° in a closed vessels. C. HOLLINS.

**Oil-soluble naphthenic compound.** O. E. BRANSKY, Assr. to STANDARD OIL Co. (U.S.P. 1,681,657, 21.8.28. Appl., 29.10.23).—A naphthenic lubricant distillate, e.g., from Louisiana oil, is neutralised with sodium carbonate solution and washed with alcohol. The washings on evaporation, acidification, and distillation in steam yield a viscous oily acid. The sodium salt is a detergent; the copper salt (green) may be applied in naphtha solution as a wood preservative. C. HOLLINS.

**Manufacture of cyclic ketones.** I. G. FARBENIND. A.-G. (B.P. 273,321, 24.6.27. Ger., 24.6.26).—Maleic anhydride is condensed in presence of sodium aluminium chloride etc. with naphthalene, acenaphthene, or other fused-ring compound (other than anthrones) having free adjacent *peri*-positions. There is first formed a keto-acid, which is subsequently condensed to a cyclic keto-acid; e.g., naphthalene gives first  $\beta$ -1-naphthoylacrylic acid, m.p. 139—140°, and then the acid, m.p. 186—187° (probably annexed formula). Acenaphthene similarly yields  $\beta$ -5-acenaphthoylacrylic acid, m.p. 154—155°, and on cyclisation an acid, m.p. 216—217°. C. HOLLINS.



m.p. 154—155°, and on cyclisation an acid, m.p. 216—217°.

**Manufacture of  $\alpha$ -anthraquinonyl ketones.** I. G. FARBENIND. A.-G. (B.P. 273,774, 5.7.27. Ger., 5.7.26. Addn. to B.P. 271,884; B., 1928, 665).—Benzanthrones containing alkyl groups in positions 2 and 3, or an alkyl or a nitrile group in position 2 or 3, are oxidised with chromic acid. 3-Methylbenzanthrone gives 1-anthraquinonyl methyl ketone, m.p. 160°; 2-methylbenzanthrone yields  $\alpha$ -1-anthraquinonyl- $\beta$ -methylglyoxal, m.p. 195°; both are obtainable from 2:3-dimethylbenzanthrone. Anthraquinone-1-carboxyl cyanide [1-anthraquinonylglyoxylonitrile], m.p. 297° (decomp.), is formed, together with a substance, m.p. 276—277°, from 3-cyanobenzanthrone. C. HOLLINS.

**Manufacture of aminoanthraquinones, their homologues, and substitution products from the**

**corresponding leuco-amino-compounds.** A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 298,279, 11.7.27).—The leuco-derivatives of 1:4-diaminoanthraquinones are oxidised by heating in nitrobenzene at 140—180° in presence of a small quantity of a basic or acid catalyst, e.g., thionyl chloride, piperidine, triethylamine, benzoyl chloride, etc. C. HOLLINS.

**Manufacture of new intermediate compounds and of azo dyes therefrom.** BRIT. DYE STUFFS CORP., LTD., and M. MENDOZA (B.P. 297,855, 27.5.27).—The processes of B.P. 245,865 and 262,243 (B., 1926, 233; 1927, 101) are extended to the manufacture of amino-sulphones from 5-substituted salicylic acids, including 2:3-hydroxynaphthoic acid, and to azo dyes therefrom. 3-Chlorosulphonyl-5-methylsalicylic acid, from *p*-cresotic acid, is reduced to 3-sulphino-5-methylsalicylic acid, m.p. 170°; 5-chloro-3-sulphinosalicylic acid, m.p. 200—201°, and 2-hydroxy-1-sulphino-3-naphthoic acid are similarly prepared. These are condensed with 4-chloro-3-nitrobenzenesulphonic acid, 2-chloro-5-nitrobenzenesulphonic acid, 1-chloro-2:4-dinitrobenzene, or 1-chloro-2:6-dinitrobenzene-4-sulphonic acid to give nitro- or dinitro-sulphones, which are reduced to amino- or diamino-sulphones; 2:4-dinitro-2'-hydroxy-3'-carboxy-5'-methyl-diphenyl sulphone melts at 284—286°, the 5'-chloro-compound at 266—268°, and 2:4-dinitrophenyl 2-hydroxy-3-carboxy-1-naphthyl sulphone at 260° (decomp.). Azo dyes which show little change in shade on chroming are obtained by coupling the diazotised aminosulphones or monoacylated diaminosulphones with coupling components, or the diaminosulphones with diazo compounds, or tetrazotising the diaminosulphones derived from 1-chloro-2:6-dinitrobenzene-4-sulphonic acid and coupling with coupling components. The dyes are useful for chrome printing, and as chrome wool colours. C. HOLLINS.

#### IV.—DYESTUFFS.

**Reactions of dyes with nitrous acid.** J. V. DUBSKÝ and A. OKÁČ (Z. anal. Chem., 1928, 75, 92—111).—The characteristic colours produced by diazotising certain dyes and materials from which they are derived afford a delicate method for the detection of nitrous acid. The colour in most cases is intensified or modified by coupling the diazo compound with substances of a phenolic character or with acid dyes; this is especially marked with substances having a free *para*-position. The reaction of nitrous acid with over 100 compounds has been examined, and the further behaviour on coupling with numerous other compounds is recorded. The sensitivity of the test is of the order of  $10^{-6}$ — $10^{-7}$ . A. R. POWELL.

See also A., Nov., 1171, Relationship between absorption spectrum and chemical constitution of azo dyes (BRODE). 1187, Viscosity of some dyes (BANERJI and DHAR). 1237, Diphenylamine derivatives (ORLOV). 1238, Azo dyes from acetacetanilides (FIERZ-DAVID and ZIEGLER). 1250 and 1251, Colouring matters of fungi (KÖGL and others). 1252, Colouring matter of paprika (ZECHMEISTER, VON CHOLNOKY, and VRABÉLY). 1255, 6-Aldehyd coumarin and derived dyes (SEN and CHAKRAVARTI). Plant colouring matters (KARRER and WIDMER; KARRER and SCHWARZ).



1256, Anthocyanin pigments of "Morning Glory" (KATAOKA). 1260, Diphenylpyridylmethane dyes (PLAZÉK and SUCHARDA). 1289, Photo-oxidation with anthraquinone (PFEILSTICKER).

Pigments of cacao beans. FINCKE.—See XIX.

#### PATENTS.

**Manufacture of azo dyes.** A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 297,884, 1.7.27).—Dyes from diazotised 5-nitroanthranilic acid are treated with sodium hydroxide and dextrose to reduce the nitro- to an azoxy- or azo-group. The products are suitable for after-coppering. The coupling components in the examples are  $\gamma$ -acid (black), J-acid (violet); diazotised on the fibre and developed with  $\beta$ -naphthol, black-blue), phenyl-J-acid (clear blue), acetyl-J-acid (violet), and 1-(6-sulpho- $\beta$ -naphthyl)-3-methyl-5-pyrazolone (brick-red). C. HOLLINS.

**Dyes.** L. B. HOLLIDAY & Co., LTD., and C. SHAW (B.P. 298,098, 28.5.27).—An aminoazo compound is condensed with a phthalic acid or anhydride to give a phthalamic acid. The products from phthalic acid and aminobenzeneazodiphenylamine (orange on wool, silk, cotton, and acetate silk) or aminoazobenzene (yellow on wool and acetate silk), and from tetrachlorophthalic acid and *p*-nitrobenzeneazo- $\beta$ -naphthylamine, are described. C. HOLLINS.

**Manufacture of dyes containing chromium.** J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 297,722, 25.6.27).—The dye, 4-chloro-2-aminophenol-6-sulphonic acid  $\rightarrow$  2 : 4-dihydroxyquinoline, is heated at 110–120° with chromium formate solution to give a complex chromium compound which dyes wool in level bordeaux-red shades fast to washing, milling, and light (cf. B.P. 28,716 of 1909; B., 1910, 1197). C. HOLLINS.

**Manufacture of derivatives of the triarylmethane series.** O. Y. IMRAY. From I. G. FARBENIND. A.-G. (B.P. 298,101, 29.6.27).—Spirit-soluble salts of triarylmethane basic dyes, suitable for printing, are obtained by adding a hydroxynaphthoic acid (2 : 3- or 2 : 6-hydroxynaphthoic or 2-naphthol-3 : 6-dicarboxylic acid) and alkali to a solution of the hydrochlorides (magenta, malachite green, etc.). C. HOLLINS.

**Production of an anthraquinone-hydrazine dye.** W. SMITH, J. THOMAS, and SCOTTISH DYES, LTD. (B.P. 298,248, 1.4.27).—3-Chloro-1-bromo-2-aminoanthraquinone (B.P. 264,916; B., 1927, 246) is heated with sodium acetate and copper acetate at 160–170° in a diluent (*o*-nitrotoluene). The resulting dichloroindanthrone gives bright reddish-blue dyeings fast to chlorine. C. HOLLINS.

**Treatment of cashew nut-shell oil and products [colours] obtained thereby.** HARVEL CORP., Assees. of M. T. HARVEY (B.P. 272,509, 7.6.27. U.S., 8.6.26).—Colours and colour bases ranging from deep red to violet are prepared by the interaction of cashew nut-shell oil and an ammonium compound or formaldehyde. The colours may be used for oil printing, or for mixing directly with varnishes, stains, or cellulose acetate. They are substantially unaffected by hydrochloric acid or by alkalis, but may be thickened to a paste by means of

oxidising or reducing agents, or by formaldehyde. When added to cellulose acetate or resins they act as plasticising and waterproofing agents. E. HOLMES.

Azo dyes (B.P. 297,855).—See III.

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

**Oxidation of cellulose on exposure to light. II. V.** SCHARVIN and A. PAKSCHVER (Z. angew. Chem., 1928, 41, 1159–1161; cf. B., 1927, 837).—Oxycellulose and carbon dioxide are produced simultaneously but not proportionally from cellulose exposed to the action of light in sealed tubes containing an atmosphere of oxygen. Small amounts of water and aldehyde-like substances are also formed. Dilution of the oxygen with inert gases reduced the rate of oxidation. No oxidation took place in pure nitrous oxide, carbon monoxide, ammonia, or hydrogen. A. G. POLLARD.

**Sulphite-cellulose cooking [with a mixture of old and new cooking acids].** E. HÄGGLUND (Papier-Fabr., 1928, 26, 657–661).—No economy is effected by the use of a mixture of waste sulphite cooking liquor with freshly prepared liquor rather than a freshly prepared acid alone. Comparative experiments with freshly prepared acid and with a mixture of one third waste liquor and two thirds fresh acid of the same concentrations of lime and sulphur dioxide show that for the latter the colour of the product is inferior, the yield is smaller for the same lignin content, the ash content is higher for equal times of cooking, a greater degree of acidity of the liquor is attained, and cooking proceeds at a slower rate. It is concluded that the danger of overcooking is greater with mixed than with fresh liquor. For the manufacture of pulp for bleaching and for the production of artificial silk, mixed liquors should be avoided, especially in the latter case, since with increasing acidity of the liquor the  $\alpha$ -cellulose content of the product falls. Better results are obtained by thorough mixing of liquid and pulp than when no agitation occurs, and the importance of efficient circulation in the cooker is emphasised. B. P. RIDGE.

**Cymene produced in the sulphite-cellulose process.** O. ASCHAN (Finska Kemistsamfundets Medd., 1927, 36, 123–125; Chem. Zentr., 1928, i., 2175).—The *p*-cymene obtained in the sulphite-cellulose process may contain *m*-cymene derived from sylvestrene by way of  $\Delta^3$ - and  $\Delta^4$ -carene. A. A. ELDRIDGE.

**Experiments in producing cellulose ethers and esters with special reference to cellulose nitroacetate.** H. A. GARDNER and C. A. KNAUSS (Amer. Paint & Varnish Manufs'. Assoc. Circ. No. 338, Oct., 1928, 657–672).—A general discussion on various ethers and esters of cellulose as possible substitutes for nitrocellulose in lacquers. Details of laboratory preparation of such products are given, special attention being paid to nitroacetates prepared by acetylation of the nitrate. The relative durability of lacquers containing cellulose esters and ethers is indicated by the results of exposure tests. S. S. WOOLF.

See also A., Nov. 1187, Denitration in artificial silk manufacture (NÁDAI). 1219, Action of alkali and carbon disulphide on xylan (HEUSER and



SCHORSCH). 1225, Cellulose (HESS and TROGUS). 1226, New degradation of cellulose (PRINGSHEIM, KASTEN, and SCHAPIRO). Action of highly concentrated nitric acid on cellulose (ANDRESS). Cellulose formate (UEDA and KATO). Sulphuric esters from cellulose (GEBAUER-FÜLNEGG, STEVENS, and DINGLER). 1227, Lignin and cellulose (FREUDENBERG, HARDER, and MARKERT). Acetylation of beech wood (SUIDA and TITSCH). Methylation of beech wood (VON WACEK). 1228, Structure of chitin (MEYER and MARK). 1229, Structure of silk fibroin (MEYER and MARK).

Action of bromine on cellulose, lignin, etc. FUCHS.—See II. Colloresin D. PFEFFER and GMELIN.—See VI. Rice straw. IWATA.—See XIX.

## PATENTS.

**Treatment of flax and similar fibrous materials.** VICKERS, LTD., and O. D. LUCAS (B.P. 298,178, 5.7.27).—Scutched flax is boiled with a 5% solution of caustic soda, washed with water, and treated with a cellulose solvent, *e.g.*, ammoniacal copper or zinc chloride, of such strength as to exert a selective action on the fibre without dissolving or completely gelatinising it. The material is then boiled with a 1% solution of caustic soda with the addition of a plasticiser, *e.g.*, sulphonated fatty acids etc., washed, immersed in acid for 15–20 min., again washed to remove the acid, and dried, yielding a soft and lustrous fibre. F. R. ENNOS.

**Improvement of vegetable fibres.** CHEM. FABR. FRANKFURT-WEST LANDAUER & Co., and L. GUTLOHN (G.P. 446,435, 29.11.24).—Agave and palm fibres etc. are strengthened by treatment with solutions of alkali, alkaline-earth, or magnesium salts capable of modifying their structure, or by the deposition on them of silica or barium sulphate, or by a combination of both processes, and their lustre is improved by subsequent treatment with soaps or with fat or mineral-oil emulsions.

L. A. COLES.

**Manufacture of tracing cloth.** M. RENKER (B.P. 297,993, 29.10.27).—Tracing cloth is treated with a solution of cellulose esters or ethers in a solvent which does not dissolve the fats or oils used in finishing the cloth, *e.g.*, glycols or their derivatives, and dried at 50–80°. If the cloth is given a protective coating of oil, varnish, or resin, solutions of cellulose compounds in other solvents may be used. F. R. ENNOS.

**Direct transformation of cellulose into defibred alkali cellulose for the manufacture of viscose.** L. C. P. JARDIN (B.P. 286,620, 5.3.28. Fr., 5.3.27).—Cellulose in any form is torn to fine pieces in a suitable apparatus maintained at constant temperature, being at the same time sprayed with sufficient caustic soda solution to convert it into alkali cellulose.

F. R. ENNOS.

**Cellulose xanthate process.** W. MENDEL, Assr. to S. A. NEIDICH (U.S.P. 1,681,900, 21.8.28. Appl., 1.5.26).—The cellulose crumbs are freed from water and occluded air by means of a partial vacuum before treatment with carbon disulphide, and after treatment carbon disulphide fumes are removed in the same manner.

C. HOLLINS.

**Spinning of artificial filaments, especially arti-**

**ficial silk from cuprammonium solutions of cellulose.** K. GRUNERT, Assr. of GRUNERT & GIANNETTI (B.P. 282,670, 16.12.27. Ger., 24.12.26).—The precipitant is aerated with air or an inert gas, the larger bubbles of which are allowed to escape before entry of the liquid into the spinning device. F. R. ENNOS.

**Treatment of waste liquors and precipitates therefrom obtained in the manufacture of cuprammonium silk.** J. P. BEMBERG A.-G. (B.P. 291,380, 25.5.28. Ger., 31.5.27).—The waste liquor or precipitate is heated at 130–140° with an amount of sulphuric acid in excess of that required to convert the copper into sulphate and to carbonise organic matter. The mixture of crude copper sulphate and carbon is separated from the liquor, and the former is purified by dissolution in water, filtration, and recrystallisation. F. R. ENNOS.

**Recovery of waste gases [sulphur dioxide] in production of sulphite pulp.** G. A. RICHTER, Assr. to BROWN Co. (U.S.P. 1,683,628, 11.9.28. Appl., 19.3.25).—The calcium bisulphite liquor for the treatment of the wood receives its sulphur dioxide first from burner gas, and then from recovery gas, being brought up to strength by sulphur dioxide released from time to time from the digester. The recovery gas unabsorbed by the bisulphite liquor is treated with fresh water in a second tower; the washings are used as condenser water, and thus lose their sulphur dioxide, which is passed with the burner gas to the bisulphite tower. C. HOLLINS.

**Treatment of sulphite-wood-pulp liquor.** W. E. B. BAKER (U.S.P. 1,685,800, 2.10.28. Appl., 25.2.22).—The liquor is treated with a sufficient amount of an alkaline earth to give  $p_H$  9 or above, and the resulting solid normal sulphite is treated with a bisulphite solution containing free sulphurous acid to give sulphite liquor for re-use. F. G. CLARKE.

**Production of non-hygroscopic solid material from sulphite-cellulose waste material.** I. G. FARBENIND A.-G. (Austr. P. 106,713, 8.1.25).—The liquor after removal of calcium and iron compounds is treated with oxidising agents, *e.g.*, potassium dichromate or sodium nitrite and hydrochloric acid, or is condensed with aldehydes, carboxylic acids, or amines, and is then evaporated to dryness and the residue ground to a powder (cf. F.P. 592,119; B., 1926, 188).

L. A. COLES.

**Recovery of volatile plasticisers from celluloid etc.** H. P. BASSETT (U.S.P. 1,681,692, 21.8.28. Appl., 11.6.27).—Celluloid scrap is covered with dilute nitric acid and steam-distilled under 1.3–2.6 atm. pressure. Camphor is removed and recovered, leaving nitro-cellulose in usable condition. C. HOLLINS.

**Digestion of raw materials for papermaking etc.** S. MILNE (B.P. 297,713, 26.3.27).—In the digestion of, *e.g.*, grass, with a suitable reagent, *e.g.*, caustic soda, the reaction is controlled by means of an externally-generated, transient *E.M.F.* of relatively high frequency, *e.g.*, that derived from electromagnetic radiation broadcast from a wireless station. J. S. G. THOMAS.

**Spinning bowls or boxes, particularly for artificial silk.** N. V. NEDERLANDSCHE KUNSTZIJDEFABR. (B.P. 297,450, 3.5.28. Holl., 22.9.27).



**Apparatus for spinning solutions of cellulose esters and ethers.** RUTH-ALDO CO., INC., Assees. of R. A. J. THENOZ (B.P. 283,140, 4.1.28. Fr., 4.1.27).

**Fertiliser** (U.S.P. 1,684,712).—See XVI.

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

**Production of printed effects with combinations of anthraquinone and indigoid vat dyes.** R. HALLER (Textilber., 1928, 9, 924—926).—The well-known process for discharging indigo with Rongalite can be successfully adapted by the use of ferrous sulphate and stannous chloride for the production of very fast anthraquinone vat dye discharges. Thus cotton fabric may be dyed in a jig with an indigoid vat dye (*e.g.*, Ciba Blue 2B), then printed with a discharge paste consisting of 600 g. of an anthraquinone vat dye (*e.g.*, Cibaneone Blue GCDN), 500 g. of Rongalite CL, 8700 g. of a discharge paste A (suitable for white discharges), 500 g. of ferrous sulphate, 200 g. of stannous chloride, and 200 g. of glycerin, steamed in an air-free Mather-Platt, and then passed through a hot solution of caustic soda and washed. Discharge paste A consists of 12 kg. of British gum, 3.5 kg. of glucose, 13 kg. of water, 10 kg. of Rongalite CL, 3—6 kg. of zinc oxide, 5 kg. of Leucotrope W, 0.5 g. of rape oil, 0.5 kg. of turpentine, and 1.8 kg. of a 50% solution of gum. A. J. HALL.

**“Colloresin D” and its application in [textile] printing.** E. PFEFFER and GMELIN (Textilber., 1928, 9, 666—669).—“Colloresin D” (I. G. Farbenind.) is a cellulose ether having the form of cotton wool; it swells in water at 40—50° and then dissolves on cooling to form a viscous solution suitable for replacing the thickening pastes of starch and gum tragacanth commonly used in printing. It is useful as a thickening agent in printing with vat dyes. A. J. HALL.

**Naphthol AS dyes on cellophane [viscose film].** G. SCHWEN (Textilber., 1928, 9, 673—674).—The changes which occur in the size of the pigment particles and their migration within cotton and artificial silk fibres dyed with insoluble azoic dyes as described by Haller and Ruperti (B., 1926, 316), and Kayser (B., 1926, 784) have been re-investigated using dyed cellophane instead of fibres. Cellophane dyed with Naphthol AS-SW (0.1 g. per litre) and Fast Red KB base is transparent and homogeneous, only a few dye particles being visible in the ultra-microscope; when dyeing is effected with a solution containing 2 g. per litre of Naphthol AS-SW, the dyed cellophane is opalescent, and a large number of dye particles are visible in an ordinary microscope. Both dyeings become bluer and opalescent in proportion to the amount of pigment present when boiled for 15 min. in water or particularly in a solution containing 0.2% of soap and 0.2% of sodium carbonate, these changes being due to an aggregation of the dye particles; no aggregation occurs when the dyed cellophane is subjected to dry heat, thereby indicating that swelling of the cellulose is necessary for aggregation. The original shade and transparency of cellophane dyed with certain dye combinations were restored by heating the dry dyed cellophane for a brief period at about 250°, and it is concluded that the aggregation of dye particles as produced by soaping and their dispersion

by subsequent dry heat is intimately related to the m.p. of the dye. A. J. HALL.

**Yellow and orange chromate discharges on indigo. Brown chromate discharges on indigo.** N. WOSNESSENSKY (Sealed Notes 1916—7, 20.7.05. Bull. Soc. Ind. Mulhouse, 1928, 94, 469—471, 471—472). Report by P. BINDER (*Ibid.*, 472—473).—The discharges are obtained by means of the nitrosoamines of dichloroaniline and *p*-nitro-*o*-anisidine. A yellow discharge is obtained by impregnating indigo-dyed cotton fabric with a solution of ammonium acetate, then printing with a paste containing nitrosamine J (from dichloroaniline), neutral sodium chromate, sodium aluminate, pyrazolone, caustic soda, and thickening agents, steaming for a short period, and then leading the fabric through the usual “cutting liquor” containing sulphuric acid and oxalic acids. Bright orange discharges are similarly obtained using a printing paste consisting of nitrosamine O (from chloroanisidine), sodium chromate,  $\beta$ -naphthol, and caustic soda.

Brown discharges are obtained by printing indigo-dyed fabric with a paste of nitroso- $\beta$ -naphthol, sodium chromate, chromium nitroacetate, and thickening agents, then steaming for 2 min. and leading through the usual “cutting liquor.” The colour of the discharge may be varied by using salts of iron or cobalt instead of chromium. BINDER reports that tendering occurs in the production of brown discharges. A. J. HALL.

**Waterproof dyeings.** K. ODA (Mem. Coll. Eng. Kyushu, 1928, 5, 71—92).—Grey to brown and black waterproof dyeings may be obtained by mordanting silk, viscose silk, and cotton yarns with iron, aluminium, or chromium in the usual manner and then treating with a dilute aqueous-alcoholic colloidal solution of the alcohol-soluble constituents of Japan lac, stearic acid, or palmitic acid; if desirable, the yarns may be first dyed by means of substantive dyes, *e.g.*, Rhodamine B. The dyed yarns have a decreased capacity for absorbing water, and the viscose yarns have a considerably increased wet and dry tensile strength. Similar waterproof dyeings may also be obtained on mordanted yarns by after-treatment with gelatin and formaldehyde. A. J. HALL.

**Mercerisation of sulphite-cellulose.** Y. I. SHAR-KOV (J. Chem. Ind. Moscow, 1926, 3, 1148—1149).—The maximum swelling occurs with 14% sodium hydroxide, or 17% potassium hydroxide, solution. The addition of alcohol or glycerin lessens the swelling. In the absorption of alkalis by cellulose equilibrium is reached in 30 sec. provided the solution has access to each fibre.

CHEMICAL ABSTRACTS.

**Ricinic acid.** SUNDER.—See XII. **Osage-orange and fustic extracts.** DESMURS.—See XV.

PATENTS.

**Printing on textile fabrics.** J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 297,959, 14.9.27).—Vegetable mucilages (*e.g.*, from carob seeds or salep bulbs) which are coagulable by alkali are used as thickeners in printing pastes of vat or sulphide colours in absence of alkali. The prints are developed by padding with alkali and reducing agent, drying, and steaming.

C. HOLLINS.



**Dyeing or printing with vat dyes on acetate silk or mixed fabrics containing acetate silk.** DURAND & HUGUENIN SOC. ANON. (B.P. 274,094, 7.7.27. Ger., 10.7.26).—The material is padded or printed with a solution of a soluble leuco-ester of a vat dye, e.g., an Indigosol, dried, and steamed. The leuco-ester in this manner penetrates and is fixed on the fibre, and may be developed by heating with acid and nitrite at 70–80°; the nitrite may be present in the padding or printing solution. C. HOLLINS.

**Dyeing of cellulose esters and ethers.** BRIT. DYESTUFFS CORP., LTD., L. G. LAURIE, F. W. LINCH, and E. H. RODD (B.P. 297,897, 5.7.27).—Acetate silk etc. is dyed in bright green shades, fast to light and to alkaline storage conditions, by application of dyes of the malachite- or brilliant-green type containing in the "aldehyde" nucleus an alkyl group in position 2 and alkyl or alkoxy groups in positions 4 and/or 5. Examples are the 2:4- and 2:5-dimethyl and 5-methoxy-2-methyl derivatives of malachite- or brilliant-green. C. HOLLINS.

**Mordant dyeing of cellulose derivatives [esters and ethers].** BRIT. CELANESE, LTD., G. RIVAT, and E. CADGENE (B.P. 273,693, 22.6.27. U.S., 30.6.26).—Acetate silk etc. is mordanted in presence of swelling agents such as formic acid, acetic acid, furfuraldehyde, phenol, pyridine, especially a mixture of furfuraldehyde with 3–5 pts. of acetic acid. C. HOLLINS.

**Peroxide solutions** (B.P. 277,628).—See VII. **Colouring rubber** (B.P. 298,364).—See XIV.

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

**Efficiency of different contact substances for the sulphuric acid contact process.** I. B. NEUMANN, H. PANZNER, and E. GOEBEL (Z. Elektrochem., 1928, 34, 696–704).—A detailed description is given of an apparatus used for comparing the yield of sulphuric acid obtained on passing a mixture of sulphur dioxide and air, containing 7% of the dioxide, at rates ranging from 150 to 750 c.c./min. and at temperatures up to 750°, over various catalysts, the catalyst carrier being either asbestos or pumice. The method adopted for keeping the composition of the sulphur dioxide-air mixture constant is outlined. The sulphuric anhydride is passed into water, the "fog" being absorbed in a tube packed with glass wool. Tests made with platinised asbestos (7% Pt) show that, with a streaming velocity of either 150 or 300 c.c./min., a maximum yield of 99.6% is obtained at 425°. With silver vanadate as catalyst, maximum yields of 97.0, 92.5, 86.0, and 81.0% are obtained at 450° (streaming velocity 150 c.c./min.), 465° (300 c.c./min.), 487.5° (500 c.c./min.), and 507° (750 c.c./min.), respectively. With vanadic acid practically no reaction takes place below 400°. Maximum yields of 90.0, 79.5, 71.3, and 63.6% are obtained at 512° (streaming velocity 150 c.c./min.), 550° (300 c.c./min.), 575° (500 c.c./min.), and 600° (750 c.c./min.), respectively. Results very little better than those given by vanadic acid are obtained by the use of vanadic acid containing copper vanadate

maximum yields of 91.3, 80.9, 70.5, and 68.2% being found at 512° (150 c.c./min.), 550° (300 c.c./min.), 550° (500 c.c./min.), and 575° (750 c.c./min.), respectively. With the object of explaining the great difference between the efficiencies of silver and copper vanadates, the catalytic action of silver was tested, but found to be very poor, probably owing to the formation of silver sulphate. Tungstic acid is a poorer catalyst than vanadic acid, giving very little yield below 600°. The mechanism of the vanadic acid catalysis is discussed.

L. L. BIRCUMSHAW.

**Rapid determination of phosphate in technical citric and tartaric acid liquors.** F. PERCIABOSCO (Atti II. Cong. Naz. Chim. Pura Appl., 1926, 1371–1373; Chem. Zentr., 1928, i, 2275).—The liquor (10 c.c., or 50 c.c. of purer solutions) is diluted to 300 (or 200) c.c.; a slight excess of ammonia, then 25 c.c. of ammonium citrate solution (unless citric acid liquor is being analysed) is added, and treated while hot with 25 c.c. of magnesia mixture. A. A. ELDRIDGE.

**Purification of hydrogen [for use in the manufacture of ammonia].** G. LEFORT DES YLOUSES (Sci. et Ind., 1927, 11, 53; Chem. Zentr., 1927, II, 2335).—Liquefiable impurities, e.g., hydrogen sulphide and carbonyl sulphide, and the last traces of carbon monoxide are removed from hydrogen recovered from water-gas by treatment with liquid nitrogen under pressure at –180°. L. A. COLES.

**Utilisation of brass scrap in the manufacture of copper sulphate.** A. V. VINOGRADOV and V. I. VINOGRADOVA (J. Chem. Ind. Moscow, 1926, 3, 1229–1230).—The brass scrap was calcined, dissolved in hydrochloric acid, and the copper removed from the solution with zinc, or brass, or by hydrogen under pressure as cuprous chloride; the latter on interaction with barium sulphide yields cuprous sulphide which is ignited at 200–300° and dissolved in dilute sulphuric acid.

CHEMICAL ABSTRACTS.

**Separation of zinc formaldehyde-sulphoxylate from zinc formaldehyde-bisulphite.** C. SUNDER and A. KEMPF (Sealed Note 2223, 20.2.13. Bull. Soc. Ind. Mulhouse, 1928, 94, 473–474). Report by R. FLATT (*Ibid.*, 474–476).—A method of separation is based on the fact that zinc formaldehyde-sulphoxylate, but not zinc formaldehyde-bisulphite, is precipitated quantitatively from its aqueous solutions when heated with zinc oxide. E.g., 500 c.c. of a solution containing zinc formaldehyde-sulphoxylate and zinc formaldehyde-bisulphite equivalent to 167 g. and 195 g. of the corresponding sodium salts, respectively, yielded after heating for 1 hr. at 45–50° 300 g. of a paste of the basic zinc salt equivalent to 160 g. of sodium formaldehyde-sulphoxylate, and the solution contained zinc salts equivalent to 180 g. of sodium formaldehyde-bisulphite and not more than 2 g. of sodium formaldehyde-sulphoxylate. FLATT confirmed substantially the efficiency of the separation, prepared in a pure form the basic zinc formaldehyde-sulphoxylate, and showed that when placed in water it hydrolyses in such a way that at equilibrium point the water in contact with it contains 0.14 g. of zinc formaldehyde-sulphoxylate per 100 c.c.

A. J. HALL.



**Detection of heavy metals in magnesium salts.** G. KOGAN (Pharm. Zentr., 1928, 69, 449—450).—The detection of small quantities of heavy metals by the formation of a brownish colour or precipitate on the addition of sodium or hydrogen sulphide to the acetic acid solution is vitiated if traces of iron in the ferrous state are present. In such cases the test should be made in a solution acidified with hydrochloric acid or a mixture of hydrochloric and acetic acids. F. R. ENNOS.

**Formation of acetylene-yielding carbides at relatively low temperatures.** F. FISCHER [with F. BANGERT] (Brennstoff-Chem., 1928, 9, 328—333).—Barium carbide has been produced by heating barium oxide, mixed with calcium oxide, in a current of methane, or by heating a mixture of barium oxide with carbon in a current of methane, or hydrogen, or *in vacuo*. The highest yields, over 60%, were obtained by heating either mixture in methane at about 1150° and under reduced pressure (12—18 mm.). Addition of a small quantity of ferric oxide in general affected the reaction favourably, but had no influence on the experiments carried out *in vacuo*. On treatment with water the product evolved not only acetylene but also hydrogen. It appears probable that the first product of the reduction is barium itself, which then is partly or wholly transformed into carbide or hydride according to the experimental conditions.

A. B. MANNING.

**Ionic exchange in zeolitic silicates through the participation of hydrolytically dissociated salts.**

**II. Natural silicates.** H. KAPPEN and B. FISCHER (Z. Pflanz. Düng., 1928, A 12, 8—37; cf. Kappen and Rung, B., 1927, 364).—In order to investigate the possibility of the introduction of ions of hydrolysed salts into zeolites the following procedure was adopted. 10 g. of the finely-powdered mineral (chabasite, desmine, stilbite, natrolith, analcime, serpentine, apophyllite, wollastonite, and talcum) were treated with 200 c.c. of 0.5*N*-solutions of the following chlorides:—ferric, ferrous, aluminium, copper, and zinc. The solution was renewed after 24 hrs. After 10 days' action the minerals were washed with water till free from chlorides and air-dried. They were then treated with *N*-potassium chloride to determine exchange acidity. Similar treatments with acid and the effects of diminution of particle size and of time of reaction were also studied. Soil and trass (volcanic earth) were treated similarly. The aluminosilicates chabasite, desmine, and stilbite are especially reactive. Ferric iron, as on permutite, was almost without action on crystalline zeolites. The introduction of bases into crystalline zeolites was much more difficult than into permutite, trass, or soils. In contradistinction to soils and permutite, the quantity was increased by diminishing particle size (and hence surface area), by raising the temperature, and by raising the salt concentration. Exchange acidity was also displayed by these minerals after treatment with acids. In a detailed theoretical discussion it is maintained that the authors' views on the nature of soil acidity and the rôle of exchangeable aluminium are substantiated, although it is admitted that exchangeable hydrogen plays a part. Further work is needed to assign to each its measure of importance.

H. J. G. HINES.

**Isotherms and isobars for air separation studies.** B. F. DODGE (Chem. Met. Eng., 1928, 35, 622).—Tables are given showing the vapour composition and pressure at various constant temperatures as a function of the composition of a liquid oxygen-nitrogen solution. Also tabulated are vapour compositions and temperatures as a similar function at constant pressures. If  $y$ ,  $x$  are the vapour and liquid compositions, then for each isobar  $y(1-x)/x(1-y)$  is very nearly a constant and may be used for approximate calculations. C. IRWIN.

**Determination of carbon dioxide [in air].** H. LUNDEGÅRDH (Z. Pflanz. Düng., 1928, A12, 1—4). P. HASSE (*Ibid.*, 4—7).—Polemical. H. J. G. HINES.

See also A., Nov., 1169, **Condition of radium salts after storage** (FRANCIS and PARSONS). 1176, **Tungsten carbides** (BECKER). 1183, **Adsorption and dissolution phenomena in precipitations** (BALCAR and STEGEMAN). 1186, **Alcosol of silicic acid** (INABA). 1190, **Thermal decomposition of Bayer's alumina** (PARRAVANO and MALQUORI). 1191, **System barium carbide-barium oxide-carbon-carbon monoxide** (THOMPSON). 1195, **Catalytic conversion of thiosulphates into polythionates** (KURTENACKER and CZERNOTZKY). 1196, **Thermal decomposition of ammonia** (BURK). **Decomposition of hydrogen peroxide at surfaces** (WRIGHT and RIDEAL; WRIGHT). 1197, **Decomposition of ammonia by high-speed electrons** (McLENNAN and GREENWOOD). 1199, **Crystalline aluminium hydroxide** (FRICKE). 1201, **Tungsten carbonyl** (JOB and ROUVILLOIS). 1204, **Determination of fluorine** (KANDILAROV). **Determination of sulphuric acid in presence of antimony** (VON FINÁLY). **Determination of polythionates** (RIESENFELD and SYDOW). **Detection of pentathionate in presence of sulphurous acid** (CZERNOTZKY). **Elimination and determination of nitrogen in argon** (LEU). **Determination of nitrogen** (SAIKO-PITTNER). **Determination of phosphoric acid** (SOMEYA). 1205, **Micro-determination of potassium** (LEULIER, VELLUZ, and GRIFFON). **Determination of potassium** (DALSGAARD). **Micro-determination of sodium** (DI BENEDETTO and MARENZI). **Electrometric determination of calcium** (CORTEN and ESTERMANN). 1206, **Volumetric determination of mercuric oxide** (RÂY and DAS-GUPTA). **Analysis of sodium and barium tungstates** (JANDER and MOJERT). **Determination of thorium** (HECHT). 1207, **Determination of antimony in presence of arsenic** (RATHSBURG). 1209, **Extraction of krypton and xenon from air and from gases dissolved in water** (CLAUDE). 1230, **Determination of cyanides and basic cyanides of mercury** (IONESCO-MATIU and CARALE). 1280, **Toxicity of lead compounds** (BISCHOFF and others).

**Fire extinguishers.** BRANDL.—See I. **Radiant energy from flames.** GARNER.—See II. **Dissociation of silicates.** GUILLIN.—See XVI.

#### PATENTS.

**Continuous concentration of dilute hydrochloric acid.** SOC. ANON. DES DISTILLERIES DES DEUX-SÈVRES (F.P. 625,511, 30.11.26. Belg., 1.12.25).—The acid is distilled in the presence of salts soluble in water, e.g.,



calcium, magnesium, or zinc chloride, or of aliphatic or aromatic sulphonic acids. L. A. COLES.

**Production of esters of silicic acid.** J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 298,778, 24.10.27).—Silicon tetrachloride is treated with alcohols in the presence of non-reacting diluents, *e.g.*, benzene.

L. A. COLES.

**Apparatus for manufacture of sodium sulphate and hydrochloric acid.** E. V. BENJAMIN, Assr. to MYLES SALT CO., LTD. (U.S.P. 1,681,760, 21.8.28. Appl., 2.1.25).—Sodium chloride is suspended in baskets in a series of decomposing chambers below ground level, where it is treated with a current of hot sulphur dioxide, steam and air entering at the top and leaving at the bottom of each chamber in such a way that fresh chloride is subjected to the action of the more exhausted gases. A continuous plant is described. C. HOLLINS.

**Removing monoalkaline-earth phosphates from monoalkali phosphate solutions.** T. BENCKISER, A. REIMANN, A. REIMANN, JUN. (J. A. BENCKISER), and F. DRAISBACH (B.P. 298,436, 21.2.28).—Monoalkaline-earth phosphates are removed from the solution of monoalkali phosphates obtained by the treatment of crude phosphates with sulphuric acid by the addition of dialkali phosphates. The latter are added either in theoretical quantity or in slight excess, and the solution is heated at 150–200° and under 5–15 atm.; the resulting solution is entirely free from calcium and contains only 0.4–0.7 pt. of MgO to 100 pts. of P<sub>2</sub>O<sub>5</sub>. P. E. L. FARINA.

**Production of barium ortho- or tri-silicate.** RHENANIA-KUNHEIM VER. CHEM. FABR. A.-G., Assees. of F. ROTHE and H. BRENEK (G.P. 449,737, 28.8.26).—Barium carbonate is heated with silica or barium metasilicate in the presence of steam, which may be produced by the combustion of gases containing hydrogen for supplying the necessary heat. L. A. COLES.

**Manufacture of calcium polysulphide.** C. D. WOOD, Assr. to LOS ANGELES CHEM. CO. (U.S.P. 1,685,895, 2.10.28. Appl., 1.9.26).—Sulphur is ground in the presence of lime and hot water. F. G. CROSSE.

**Treatment of fines of earthy materials.** R. W. HYDE, Assr. to DWIGHT & LLOYD METALLURGICAL CO. (U.S.P. 1,684,958, 18.9.28. Appl., 30.4.25).—A mixture of an alkaline-earth carbonate in small particles with a small proportion of solid fuel is exposed in a uniform layer and calcined so that heated combustion gases from an independent source pass through the entire layer at a constant rate. The solid fuel is thereby burnt, and the carbonate, heated and maintained above its decomposition temperature but below its fusion point, is converted into oxide. W. G. CAREY.

**Treatment of slag and the like for the production of aluminium sulphate and other by-products.** M. ODLING and A. A. STREET (B.P. 298,141, 4.5.27).—Blast-furnace slags, natural rocks, or slags of similar nature are crushed, mixed with water, and heated in pans with sulphuric acid under conditions that render the silica insoluble; the mass is lixiviated with water, filtered or decanted from insoluble matter, and evaporated to recover the aluminium sulphate. Lixiviation

may be repeated and the resulting solutions used as desired. The conditions for treating the slag are determined by the nature of the latter. Generally 2½ gals. of water to 1 cwt. of slag and seven eighths of the theoretical sulphuric acid are used; the temperature required is 105°, and is obtained from the heat of reaction and from steam or waste gas. Suitable oxidising agents are added, if desired, to free the operation from noxious fumes. Instead of waxy hydrated aluminium sulphate, the crystalline basic sulphate may be produced by the addition of lime etc. after the reaction. The insoluble residue of calcium sulphate and silica may be either used for agricultural purposes or converted by heat into a hard wall plaster.

P. E. L. FARINA.

**Separation of alumina from alum.** G. S. TILLEY (U.S.P. 1,686,112, 2.10.28. Appl., 3.6.27).—Alum is heated at a temperature below which it would melt in its own water of crystallisation until more than one half of that water has been removed, after which the temperature is raised to drive off combined sulphur trioxide. H. ROYAL-DAWSON.

**Removal of heavy metals other than iron from neutral or alkaline solutions of zinc compounds.** SILESIA VER. CHEM. FABR., Assees. of H. KLEIN and W. FLEMING (G.P. 450,285, 17.12.25).—The metals are precipitated by the addition of aqueous solutions of salts of a disubstituted dithiocarbamic acid.

L. A. COLES.

**Separation of cobalt from [solutions containing] other materials [e.g., nickel].** S. C. SMITH (B.P. 298,301, 25.7.27).—Cobalt is selectively precipitated from solutions of cobalt and nickel salts (particularly sulphates) by means of lead peroxide without the addition of manganese. The cobalt and nickel are completely separated. The operation is conducted at the b.p.; cobalt is recovered from the residue by leaching with sulphuric acid, and the lead sulphate produced is reconverted into the peroxide, the process thus being a cyclic one. By suitably adjusting conditions the separation may be carried out in two stages, a small amount of cobalt being left in solution at the end of the first operation. The process may be applied to the treatment of ores, mattes, etc. P. E. L. FARINA.

**Production of lead tetraethyl.** W. S. CALCOTT, A. E. PARMELEE, and F. R. LORRIMAN (B.P. 280,169, 26.7.27. U.S., 3.11.26).—Ethyl chloride reacts at 30–45° with a lead alloy containing about 9% Na and 1% K.

L. A. COLES.

**Manufacture of catalytic gels.** SILICA GEL CORP., Assees. of E. B. MILLER and G. C. CONNOLLY (B.P. 280,939, 17.11.27. U.S., 19.11.26).—The hydrogel (as defined) is impregnated with the catalyst in soluble form (*e.g.*, the salt of a metal) by immersion for a definite time in a solution of required concentration. It is then converted into a hard, highly porous gel by dehydration, which may be effected by a current of air at 75–120° and subsequent increase to 300–400°. The salt is decomposed by further heat-treatment. The temperature of decomposition should not exceed 550°; where a metal catalyst is required the decomposition is carried out in a suitable reducing atmosphere. The hydrogel may be



impregnated with a mixture of salts and mixed hydrogels employed. A hydrogel is defined as a product giving a gel that will adsorb a minimum of 10% of its dry weight when in equilibrium with water vapour at 30° and 22 mm. of mercury. P. E. L. FARINA.

**Purifying hydrogen or gases containing hydrogen.** GEWERKSCHAFT DER STEINKOHLENZECHER MONT-CENIS (B.P. 276,668, 23.8.27. Ger., 26.8.26).—The gases are treated with alkaline reacting substances (preferably soda-lye, 5–15%) to remove carbon dioxide, hydrogen sulphide, sulphur dioxide, etc., and are then passed at increased temperature (150–450°) and pressure (70–800 atm.) over a catalyst, whereby the carbon monoxide is decomposed into water and methane. By exactly repeating the process the catalyst in the second vessel has a life of 10–100 times longer than the usual. The catalyst may consist of finely-divided metals of the iron group, or metals or oxides of chromium, zinc, manganese, or vanadium, either alone or containing compounds of alkali, alkaline-earth, and certain earth metals; they are deposited as nitrates on the carrier substance where they are decomposed and reduced. The process, suitably modified, is utilised for the synthesis of ammonia. P. E. L. FARINA.

**Carrying out exothermic chemical reactions under pressure and at raised temperatures.** SOC. CHIM. DE LA GRANDE PAROISSE, AZOTE ET PROD. CHIM. (F.P. 626,491, 31.3.26).—Mixed gases, e.g., nitrogen and hydrogen for the synthesis of ammonia, circulate through an annular space between the outer walls of a pressure chamber and the inner tube containing the catalyst so that they are preheated by the heat of reaction generated in the catalyst compartment. L. A. COLES.

**Means for testing for carbon monoxide.** E. W. HULTMAN (U.S.P. 1,684,587, 18.9.28. Appl., 23.3.26).—Test papers soaked in a solution of palladous chloride containing a hygroscopic salt to keep them permanently moist are claimed. A. R. POWELL.

**Manufacture of stable solutions of peroxides, persalts, and peracids.** OESTERR. CHEM. WERKE GES.M.B.H. (B.P. 277,628, 13.7.27. Austr., 16.9.26).—Solutions containing, or capable of giving, hydrogen peroxide are stabilised by the addition of an alkali pyrophosphate in the presence of an activator such as an alkali chloride and/or silicate. The specific actions of the stabiliser and activator are mutually dependent and intensified, the total amount added being about 4%. The acidity of the solution is restored after treatment by the addition of suitable acid. 30% hydrogen peroxide solutions thus treated may be kept at 70° for several hours, the extent of the decomposition being nil to 2.3%, according to the nature of the stabilising mixture employed. Such solutions, suitably diluted (0.5–3% H<sub>2</sub>O<sub>2</sub>), are of value in the bleaching industry in checking the action of catalysts which normally cause high peroxide consumption. Examples are given of the bleaching of straw, wool, and felt where a peroxide consumption of up to 100% is reduced to 10–20%. A particularly stable solution is obtained by adding Turkey-red oil to the other stabilising and activating constituents. P. E. L. FARINA.

**Manufacture of hydrogen peroxide by cathodic reduction of oxygen.** A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 297,880, 30.6.27).—The electrolyte is saturated with oxygen under pressure and electrolysed with the pressure released, thereby obviating risks of explosion. By a continuous cycle of operations through the saturation vessel and electrolytic cell, a 3% solution of hydrogen peroxide is obtained with an average current efficiency of 80%. The process enables a greater current density to be employed, as this depends on the degree of supersaturation. P. E. L. FARINA.

**Finely-divided tellurium.** C. LEVADITI (F.P. 626,506, 2.4.26).—A 30% aqueous solution of dextrose is added to a 5% aqueous solution of sodium tellurite, and the mixture heated for 30 min. to boiling.

J. S. G. THOMAS.

**Causticising unit.** W. D. MOUNT (U.S.P. 1,685,929, 2.10.28. Appl., 16.10.22).—See B.P. 265,669; B. 1927, 409.

**Heat exchanger (B.P. 297,509).**—See I. **Manganese salts from gas purification (G.P. 450,230).**—See II. **Catalysts for synthetic methyl alcohol (U.S.P. 1,681,750–3; B.P. 271,840 and 279,378).** **Catalytic oxidation (B.P. 298,142).**—See III. **Waste liquors etc. from cuprammonium silk (B.P. 291,380).**—See V. **Blanc fixe (G.P. 450,180).** **White lead (B.P. 298,520).**—See XIII. **Salts from sea water (U.S.P. 1,684,935).**—See XXIII.

### VIII.—GLASS; CERAMICS.

**Beryllium glass.** C. F. LAI and A. SILVERMAN (J. Amer. Ceram. Soc., 1928, 11, 535–541).—In order to determine the general melting and cooling effects of beryllium oxide on glass, a soda-beryllia-silica triaxial diagram was prepared. The batch was melted in a covered crucible in a gas-fired furnace for 9 hrs. at 1400–1430° and the glasses were carefully cooled in the furnace. The products were divided into five categories, viz., (1) unmelted, (2) devitrified, (3) incipiently devitrified, (4) uniformly opaque, (5) transparent. From the clear glass area, four series of glasses were prepared for test purposes, especial precautions being taken with the heating and the cooling. The total time required for annealing was 18 hrs. Beryllium glass melts at a somewhat higher temperature than ordinary glass; it melts between 1400° and 1430° if the molecular ratio of its constituents Na<sub>2</sub>O, BeO, and SiO<sub>2</sub> is limited between 1:1:4.25 and 1:1:4, respectively. Its annealing properties introduce no radical difficulties in manufacture. Its density is lower than that of corresponding calcium and magnesium glasses, but this value increases linearly with increasing beryllia content. The hardness of beryllium glass (6.2–6.7) increases only slightly with increasing beryllia content, greatly exceeds that of soda-lime glasses, and is greater than that of magnesium glass. The refractive index, which increases linearly with increasing beryllia content, is slightly higher than that of magnesium glass, but much lower than that of calcium glass. In the transmission of ultra-violet light, the value for beryllium glass is greater than that of ordinary glass, but less than that of magnesium glass. Ultra-violet light transmission de-



creases with increasing beryllia content. If hardness alone is required in a commercial glass, beryllium may be introduced as beryl, the presence of aluminium in which toughens the glass.

A. T. GREEN.

#### Use of 8-hydroxyquinoline in silicate analysis.

J. ROBITSCHKEK (J. Amer. Ceram. Soc., 1928, 11, 587—594).—The methods of Berg (A., 1927, 639, 848) and of Hahn and Vieweg (*ibid.*, 639) have been applied to the determination of alumina, magnesia, and alkalis in silicates. The ground sample of silicate is fused in the normal way, and, after extracting the fused mass, the solution is neutralised, and slightly acidified with acetic acid. After the addition of ammonium acetate the aluminium is precipitated with a reagent prepared by grinding 8-hydroxyquinoline in acetic acid, diluting, adding ammonia until cloudy, cooling, and filtering. This precipitate,  $\text{Al}(\text{C}_9\text{H}_6\text{ON})_3$ , is collected on a filter, washed, dissolved in hydrochloric acid, and titrated with standard potassium bromide-bromate solution. Alternatively, the precipitate may be dried and weighed. After removing the calcium as oxalate, the filtrate is treated with sodium tartrate. On adding the reagent, neutralising with dilute sodium hydroxide solution, and warming to 70°, magnesium is precipitated as  $\text{Mg}(\text{C}_9\text{H}_6\text{ON})_2$ . After washing, this precipitate may either be dried and weighed or dissolved and titrated as above. A method for the determination of alkalis, using hydrofluoric acid for the removal of silica and 8-hydroxyquinoline for the elimination of alumina and magnesia, is described.

A. T. GREEN.

#### Method of determining free aluminium oxide in silicate mixtures and its application to the study of clays.

L. A. SCHMELEV (Trans. Ceram. Res. Inst., Moscow, 1928, No. 14, 24 pp.).—A small quantity of the powdered silicate mixture is treated in a test-tube with a hot alcoholic solution of alizarin-red, the solution having been previously saturated at the b.p. with boric acid to prevent coloration of the alkalis and alkaline-earths. The contents of the test-tube are boiled and decanted, and the residue is washed with a hot, saturated alcoholic solution of boric acid. The extent to which the residue has become stained red indicates the amount of free alumina present. Hydrargillite and diasporite do not react with the alizarin-red solution, but they become strongly coloured after heating for 2–5 min. in the Bunsen flame. No liberation of alumina from the kaolinite molecule was detected by this method between the temperature limits of 550° and 1100°.

F. SALT.

#### Deformation of refractory materials under load at high temperatures.

E. KÖHLER (Trans. Ceram. Res. Inst., Moscow, 1928, No. 12, 119 pp.).—The various methods of determining the refractoriness-under-load of refractories, as described in the literature, are critically reviewed, and preference is given to the method which measures the degree of deformation under a given load under the influence of a gradually rising temperature. Tests were carried out with apparatus consisting essentially of an electric carbon-resistance furnace provided with a system of levers for applying the load. A pointer recorded the movements of the test piece, magnified ten times, on a suitable scale. A constant load of 1 kg./cm.<sup>2</sup> was applied, and

the temperature rose at the rate of 300° per hr. up to 950°, and thereafter at 240° per hr. Temperatures were measured with a thermo-element, protected by a special tube passing through the bottom of the furnace, the junction of the element being level with, and in close proximity to, the lower third of the test-piece. The test pieces were cylinders 50 mm. high and 35.7 mm. in diam. The results of tests made on Russian clays showed that the finer the grog, the higher was the temperature of initial softening; a 40% deformation, however, occurred at a lower temperature with the fine grog mixtures than with the coarser grog mixtures. Bodies containing mixed grog sizes showed greater resistance to deformation than bodies with one fraction, whether fine or coarse. With mixtures made from one clay, a close relationship was noted between the maximum strength (cold), the temperature at which a 4% deformation took place under load, and the firing shrinkage corresponding to the maximum cold strength. A low-fired grog produced better cohesion between the grog grains and the bonding clay. The ratio of grog to bond, within the limits of 35% to 55% of bond, had no effect on the strength under load. Kaolin-grog bodies were also prepared and fired to different temperatures. Best results in the under-load test were obtained with bricks fired at cone 28.

F. SALT.

See also A., Nov., 1182, Adsorption of gases by glass (ZEISE). 1205, Colorimetric determination of silica (KING and LUCAS). 1211, Changes in clays through weathering (OKAZAWA).

Pulverising hard substances. VON WARTENBERG and others.—See I.

PATENTS.

Manufacture of ceramic products with pure white shades. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 297,939, 29.8.27).—The shaped ceramic materials are raised to a red heat or an elevated temperature in a stream of chlorine or in a gas containing chlorine.

H. ROYAL-DAWSON.

Production of refractory materials. A. WAGEMANN (B.P. 286,677, 8.3.28. Ger., 8.3.27).—The addition of artificial silicates (slag from metal smelting and dust-destroyer clinker) to the mix for siliceous and silica materials gives after burning a product with increased strength and resistance to slag attack. Up to 10% of such silicates is added according to the particular refractory. By these additions the amount of clay bond in rammed materials may be greatly reduced, giving a product of equal strength and density but with diminished shrinkage.

J. A. SUGDEN.

Manufacture of zircon refractories. LE R. H. MINTON (U.S.P. 1,684,739, 18.9.28. Appl., 27.6.25).—Zircon is ground wet in the presence of a deflocculant, such as tannic acid, lignin, or gallic acid, and coarse zircon is then added. A plastic mass is formed by means of dextrin, tar, gums, or similar binders, and the mixture is moulded and fired.

F. G. CLARKE.

Reinforced [laminated] glass. N. B. MATTINGLEY and A. REA (B.P. 298,423, 27.1.28).

Stabilisation of disperse systems (Swiss P. 121,097).—See I. Silicon carbide (U.S.P. 1,684,611).—See XI.



## IX.—BUILDING MATERIALS.

**Cottrell-Moeller process for dusts.** VER EECHE.  
—See I.

## PATENTS.

**Apparatus for calcining cement or lime.** E. MEIER (G.P. 449,789, 31.12.24. Addn. to G.P. 445,554; B., 1928, 194).—The calcining zone in the apparatus described previously is provided with baffles for deflecting the course of the falling particles, the baffles being constructed of hollow fireclay bricks of square cross-section arranged with one of the edges pointing upwards. A current of cooling air is passed through the hollow cavities in the bricks. L. A. COLES.

**Treatment of gypsum.** RHENANIA-KUNHEIM VER. CHEM. FABR. A.-G., Assees. of F. ROTHE and H. BRENEK (G.P. 450,172, 3.8.26. Addn. to G.P. 438,172).—Alkali aluminium silicates are used as silica carriers in the prior process. Soluble alkali aluminium compounds are washed out of the sintered material after removal of sulphuric acid but before working up to cement. The proportions of the materials are so adjusted that they contain 2 mols. of  $\text{CaSO}_4$  per mol. of  $\text{SiO}_2$ , and alumina is removed almost quantitatively. L. A. COLES.

**[Production of] cementitious material.** E. R. HARRAP, J. A. CANN, and BELL'S UNITED ASBESTOS CO., LTD. (B.P. 298,270, 7.7.27).—The material comprises metal oxides (magnesium oxide) and soluble metal sulphates capable of forming oxysulphates or basic sulphates (ferrous sulphate), with or without the addition of retarding agents, e.g., boric acid. L. A. COLES.

**Manufacture of materials for use in making or repairing roads and other surfaces.** F. MORTON (B.P. 298,812, 20.12.27).—A mixture of pitch with 5–20% of pure bitumen is used as binding agent. L. A. COLES.

**Stabiliser and plaster composition containing the same.** A. H. GALLAGHER (U.S.P. 1,683,539, 4.9.28. Appl., 19.9.27).—A plaster having uniform setting properties is obtained by adding an alkali-hydrolysed, nitrogenous, organic material, such as glue or waste organic matter, together with re-ground set plaster, or other crystal-forming calcium sulphate. The former prevents too rapid setting, and the latter counteracts the effect of retarding substances or conditions. F. G. CLARKE.

**Production of [heat-]insulating sheets.** J. WEISS (B.P. 274,471, 13.7.27. Switz., 4.10.26).—Fibrous vegetable material, e.g., wood wool, is dipped in a mixture of kieserite solution and magnesium oxide and, after draining, is dried in moulds having perforated bottoms and covers. L. A. COLES.

**Manufacture of heat- and sound-insulating material.** P. H. USSING (B.P. 289,830, 12.4.28. Denm., 3.5.27).—Straw etc., after softening with alkalis and treatment with solutions of soluble soaps and aluminium salts to precipitate aluminium soaps on the fibre, is formed into sheets on wire screens and these are pressed and dried. L. A. COLES.

**Siliceous composition flooring material.** D. and R. F. MACDONALD (B.P. 298,290, 15.7.27).—Mixtures of silica with, e.g., iron, aluminium, calcium, and

magnesium oxides are heated to fusion and the product is ground to a suitable size. Additional colour may be added by coating the surface of the material with potassium or sodium silicate and pigments and again firing to form a coloured glaze. L. A. COLES.

**Treatment of wood prior to impregnation.** COMP. FRANÇ. DES ÉTABL. GAILLARD (F.P. 601,663, 4.8.25).—The wood is heated above 100° by means of hot air to expel volatile constituents and to open up the pores, and the sap is then expelled by treating the wood with hot water, creosote oil, or sodium fluoride or copper sulphate solution under pressure followed by treatment *in vacuo* to withdraw the liquid from the pores. L. A. COLES.

**Preservation of wood.** Z. HADNAGY and L. LANYI (F.P. 624,258, 1.3.26).—Railway sleepers etc., after impregnation with preservatives if desired, are coated with cement resistant to water and salt solutions. L. A. COLES.

**Antiseptic material for the preservation of wood.** G. FRANCIOSI (F.P. 608,576, 28.12.25. Ger., 29.12.24).—The material comprises a solution of peat tar in not less than its own weight of tar oil. Up to one third of the peat tar may be replaced by wood tar, and zinc chloride may also be added. L. A. COLES.

**Mixtures of pulverulent materials** (B.P. 273,768).  
—See I. Naphthenic compound (U.S.P. 1,681,657).  
—See III. Glueing wood (B.P. 279,087).—See XVII.

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

**Siemens-Martin open-hearth furnace with mixed-gas heating.** W. HEILIGENSTAEDT (Stahl u. Eisen, 1928, 48, 1465–1472).—The firing of open-hearth steel furnaces with producer gas is compared with the procedure necessary with mixed gas (coke-oven gas and blast-furnace gas). In the latter case the gas must be preheated to 1000–1100° to decompose methane, whereas producer gas need be preheated only to 450°. Hence with mixed gas a much more efficient heat-interchange system is required. The heat balance in both cases is discussed at some length, together with the necessary changes in the design of the furnace and regenerator. A. R. POWELL.

**Heat content and sp. heat of some [blast-furnace and open-hearth] slags at high temperatures.** S. UMINÓ (Sci. Rep. Tôhoku Imp. Univ., 1928, 17, 985–996).—The heat content and sp. heat of three blast-furnace slags and of three open-hearth furnace slags have been determined up to 1500°. The mean heat content at 1500° is about 400 g.-cal./g., and the mean sp. heat increases from about 0.18 at 100° to 0.28 at 1550°. A. R. POWELL.

**Energy losses of a 7-ton and of a 10-ton Héroult furnace.** N. WARK; also H. KLINAR, O. REINHOLD, and N. WARK (Arch. Eisenhüttenw., 1928, 9, 2, 145–150, 151–153; Stahl u. Eisen, 1928, 48, 1441–1442).—The heat balance of two Héroult steel furnaces has been determined; for the 7-ton furnace 20.8% of the heat input is lost by radiation, 14.7% in the cooling water, and 11.6% in the conductors. A. R. POWELL.



**Energising action of carbonates contained in carburising mixtures.** G. TAKAHASHI (Sci. Rep. Tôhoku Imp. Univ., 1928, 17, 883—926).—The rate of carburisation of iron by carbon and by carbon monoxide in the presence of carbonates of the alkalis and alkaline-earths has been investigated. That the accelerating effect of carbonates on cementation is not due to reduction by carbon followed by interaction between carbon monoxide and the iron is shown by the fact that carburisation is more energetic with carbonate-carbon mixtures than in a rapid current of pure carbon monoxide. Again, carburisation is accelerated by carbonates even at temperatures below the dissociation temperatures of the carbonate used, and when carbon monoxide is used as the carburising agent in place of carbon. In the latter case, when no iron is present, decomposition of carbon monoxide into carbon dioxide and finely-divided carbon takes place at carburising temperatures, and it is this active carbon which diffuses into iron during cementation at such increased velocity. Hence the rapid action of the carbon-carbonate mixture is due to the progressive formation from the carbon of carbon monoxide by the action of small quantities of oxygen or carbon dioxide and its almost immediate decomposition by the carbonate into an active form of carbon having a high rate of diffusion in contact with ferrous metals. A. R. POWELL.

**Desulphurising action of manganese.** Z. SHIBATA (Tech. Rep. Tôhoku Imp. Univ., 1928, 7, 299—303).—The degrees of desulphurisation of iron by manganese are calculated by means of the Nernst heat theorem for 1500°, 1600°, and 1700°, for various concentrations of manganese. C. W. GIBBY.

**Mechanical properties of low-manganese steel.** M. HAMASUMI (Tech. Rep. Tôhoku Imp. Univ., 1928, 7, 305—341).—Static tensile tests and notched-bar impact tests have been made on 21 low-manganese steels varying in composition from 0.1—0.4% C and 0.4—5.0% Mn. Cold-brittleness and blue-shortness are explained by the relative change of the maximum normal resistance and the maximum slip resistance of the crystals with respect to temperature. C. W. GIBBY.

**Age-hardening of alloys and new age-hardening phenomena in iron.** G. MASING (Arch. Eisenhüttenw., 1928—9, 2, 185—196; Stahl u. Eisen, 1928, 48, 1472—1473).—The phenomenon of age-hardening in alloys is discussed with especial reference to duralumin and beryllium-copper alloys (cf. Masing; also Dahl, B., 1928, 160). As the solubility of carbon in iron decreases from 0.03 to 0.04% at 700° to less than 0.01% at 20°, soft iron undergoes age-hardening when quenched from 650—700° and kept at the ordinary temperature for some days. This treatment increases the hardness from 120 to 185 Brinell and the tensile strength from 40.3 to 57.5 kg./mm.<sup>2</sup>, whilst the elongation is reduced from 27.5% to 14%. A. R. POWELL.

**Plastic deformation of metals.** F. KÖRBER (Stahl u. Eisen, 1928, 48, 1433—1441).—A review of recent progress in the study of the mechanism of plastic deformation showing, with reference to numerous examples, the value of flow lines and recrystallisation

phenomena in interpreting the behaviour of mild steels during forging and rolling. The theories of plastic flow derived from the above-named considerations are shown to be confirmed by X-ray examination of plastically deformed metal. A. R. POWELL.

**Ludwig-Soret effect in metallic alloys.** II. M. BALLAY (Rev. Mét., 1928, 25, 509—520; cf. B., 1928, 787).—It is shown thermodynamically that the Ludwig-Soret effect should depend on the heat of dilution of the solution. The ratio  $c_1/c_2$  of the concentrations in the colder and hotter parts of the solution should approach unity at infinite dilution, and not the ratio of the absolute temperatures. This is shown to be in much better agreement than the theory of van't Hoff with the experimental data recorded for potassium chloride, sodium chloride, and hydrochloric acid. C. W. GIBBY.

**Separation and concentration of minerals by flotation.** C. BERTHELOT (Rev. Mét., 1928, 25, 372—396, 411—426, 496—508).—A review of the theory and technique of flotation methods, of the plant and media used, and of the ores to which they are applied. C. W. GIBBY.

**Lime scale as a concentrate.** R. E. HEAD (Min. and Met., 1928, 9, 455—457).—Lime scale which formed on the sides of the cleaner cells of a Callow flotation plant treating auriferous copper ore was found to contain 95 oz./ton of gold, 35 oz./ton of silver, and 2.5% of copper, all of which were present as fine particles of free metal enveloped in a carbonaceous matrix which collected in the interstices of the crystalline calcium carbonate scale. A. R. POWELL.

**Electrodeposition of silver with special reference to the use of sodium cyanide.** E. B. SANIGAR (Trans. Faraday Soc., 1928, 24, 45—55).—Good deposits of silver with a satin surface may be obtained with baths containing sodium cyanide instead of potassium cyanide; a suitable bath contains 35 g. of silver nitrate, 40.4 g. of sodium cyanide (*i.e.*, twice the theoretical to form the double salt), and 80 g. of sodium carbonate per litre. The conductivity of this solution at 25° is  $9.08 \times 10^{-2}$  mho compared with  $14.25 \times 10^{-2}$  mho for the usual potassium cyanide bath. Increasing the carbonate content of the bath results in a softer deposit, as also does an increase in the free sodium cyanide up to twice the combined sodium cyanide; more free cyanide than this tends to harden the deposit and to change its character. High current densities favour the formation of soft deposits, but in order to obtain smooth surfaces agitation is necessary. In replenishing the free cyanide content of potassium cyanide baths, sodium cyanide may be used, provided that pure salts are used and that care is taken to exclude impurities from the plating vat; in the presence of impurities, addition of the sodium salt to potassium cyanide vats often results in the formation of brown anode slimes, although such slimes are not produced in vats containing only sodium cyanide. A. R. POWELL.

**Ageing of thermocouple wires.** H. LENT and F. KÖFLER (Arch. Eisenhüttenw., 1928—9, 2, 173—176; Stahl u. Eisen, 1928, 48, 1473—1474).—The alteration in the calibration of base-metal thermocouples after



prolonged use in coke-oven and blast-furnace gases at 800° has been determined. In furnaces fired with coke-oven gas the calibration of couples composed of chronin-V2A steel, chronin-constantan, and chronin-NCT3 (17.5% Ni, 37.6% Cr, 0.48% Mn, remainder iron) altered rapidly, the *E.M.F.* for any temperature increasing rapidly with the time of exposure to the gases. In furnaces fired with flue gas from blast furnaces, however, all the above-named couples retained their calibration over long periods. Chronin-nickel couples withstand both types of gas-firing up to 1000—1100° for 5—6 weeks, and chronin-cekas (59.7% Ni, 11.2% Cr, 2% Mn, remainder iron) couples are stable for longer periods at 800°.

A. R. POWELL.

See also A., Nov., 1174, **Crystallographic orientation of electrodeposited copper and nickel** (TAMMANN and STRAUMANN). **X-Ray analysis of copper-tin alloys** (WESTGREN and PHRAGMÉN). 1175, **X-Ray analysis of silver-cadmium alloys** (ÅSTRAND and WESTGREN). **Fibrous structure of electrodeposited metals** (TSUBOI). **Recrystallisation of aluminium** (TANAKA). **X-Ray analysis of copper-magnesium alloys** (RUNGQVIST, ARNFELT, and WESTGREN). 1178, **Structure of quenched carbon-steel** (KURDUMOV and KAMINSKY). **Electrical resistance of alloys under pressure** (UFFORD). 1181, **X-Ray analysis of thallium-antimony alloys** (PERSSON and WESTGREN). **Recrystallisation of cast steel** (HEIKE and WESTERHOLT). 1190, **Systems cadmium-antimony and cadmium-lead** (ABEL, REDLICH, and ADLER). **Constitution of iron-tungsten and iron-molybdenum alloys** (ARNFELT). 1191, **System lead-antimony-cadmium** (ABEL, REDLICH, and ADLER). 1195, **Oxidative catalytic action of iron** (WARBURG). 1196, **Nickel catalyst for continuous hydrogenation** (SVIZUIN). 1201, **Iron and tin** (KNOWLTON). 1204, **Determining chromium in chromium steels** (SOMEYA). 1206, **Determination and separation of chromium, iron, aluminium, and phosphorus** (JÄRVINEN). 1207, **Determination of vanadium in presence of chromium, tungsten, and iron** (WILLARD and YOUNG).

**Cottrell-Moeller process for dusts.** VER EECHE.—See I. **Brass scrap.** VINOGRADOV and VINOGRADOVA.—See VII. **Water in relation to corrosion.** HAASE.—See XXIII.

## PATENTS.

**Rotary furnace.** E. AMME, K. DIENST, and D. J. UHLE (U.S.P. 1,685,972, 2.10.28. Appl., 25.2.27. Ger., 31.1.27).—A rotatable cooling drum, comprising a number of concentric cylinders separated by annular chambers communicating respectively with the inner part of the drum and with each other at opposite ends, is removably mounted in axial alinement with a rotary drum which can be heated. Elevating ribs project from the drums into the annular chamber, and disintegrating means are provided within the cooling drum.

J. S. G. THOMAS.

**Centrifugal liquid crucible.** J. MAXIMOFF and M. S. DE COSTA (U.S.P. 1,684,800, 18.9.28. Appl., 23.10.26. Fr., 24.12.25).—An apparatus for forming crucibles from liquid metals comprises a centrifugal

vessel with a refractory lining to contain the molten metal and a vertical electrode embedded in the bottom of the lining.

A. R. POWELL.

**Steel manufacture.** J. R. C. MARSH, Assr. to F. N. BARD (U.S.P. 1,684,841, 18.9.28. Appl., 19.1.22).—Molten iron is added to finely-divided, loose, graphitic material in such a manner as to effect a thorough mixing and completely to carburise the metal.

A. R. POWELL.

**Reducing the corrosive action of acids on iron and steel in pickling baths.** GOODYEAR TIRE & RUBBER Co., Asses. of L. B. SEBRELL (B.P. 298,390, 10.11.27. U.S., 21.10.27).—The attack of pickling acid on metal surfaces is minimised, without affecting the dissolution of oxide, by addition of about 0.1% of one of the products obtained by interaction of formaldehyde and hydrogen sulphide, e.g., dithiolmethane, dithioldimethyl sulphide, bis(thiolmethylthiol)methane,  $\text{CH}_2(\text{SH})\cdot\text{S}\cdot\text{CH}_2\cdot\text{S}\cdot\text{CH}_2\cdot\text{SH}$ , and the cyclic sulphides derivable from these.

C. HOLLINS.

**Proofing of iron and steel against rust.** W. H. COLE (B.P. 298,328, 22.8.27).—The metals are treated, in an autoclave, either fixed or movable, with the mixed phosphate solution described in B.P. 289,906 (B., 1928, 488), at a pressure above atmospheric and at a temperature above the b.p. of the liquid under atmospheric pressure.

F. G. CROSSE.

**Wet extraction of copper.** F. DIETZSCH (B.P. 296,899, 26.9.27).—The ore is roasted if it contains sulphides and the product is leached with dilute hydrochloric acid or with a solution of sodium chloride saturated with sulphur dioxide. The leach liquor is freed from sulphur dioxide by passing it through a fresh quantity of ore and its copper content is separated by means of hydrogen sulphide generated by passing the roaster gases together with steam over red-hot coke. The liquor from which the copper has been removed is again saturated with sulphur dioxide and used for treating further quantities of ore.

A. R. POWELL.

**Copper alloys.** METALBANK & METALLURGISCHE GES. A.-G. (B.P. 286,615, 5.3.28. Ger., 5.3.27).—Alloys exhibiting high mechanical strength, hardness, and toughness consist of 87—99% Cu, 0.5—10% Ni, and 0.5—3% of ferrosilicon.

F. G. CROSSE.

**[Silver] alloys resistant to chemical action.** J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 297,665, 30.6.27. Addn. to B.P. 297,165; B., 1928, 863).—An alloy resistant to hydrochloric acid contains at least 78% of silver and up to 22% of thallium, or a mixture of thallium with one or more of the following: magnesium, zinc, arsenic, antimony, bismuth, tin, or silicon.

A. R. POWELL.

**[Silver] alloys resistant to chemical action.** J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 298,122, 30.6.27. Addn. to B.P. 297,165; B., 1928, 863).—Alloys similar to those of B.P. 297,665 (preceding) consist of at least 78% of silver and up to 22% of a mixture of manganese with one or more of the elements thallium, magnesium, zinc, arsenic, antimony, bismuth, or tin, or of a mixture of manganese, thallium, and silicon with one or more of those elements. Alternatively,



the silver may be alloyed with up to about 22% of a mixture of manganese and silicon with one or more of the following: arsenic, antimony, bismuth, or magnesium.

F. G. CROSSE.

**Recovery of tin from cassiterite.** E. A. ASHCROFT (B.P. 297,784, 24.6.27).—The crushed dried material is mixed with powdered iron, aluminium, magnesium, or with powdered iron-tin, nickel-tin, or nickel-iron-tin alloys, the quantity being sufficient or slightly in excess of that required for complete reduction; the charge is heated at 500–900° under non-oxidising conditions or in a wholly reducing atmosphere. Instead of iron, iron oxide mixed with sufficient carbonaceous fuel to reduce the oxide to metal *in situ* may be used at non-slugging temperature.

M. E. NOTTAGE.

**Magnetic alloys.** W. E. BEATTY. From BELL TELEPHONE LABS., INC. (B.P. 297,938, 29.8.27).—Alloys of iron and cobalt containing 40–60% Co (preferably 50% Fe and 50% Co), heated at about 1100° for 2–3 hrs. and then cooled slowly in the furnace, have a permeability above that of Armco iron at a corresponding magnetising force.

M. E. NOTTAGE.

**Refining or purifying metals and alloys.** F. W. CORSALLI (B.P. 297,759, 23.6.27).—The fluid metal or alloy is mixed with the necessary quantity of improving materials (*e.g.*, carbon, alloys, metals) or purifying and deoxidising substances (such as aluminium and soda) by allowing it to flow through a mixing device which, by itself, or in common with a collecting vessel into which it passes, is adapted to be set in vibration by swinging, rotating, or by impact alternately in opposite directions; or, alternatively, it may be fixed immovably. The mixing device is provided with main channels which are connected together by smaller inclined channels, and is rigidly connected with the collecting vessel, a common driving device being provided. The charge in the mixing and/or collecting devices is heated by means of an electric current, coal dust, oil, furnace or hot exhaust gases, or by the introduction of heat-generating materials such as "Thermit." The furnace gases are passed partly through an aperture and partly over the chamber or the collecting vessel into the mixing receptacle in a direction counter to that of the metal stream; or the hot exhaust gases are introduced and conducted through the inner chamber by means of ejector action.

M. E. NOTTAGE.

**Metallic composition and its manufacture.** W. H. JUDY, Assr. to SUMET CORP. (U.S.P. 1,686,277, 2.10.28. Appl., 9.8.23).—In the purification of lead, hydrogen to the exclusion of oxygen is introduced into the molten metal.

H. ROYAL-DAWSON.

**Flotation treatment of ores, coal, etc.** W. SCHÄFER, and ERZ- u. KOHLE-FLOTATION GES.M.B.H. (B.P. 289,848, 16.3.28. Ger., 4.5.27).—The addition of solutions of polythionates especially of multivalent metals to the ore pulp assists the flotation of lead, zinc, copper, and antimony minerals. Galena is floated with ferrous dithionate and a hardwood tar oil; addition of a little sodium silicate inhibits the simultaneous flotation of blende, which is then subsequently floated by treating the pulp with copper sulphate and a zinc polythionate

solution. Copper pyrites is floated with sodium tetrathionate, sodium carbonate, and acetone oil, whereas iron pyrites remains unaffected by this treatment. Stibnite may be separated from mispickel by flotation in a pulp containing ferrous and manganous dithionates together with a little copper sulphite and sulphuric acid.

A. R. POWELL.

**Concentrating oxidised ores and minerals.** F. A. BIRD (U.S.P. 1,686,064, 2.10.28. Appl., 30.8.26).—Ore, prior to flotation concentration, is ground in a mill free from metal surfaces which might make contact with the ore, and is then subjected to a sulphidising agent.

H. ROYAL-DAWSON.

**Production of coated metal articles, *e.g.*, stereo-type plates.** C. C. WALLER (U.S.P. 1,684,565, 18.9.28. Appl., 7.2.24).—A copper coating is produced upon a stereotype plate by impregnating a fibrous blank with an aqueous emulsion containing copper sulphate, hydrated aluminium silicate, and gum arabic, impressing the desired characters thereon at 115°, casting molten type metal against the matrix so formed, and removing the casting and cleaning its surface.

A. R. POWELL.

**Operation of cupolas.** F. B. DEHN. From GRIFFIN WHEEL CO. (B.P. 297,715, 20.4.27).—See U.S.P. 1,627,536; B., 1927, 683.

**Finely-divided powders** (U.S.P. 1,685,956).—See I. **Treatment of slag** (B.P. 298,141).—See VII.

## XI.—ELECTROTECHNICS.

See A., Nov., 1171, **Photo-electric emission of water and aqueous solutions** (COUNSON and MOLLE). 1178, **Resistance of alloys under pressure** (UFFORD). **Change of resistance of lead by action of radium** (PRASAD and BASU). **Conductivity of vaporised potassium chloride** (PECZALSKI and CHICHOCKI). 1181. **Conductivity of tellurium** (KRAUS and JOHNSON). 1184, **Determination of electro-endosmosis** (SCHÖNFELDT; ILLIG and SCHÖNFELDT). 1192, **Conductivity determination** (REDLICH). **Light-sensitivity of selenium cells** (BARNARD). 1192, ***E.M.F.* between copper and its amalgam** (OKU). **Lead-mercurous iodide cell** (VOSBURGH). 1197, **Electrochemical reduction of solid electrodes** (FISCHBECK and EINECKE).

**Cottrell-Moeller process for dusts.** VER EECKE.—See I. **Electrodeposition of silver.** SANIGAR.—See X. **Antimony electrode and soils.** SNYDER.—See XVI. **Moisture testing.** FISHER and JONES.—See XIX.

## PATENTS.

**Electric furnaces.** A. D. KEENE, Assr. to WESTINGHOUSE ELECTRIC & MANUF. CO. (U.S.P. 1,686,009 and 1,686,010, 2.10.28. Appl., [A] 24.9.26, [B] 14.1.27).—(A) Electric resistor heating units are supported and protected by a cast metallic frame held by and inter-fitting with upwardly extending, cast metallic frames having a number of openings. (B) A resistor support, comprising a block forming part of the lining of the furnace wall and having portions projecting from the face of the wall, is carried by the furnace wall. Elongated members fit in the block and extend outwards over the projecting portions.

J. S. G. THOMAS.



**Electric [induction crucible] furnace.** C. B. FOLEY, Assr. to C. B. FOLEY, INC. (U.S.P. 1,685,914, 2.10.28. Appl., 13.3.20. Renewed 23.2.28).—A uniformly dense, highly compressed block composed of finely-divided refractory material is carved to form half the crucible, near the bottom of which a tube, having a constricted passage between the tube itself, the bottom, and sides of the crucible, is formed as an integral portion of the block. Two such parts are united to form a complete furnace. J. S. G. THOMAS.

**Electric furnace for producing silicon carbide.** H. E. WHITE, Assr. to FEDERAL ABRASIVES Co. (U.S.P. 1,684,611, 18.9.28. Appl., 4.9.25).—The concrete end walls of the furnace, the hearth of which rests upon concrete supports, are unconnected with the latter. F. G. CLARKE.

**Electrical gas purifier.** SIEMENS-SCHUCKERTWERKE GES.M.B.H., Assees. of R. RÜDENBERG (G.P. 448,034, 7.5.25. Addn. to G.P. 426,149).—The capacity of the condenser arranged in parallel with the electrodes is so proportioned, and the amplitude of the pulsating direct voltage so chosen, that even the smallest voltage at the electrodes exceeds the ionisation potential by at least 20%. J. S. G. THOMAS.

**Precipitating electrode for electrical gas purifier.** SIEMENS-SCHUCKERTWERKE GES.M.B.H., Assees. of R. HEINRICH (G.P. 447,912, 15.2.24. Addn. to G.P. 438,972).—Angular or V-shaped slots, running principally in the vertical and horizontal directions, are provided. J. S. G. THOMAS.

**Arrangement of electrodes for electrical gas purifiers.** METALLBANK & METALLURGISCHE GES. A.-G. (G.P. 450,391, 29.8.25).—Precipitating electrodes comprise a number of single horizontal or vertical channels with intervening open slits arranged in a plane, and discharge electrodes extend parallel to the channels in the direction of the slits. Thus the slits throughout their length are in the region of the discharge of electricity from the discharge electrodes, which lie at the centre of a circular arc which touches the flange of a channel and the anterior edge of the channel next in the direction of the gas stream. J. S. G. THOMAS.

**Method of cleaning electrodes of electrical gas purifiers.** SIEMENS-SCHUCKERTWERKE GES.M.B.H., Assees. of H. HÖFLER (G.P. 448,505, 24.8.24. Addn. to G.P. 373,773).—Electrodes are removed and allowed to slide or roll down an inclined plane, and strike an obstacle. Alternatively, pendular electrodes are disturbed from their position of rest and strike an obstacle, *e.g.*, another electrode. J. S. G. THOMAS.

**Protection of electrical gas-purifying plants.** SIEMENS-SCHUCKERTWERKE GES.M.B.H., Assees. of J. FISCHER and F. MÜLLER (G.P. 450,392, 10.10.25).—A device operated by electric waves generated by a spark occurring at a spark gap on the chamber is caused to reduce the electrode potentials, or to cut off the current, or to operate a signal or switch. The device is screened so that it cannot be operated by electromagnetic waves other than those originated by the spark discharge in the chamber, and is non-resonant to the principal wavelengths generated by the spark discharge. J. S. G. THOMAS.

**Electrical gas purification.** H. ROHMANN and ELEKTR. GASREINIGUNGS GES.M.B.H. (G.P. 448,691, 30.10.21).—Suspended particles, owing to their different velocities or charges, are separately precipitated. Gaseous ions are precipitated by an electric field of such strength and dimensions and so arranged that suspended particles are not precipitated by the field. J. S. G. THOMAS.

**Rectifier electrode.** E. W. ENGLE, Assr. to FANSTEEL PRODUCTS Co., Inc. (U.S.P. 1,686,316, 2.10.28. Appl., 7.1.27).—In an electrolytic device are electrodes of rhodium and tantalum, respectively, immersed in an electrolyte of sulphuric acid containing a small amount of metal of the iron group. H. ROYAL-DAWSON.

**Galvanic battery.** L. A. LEVY, and ALMEIDA ACCUMULATORS, LTD. (B.P. 298,289, 14.7.27).—A positive electrode of activated carbon, or an electrode associated, *e.g.*, packed, with activated carbon, is immersed in an electrolyte composed of a solution of a mixture of halides, *e.g.*, zinc chloride and zinc bromide, which just shows a definitely acid reaction towards Congo-red. J. S. G. THOMAS.

**Production of electrodes emitting electrons at a relatively low temperature.** REILIBUD RESEARCH & DEVELOPMENT Co., Inc. (G.P. 449,672, 14.9.24).—A wire of platinum-iridium or platinum-nickel alloy, heated by a suitable electric current, is coated with barium carbonate or strontium carbonate by repeatedly dipping it into a solution of the carbonate in distilled water; the coating is converted into oxide by heating the wire strongly in the presence of oxygen. J. S. G. THOMAS.

**Manufacture of incandescence cathodes for electric discharge devices.** N. V. PHILIPS' GLOEI-LAMPENFABR. (B.P. 285,434, 13.2.28. Fr., 16.2.27).—A metal core is immersed in a bath of molten barium hydroxide and then heated, thus producing an electrode coated with barium oxide; the product is then heated in an oxidising atmosphere (*e.g.*, in oxygen) at about 1000°. H. ROYAL-DAWSON.

**Insulating materials [for conductors of submarine cables].** A. R. KEMP, and WESTERN ELECTRIC Co., Inc. (B.P. 298,694, 18.7.27. Addn. to B.P. 246,663).—Rubber compounds of different characteristics are mixed. Thus a mixture containing approx. 5% of sulphur and 95% of raw rubber is heated to 200–280°, and the product compounded with another mixture resulting from a mixture of 20% of sulphur and 80% of rubber by wt. similarly treated. If desired, the heating may be carried out after the final mixing. J. S. G. THOMAS.

**Ion-concentration control.** I. B. SMITH and E. A. KEELER, Assrs. to LEEDS & NORTHRUP Co. (U.S.P. 1,684,645, 18.9.28. Appl., 3.1.22).—A *P.D.* is produced by the variation in ion concentration, and the change in *P.D.* per unit change in ion concentration is magnified by mixing with the solution containing the ions a predetermined quantity of a suitable material, so that the slope of the potential-ion concentration curve is increased. The magnified *P.D.* is utilised to control the ion concentration of the unmodified solution. F. G. CLARKE.

**Apparatus for detecting the presence of inflammable gas.** W. M. THORNTON (B.P. 298,767, 11.10.27).



—An instrument of the type of a miner's electric lamp comprises two filaments mounted together, one of which is sealed in air and is normally used for illumination, whilst the other is exposed to the atmosphere under test. Means are provided for adjusting a variable resistance contained in the lamp casing, by relative movement of two parts of the casing, so that the two filaments appear equally bright, the amount of such movement indicating the percentage of inflammable gas present.

J. S. G. THOMAS.

**Electric incandescence [projection] lamp.** N. V. PHILIPS' GLOEILAMPENFABR. (B.P. 285,069, 12.12.27. Holl., 11.2.27).

**Augmenting the output of [dry] electric cells.** G. C. FURNESS (B.P. 274,907, 25.7.27. U.S., 23.7.26).

**Photo-electric cells.** DE FOREST PHONOFILMS, LTD., Assees. of L. DE FOREST (B.P. 284,342, 27.1.28. S. Afr., 4.4.27).

**Papermaking** (B.P. 297,713).—See V. **Hydrogen peroxide** (B.P. 297,880).—See VII. **Liquid crucible** (U.S.P. 1,684,800). **Magnetic alloys** (B.P. 297,938).—See X. **White lead** (B.P. 298,520).—See XIII. **Irradiated milk** (B.P. 298,585).—See XIX.

## XII.—FATS; OILS; WAXES.

**Glycerides of fats and oils.** XII. **Glycerides of lauric and myristic acids.** A. BÖMER and K. EBACH (Z. Unters. Lebensm., 1928, 55, 501—528. Cf. Bömer and Schneider, B., 1924, 478).—It was not found possible to isolate pure glycerides from palm-kernel oil by distillation in the vacuum of the cathode light (cf. Bömer and Baumann, Z. Unters. Lebensm., 1920, 40, 151) either by direct distillation of the oil after removal of free acids or by fractional crystallisation of the deacidified oil into 4 fractions and distillation of these separately. Addition of an equal weight of hardened sesamé oil or coconut oil produced no better results. The volatile glycerides of coconut oil can be distilled without difficulty from a mixture of the fat with ordinary or hardened sesamé oil. Trilaurin (m.p. 45·6°, corr.) and trimyristin (m.p. 56·2°, corr.) were isolated from laurel oil and nutmeg oil, respectively, by treatment of the oils with alcohol and repeated fractional crystallisation from acetone and ether. Laurel oil contains about 30% of trilaurin. No less soluble glyceride such as myristin was found. Nutmeg oil contains about 40% of trimyristin and 6% of free stearic acid.  $\alpha$ -Lauro- $\alpha\beta$ -dimyristin (m.p. 43·3°) and  $\alpha$ -myristo- $\alpha\beta$ -dilaurin (m.p. 38·0°) were prepared synthetically by the method of Fischer, Bergmann, and Bärwind (B., 1920, 790 A).

W. J. BOYD.

**Lauric acid content of coconut and palm-kernel oils and the detection of these in mixtures of edible fats.** J. GROSSFELD (Z. Unters. Lebensm., 1928, 55, 529—553).—Separation of lauric acid from other fatty acids by treatment with dilute alcohol or by means of the greater solubility of its lithium salt is unsatisfactory. The approximate lauric acid value (c.c. of 0·1N-acid per 5 g. of fat) of mixtures containing coconut oil, palm-kernel oil, and butter fat can be calculated from the formula  $L = 3·3(V - B - 1·2C - V_K)$  where  $L$  is the lauric acid value,  $V$  the saponif. value,  $B$  the

butyric acid value,  $C$  the octoic acid value, and  $V_K$  the saponif. value of the pure fat in the absence of coconut oil, palm-kernel oil, and butter fat.  $V_K$  can, in general, be taken as 197 for edible fats. The lauric acid value so obtained was found to vary from 111 to 138 with a mean value of 126 for 22 samples of coconut and palm-kernel oils. In the case of butter fat it varied from 5 to 18 with a mean value of 11 for 10 samples. The content of coconut and palm-kernel oils in an edible fat mixture can be calculated from the lauric acid value according to the equation: coconut oil + palm-kernel oil =  $0·79 \times (L - 0·6B)$ .

W. J. BOYD.

**Determination of iodine values by Margosches' method.** G. BRACHMANN and A. MOROSOV (Oil Fat Ind. Russia, 1926, No. 2—3, 73—77).—Ethyl alcohol containing 1—2% of amyl alcohol was used as solvent, since it dissolves hard fats. CHEMICAL ABSTRACTS.

**Validity of the Hagen-Poiseuille law in the pressure-viscosimetry of vegetable oils.** P. SLANSKY and L. KÖHLER (Kolloid-Z., 1928, 46, 128—136).—The construction of a capillary viscosimeter is described in which the hydrostatic pressure is readily adjustable, and which is specially useful for investigating the pressure-viscosimetry of viscous liquids at slow rates of flow. Measurements with this viscosimeter and with a modified Ostwald-Kruyt capillary viscosimeter showed only relatively small deviations from the Hagen-Poiseuille law in the region of small velocities of flow with all the vegetable oils examined, whether in the dried or undried state. Castor oil, in spite of its high viscosity, forms no exception in the course of its pressure-viscosity curve. In regard to the alteration in the properties of vegetable oils on drying, it is pointed out that the pressure-viscosity curve is not affected by the process of drying, and that the amount of the disperse phase in the dried oil must, therefore, be small.

E. S. HEDGES.

**Validity of the Hagen-Poiseuille law for vegetable oils.** W. OSTWALD, V. TRAKAS, and R. KÖHLER (Kolloid-Z., 1928, 46, 136—144).—Using the Ostwald-Auerbach overflow viscosimeter, a study has been made of the applicability of the Hagen-Poiseuille law to the viscosimetry of vegetable oils, mineral oils, and Voltol oils. Pure mineral oils showed no structure viscosity. Plant oils show little or no structure viscosity at the ordinary temperature, but show the phenomenon well at 5—7°. Partly polymerised plant oils and the Voltol oils exhibit marked structure turbulence at the ordinary temperature. It appears that structure viscosity is observed at a higher velocity of flow, the greater is the diameter of the capillary of the viscosimeter used. E. S. HEDGES.

**Action of carbon monoxide on the nickel catalyst in hydrogenation of fats.** E. MASHKILLEISON (Oil Fat Ind. Russia, 1926, No. 2—3, 47—50).—In the presence of carbon monoxide the hydrogenation of oleic acid is retarded. CHEMICAL ABSTRACTS.

**Hydrogenation of vegetable oils with water-gas.** K. BUTOVSKI (Oil Fat Ind. Russia, 1926, No. 2—3, 45—47).—The water-gas was treated with 2N-sodium hydroxide solution, ferric oxide with 10% of sawdust, and hydrated lime with 10% of sawdust; the best



temperature was 220—250°. The iodine value of the oil was reduced from 78.3 to 66.9 after 5 hrs.; with hydrogen for 2.25 hrs. it was reduced to 35.7. A nickel catalyst was used. CHEMICAL ABSTRACTS.

**Fatty acids of olive oil.** K. H. BAUER and J. MITSOTAKIS (Chem. Umschau, 1928, 35, 275—277).—Lignoceric acid was identified in the "solid" fatty acids (separated by fractional precipitation of the lithium salts) from a carbon disulphide-extracted olive oil, but could not be traced in the acids from an expressed oil examined by the authors. E. LEWKOWITSCH.

**Ricinic acid.** C. SUNDER (Bull. Soc. Ind. Mulhouse, 1928, 94, 477—481).—Acid products obtained by treating castor oil with dilute caustic soda or acids remained liquid at the lowest temperatures obtainable by means of ice and salt, but a ricinic acid which solidified at low temperatures was obtained by effecting the saponification with caustic soda of *d* 1.334 at 100—120°; this latter acid is not identical with one previously described by Juillard (cf. B., 1893, 528). These new ricinic acids are capable of acting as mordants for alizarin dyes in the presence of aluminium salts. A. J. HALL.

**Oil from mustard seed and husks.** V. MOLODOVSKI (Oil Fat Ind. Russia, 1928, No. 2, 37).—The original oil, and the oil blown at 90—110° for 10, 40, and 75 hrs., respectively, have *d*<sup>15</sup> 0.918, 0.924, 0.944, 0.966; Engler viscosity at 20° 9.9, 13.0, 42.0, 238.0; acid value 0.6, 0.36, 2.05, 4.0; saponif. value 188.4, 261.0, 244.0, 254.0; iodine value 116.2, 112.6, 85.3, 62.6; hydroxy-acids —, 2.92, 10.82, 24.04%; unsaponifiable matter 0.6, 1.57, 1.76, 4.78%. The husks contained moisture 5.15—8.2, protein 5.2—26.28, oil 11.8—14.1, cellulose 22.0, ash 5.58%.

CHEMICAL ABSTRACTS.

**Elmseed oil.** K. KARDASHEV (Oil Fat Ind. Russia, 1926, No. 2—3, 78—84).—The oil (20—25%) of the seeds of *Ulmus effusa*, Willd., and *U. scabra*, Mill., had Reichert-Meissl value 4.62—5.77, Polenske value 37.4—41.5, iodine value 15.9—25.0.

CHEMICAL ABSTRACTS.

**Determination of the oil content of seeds.** G. BRACHMANN (Oil Fat Ind. Russia, 1926, No. 9, 5—8).—The seed (4 g.) is kept in a stoppered bottle with ether (100 c.c. — expected vol. of oil); equilibrium is reached in 12 hrs. The oil in 50 c.c. of the ethereal solution is determined by evaporation.

CHEMICAL ABSTRACTS.

**Determination of the oil content of seeds etc.** D. A. COLEMAN and H. C. FELLOWS (U.S. Dep. Agric., Tech. Bull., 1928, No. 71, 1—13).—A study of Wesson's refractometric method. The method is suitable when more than 8% of oil is present. CHEMICAL ABSTRACTS.

**Emulsification of sulphonated oils.** D. WOODROFFE and F. N. CRANE (J. Soc. Leather Trades' Chem., 1928, 12, 419—423).—The *p*<sub>H</sub> value of commercial products varied from 1 to 9. Some commercial products emulsified in buffer solutions over a wide range of *p*<sub>H</sub> values (2.2—10.5), whilst others had a very limited range (8.6—10.0 and 7.8—12.0). Some, again, emulsified better in large volumes of water than in small, whereas with others the opposite was the case.

Most sulphonated oils will not emulsify in salt solutions stronger than 3%. D. WOODROFFE.

**Determination of "total fatty matter" in sulphonated oils.** K. REITZ (Chem. Umschau, 1928, 35, 270—274).—The available methods for the determination of "total fatty matter" of sulphonated oils are discussed, and a scheme for the collection of further data from manufacturers, analysts, etc. is suggested.

E. LEWKOWITSCH.

See also A., Nov., 1172, **Cholesterol and its effect on fatty acid films** (ADAM and JESSOP). 1176, **X-Ray investigation of long-chain compounds** (MÜLLER). 1196, **Nickel catalyst for continuous hydrogenation** (SVIZUIN). 1270, **Micro-determination of fats in blood** (MILROY).

**Washing nickel catalyst.** SOSENSKI.—See I. **Oil varnishes.** KRAUZ and HRACH.—See XIII. **Extracts containing fat.** HÜBSCHER. **Mercury ointment.** DIETZEL and SEDLMEYER.—See XX.

PATENTS.

**Production of sulphonated oils and fats with a high content of organically combined sulphuric acid.** H. FLESCHE (B.P. 284,206, 4.8.27. Ger., 24.1.27. Addn. to B.P. 282,626; B., 1928, 456).—In the process of the prior patent the glacial acetic acid is replaced by other low aliphatic acids in an anhydrous condition, e.g., formic, propionic, butyric, and lactic acids, or by their acyl chlorides. H. ROYAL-DAWSON.

**Manufacture of esters of fatty acids and of mixtures containing fatty acids.** E. WECKER (B.P. 273,276, 13.6.27. Ger., 23.6.26).—The removal of alcohols from difficultly volatilisable esters, after processes of esterification involving the use of excess of alcohol (e.g., glycerin), is effected by using approx. 90% of the theoretical amount of glycerin necessary for complete esterification and then removing the excess of acid by the process of B.P. 213,267 (B., 1925, 619).

E. HOLMES.

**Treatment of cashew nut-shell oil and products obtained thereby.** HARVEL CORP., ASSEES. of M. T. HARVEY (B.P. 272,510, 7.6.27. U.S., 8.6.26).—The oil is heated at about 140° with a metal, e.g., copper, aluminium, or lead, or with a metal oxide, hydroxide, or carbonate, and any residue is subsequently removed from the oil. L. A. COLES.

**Products from cashew nut-shell oil** (B.P. 272,509).—See IV.

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

**Drying of dammar oil varnishes.** C. K. KRAUZ and V. F. HRACH (Chem. News, 1928, 137, 257—260).—Mixtures of equal parts of dammar resin and various oils (linseed, hempseed, locustseed, soya bean, poppyseed, and walnut) with varying amounts of driers were heated at definite temperatures for varying lengths of time, and the varnishes so obtained were examined for drying properties. The varnishes were the thinner the higher was the temperature at which they were prepared, whilst at the same temperature cobaltic oxide produced the thinnest and cobaltous oxide the thickest products. The rate of drying increased with the temperature of



heating up to a definite optimum, and again decreased as the temperature was raised further. The optimum temperatures were situated between 175° and 275°, and the same drier usually required the same optimum temperature whatever oil was used. The iodine value of the original oil is only an approximate index of the rate of drying of the varnishes, locustseed oil varnishes drying more quickly than linseed oil varnishes. The acid and saponification values decreased with rise of temperature, duration of heating, and amount of drier added. The optimum duration of heating was usually the shorter the higher the temperature used. The drier had a profound influence on the rate of drying; cobaltous oxide was most efficient for oils of high iodine value, followed by manganous oxide, lead peroxide, red lead, cobaltic oxide, and lead monoxide, but with oils of low iodine value lead monoxide was best and cobaltous oxide worst, whilst manganous oxide was the best drier for poppyseed oil varnishes and one of the worst for walnut oil. The optimum amount of drier varied considerably, being usually the greater the higher was the optimum temperature. The scraping test was applied to all varnish films, those prepared at lower temperatures being brittle whilst those prepared at the optimum temperatures were smooth and resistant.

S. COFFEY.

**Oil-soluble phthalic- and phenolic-type synthetic resins.** H. A. GARDNER (Amer. Paint & Varnish Manufs.' Assoc. Circ. No. 339, Oct., 1928, 673—709).—A résumé of patent literature on the production of oil-soluble phenol-formaldehyde and "glyptal" resins. The types are discussed generally and the results of accelerated roof tests of oil varnishes containing them are tabulated and illustrated by photomicrographs.

S. S. WOOLF.

**Cellulose esters and ethers.** GARDNER and KNAUSS.—See V.

## PATENTS.

**Paint or waterproofing material and its production.** F. W. McRAE, Assr. to McRAE PAINT PRODUCTS, INC. (U.S.P. 1,684,593, 18.9.28. Appl., 13.3.28).—The light oils are evaporated from a Trinidad asphalt and a cold petroleum distillate is added, whereby the inorganic constituents are permanently suspended and the other constituents dissolved and rapidly cooled. A pigment is finally added.

F. G. CLARKE.

**[Production of bituminous] paints.** S. FOWLER and E. EDSEER (B.P. 298,256, 8.6.27).—The paint comprises a solution in a volatile solvent of bitumen and neutral wool fat free from soap, prepared, e.g., as described in B.P. 253,995 (B., 1926, 759), with or without the addition of pigments, e.g., red iron oxide.

L. A. COLES.

**Production of blanc fixe.** P. KIRCHEISEN (G.P. 450,180, 13.3.26).—Barium sulphate is precipitated by the action of sodium sulphate on barium sulphide solution under pressure, or is heated under pressure with sodium sulphide solution or with water after precipitation, so that it is obtained in a granular form which filters readily.

L. A. COLES.

**Manufacture of white lead by electrolysis.** R. S. CARRERAS (B.P. 298,520, 7.7.27. Addn. to B.P. 277,723;

B., 1927, 917).—A single tank is used in the prior process, the electrolyte comprising a dilute solution of, e.g., sodium chlorate as catalyst charged with carbon dioxide. The exhausted electrolyte can be withdrawn in a small stream and replaced by fresh electrolyte at the same rate without removal of the lead carbonate. The electrodes are spaced far enough apart to allow the lead carbonate to settle as a fine sludge.

L. A. COLES.

**Products from cashew nut-shell oil** (B.P. 272,509).—See IV.

## XIV.—INDIA-RUBBER; GUTTA-PERCHA.

**Effect of flour in sulphur-vulcanised rubber mixtures.** R. DITMAR (Gummi-Ztg., 1928, 43, 191).—Flour of various sorts aids the plastication of rubber and, although not suitable for incorporation in material to be vulcanised with sulphur chloride, can be used satisfactorily in rubber to be vulcanised with sulphur at fairly low temperatures, e.g., at 100°, with the aid of an ultra-accelerator. Relative to common mineral ingredients, the tensile properties of the product are affected somewhat adversely by flour.

D. F. TWISS.

**Absorption of vapours by rubber.** S. REINER (Kautschuk, 1928, 4, 210—215).—Apparatus is described suitable for the measurement of the rate of absorption of vapour, e.g., of petrol or benzene, by rubber. With benzene vapour at 25° progressive absorption was observed for 700 hrs. without any sign of equilibrium.

D. F. TWISS.

**Evaluation factors for rubber vulcanisates.** W. ESCH (Kautschuk, 1928, 4, 215—222).—A discussion of the influence of the composition of vulcanised rubber mixtures and the nature of the components on the desirable mechanical characteristics of the product.

D. F. TWISS.

**Determination of inorganic matter in soft rubber goods.** S. MINATOYA, H. OKUHARA, and S. OHKI (Res. Electrotech. Lab., Japan, 1928, No. 234, 42 pp.).—The finely-divided rubber (1 g.) is heated with molten paraffin wax (10 g.) at 180° until the dispersed mineral matter begins to coagulate and the upper layer of liquid clears. While warm, 70 c.c. of light petroleum are added and the mixture is centrifuged for a few minutes at 2500 r.p.m. After decanting, the residue is washed with light petroleum and again decanted. Then a mixture of equal weights of acetone and chloroform is added, and the mixture after boiling is again centrifuged. Finally the liquid is decanted, washed three times more, dried, and weighed.

D. F. TWISS.

See also A., Nov., 1186, **Micellar structure of caoutchouc** (MARK and VON SUSICH). 1252, **Caoutchouc** (MEYER and MARK).

## PATENTS.

**Direct production of rubber articles from aqueous dispersions of rubber and the like vegetable resins or compounds thereof.** P. KLEIN, A. SZEGVARI, R. F. MCKAY, C. HAYES, and G. W. TROBRIDGE (B.P. 297,780 and 298,117, 26.3.27).—(A) The nature of electrophoretic deposits from aqueous dispersion of rubber or similar substances on a metal such as zinc is favourably influenced by the introduction of hydroxyl-free electrolytes



such as an alkali chloride, calcium chloride, or an alkali ferrocyanide. The proportion of hydroxyl ions in the dispersion may even exceed the limit of alkalinity at which, before the introduction of the said electrolyte, anodic gassing would occur. Unrequired electrolytes in the dispersion may be removed by dialysis. (B) In the production of articles from aqueous dispersions whether natural or artificial, *e.g.*, of rubber (compounded or otherwise), by a process in which the thickness of the article formed on a deposition foundation increases with the time of the operation, the surface of the article not in contact with the deposition foundation is subjected to a coagulating agent, such as moist air, steam, hot water, or a coagulant liquid or vapour before the final drying operation. This treatment improves the uniformity of the deposit and prevents fissuring during the subsequent drying. A deposit after such treatment may be coated with a fresh deposit, the procedure being repeated. D. F. TWISS.

**Direct production of rubber goods.** ANODE RUBBER CO., LTD. FROM W. C. GEER, B. DALES, and B. F. GOODRICH Co. (B.P. 297,850, 28.3.27).—In the production of articles from aqueous dispersions of rubber and/or of rubber-like substances and vulcanising agents by direct deposition on moulds or formers, ultra-accelerators, *e.g.*, diethylamine diethyldithiocarbamate, mercaptobenzthiazole, or a dithiofuroate, are included in the dispersions. Complete vulcanisation can then be effected while the articles are still on their formers, *e.g.*, in hot air or hot water, during their drying or by the time they are dried. D. F. TWISS.

**Manufacture of articles from aqueous dispersions containing rubber, gutta-percha, balata, and similar resins.** DUNLOP RUBBER Co., and D. F. TWISS (B.P. 297,911, 25.7.27).—Non-porous moulds or formers having on their surfaces films of coagulant liquids such as alum or formic acid are dipped in concentrated aqueous dispersions of rubber or the like, *e.g.*, into concentrated latex, containing also rubber-compounding ingredients. D. F. TWISS.

**Manufacture of rubber compositions.** GOODYEAR TIRE & RUBBER Co., Assees. of L. B. SEBRELL (B.P. 287,445, 11.1.28. U.S., 19.3.27).—The condensation product of crotonaldehyde and an amine, *e.g.*, aniline, formed particularly in an acidic medium, is applied as an anti-oxidant. D. F. TWISS.

**Manufacture of rubber filaments and the like.** M. DRAEMANN (B.P. 297,912, 25.7.27).—Rubber solution, prepared without destroying the nerve of the rubber, is extruded from nozzles, *e.g.*, by means of a plunger acting in a cylinder, the dimensions of the filaments being adjustable by the tension as they fall from the nozzles or while they are being conveyed through the successive stages. The issuing filaments are dusted with talcum powder and, after drying, are vulcanised, *e.g.*, by passage through a bath of molten sulphur. Uniform tension on all the filaments may be ensured by causing these to adhere together, *e.g.*, by means of liquid sulphur, casein, or glue applied before or after the vulcanisation stage. D. F. TWISS.

**Production of a hydrogenated derivative of rubber.** SOC. CHEM. IND. IN BASLE (Swiss P. 121,111,

22.3.26).—A product suitable for use in the manufacture of impregnating agents, lacquers, adhesives, etc. is prepared by masticating rubber in the absence of air or in the presence of hydrogen, and subsequently hydrogenating it in the presence of a catalyst. L. A. COLES.

**Colouring of rubber.** J. Y. JOHNSON. FROM I. G. FARBENIND. A.-G. (B.P. 298,364, 6.10.27).—Calcium benzeneazo-2-hydroxynaphthalene-6-sulphonate withstands cold and hot vulcanisation and satisfactorily replaces antimony sulphide as an orange-red colour for rubber. D. F. TWISS.

**Jelutong product and its manufacture.** S. S. YATES, Assr. to CHICLE DEVELOPMENT Co. (U.S.P. 1,685,797, 2.10.28. Appl., 24.9.27).—Jelutong latex is coagulated, melted, heated until the water content is below 5%, and cast into moulds. F. G. CLARKE.

**Treatment of latex and products obtained therefrom.** U.S. RUBBER PLANTATIONS, INC., Assees. of W. A. GIBBONS and J. MCGAVACK (B.P. 290,242, 19.3.28. U.S., 11.5.27).—See U.S.P. 1,673,672; B., 1928, 616.

**Insulating materials** (B.P. 298,694).—See XI.

## XV.—LEATHER; GLUE.

**Osage-orange and fustic extracts.** G. DESMURS (J. Soc. Leather Trades' Chem., 1928, 12, 424—429).—Extracts of liquid Cuba fustic and of liquid and dry osage-orange, respectively, had  $\bar{d}$  1.280, 1.255, 4.9; solid matter 55.7, 56.9, 95.1; soluble matter 54.3, 50.8, 85.2; non-tans 16.3, 10.7, 19.0; tans 38.0, 40.1, 66.2; insoluble matter 1.4, 6.1, 9.9%; colour of 0.5% solution, red 3.2, 4.8, 6.2; yellow 24.8, 26.8, 26.0. The extracts can be differentiated by the orange-coloured filtrate of fustic in the formaldehyde-hydrochloric acid reaction (cf. "Leather Chemists' Pocket Book," 1919, 51) and the yellow filtrate with osage-orange. A blue or violet coloration indicates the presence of quercitrin, chestnut, myrobalans, or other pyrogallol tannin. The precipitates obtained with lead acetate-acetic acid are: osage-orange (yellow), fustic (orange); and with sodium hydroxide-lead acetate are: osage-orange (orange), fustic (yellow). On Mulhouse strips, fustic and osage-orange give the following colours, respectively, on wool, reddish-beige, dull yellow; wool mordanted with stannous chloride, dull golden-yellow, bright golden-yellow; mordanted with alum, brownish-yellow, dull yellow; mordanted with alum and stannous chloride, orange-yellow, golden-yellow. Cotton dyed with osage-orange shows a deep yellow colour by a Wood light and fustic a slightly mauve-tinted yellow. 3% of fustic extract and 0.1—0.15% of potassium titanium oxalate is recommended for dyeing tan or yellow shades. It can be used for bottoming chocolate, champagne, blood-red, or dark olive-green shades, and various shades of brown and maroon on shoe leathers, gloving, or chamois leathers. In textile dyeing it is useful in correcting the bluish tone of logwood-blacks, in yellowish-beige shades, for bottoming brownish shades, greens, olives, and for mordanting cotton. D. WOODROFFE.

**Tannin of *Geranium maculatum*.** J. C. and B. L. DE G. PEACOCK (Amer. J. Pharm., 1928, 100, 548—557;



cf. B., 1927, 790).—The powdered drug, examined by methods previously described, behaved very similarly to *Heuchera Americana*. The tannin of *G. maculatum* is not like gallotannic acid, and does not give either gallic acid or dextrose on decomposition by mineral acids. Gallic acid is not present in the drug and is not formed on drying the rhizome, but the latter contains a crystalline acid substance which gives a green colour with ferric chloride and which decomposes the soluble tannin with formation of phlobaphen. A white, water-soluble tannin is the primary source of the various forms of phlobaphen found in the commercial drug and its preparations.

E. H. SHARPLES.

**Tintometer [for measuring the colour of tan liquors].** J. G. PARKER (*J. Soc. Leather Trades' Chem.*, 1928, 12, 417—418).—A modified Lovibond tintometer is described in which there is only one eyepiece. The glasses are fixed on movable, horizontal carriers which are controlled by sliding knobs on the front of the apparatus. The units and decimals are in separate rows. By sliding the glasses backwards and forwards, a perfect colour match is obtained more speedily than with the old tintometer.

D. WOODROFFE.

**Commercial gelatin and glue.** M. RÜDIGER and E. MAYR (*Kolloid-Z.*, 1928, 46, 81—89).—The chemical compositions and physical properties of 7 kinds of commercial gelatin have been determined, and the results indicate that chemical analysis furnishes little or no evidence as to the properties of a sample of gelatin, the important factor being the content of glutin. Herold's method of determining glutin is applicable to leaf gelatin, but gives inconsistent results with gelatin containing a high percentage of degradation products. Titration of gelatin solutions with formaldehyde solutions does not give quantitative results as to the amount of decomposition products present, but serves as a rough indication. Determination of glutin gravimetrically in the residue after washing out the degradation products gives consistent results and serves as a means of evaluating a sample of gelatin. Trunkel's method of determining gelatin by addition of tannin depends on the glutin content. The initial viscosity and the change of viscosity with time are dependent on the glutin content and afford a qualitative means of characterisation. The surface tension of a gelatin solution is independent of the amount of gelatin, and is determined mainly by the presence of impurities.

E. S. HEDGES.

**Pigments of cacao beans.** FINCKE.—See XIX.

#### PATENTS.

**Unhairing and/or softening animal skins.** SOC. PROGIL (B.P. 284,719, 3.2.28. Fr., 4.2.27).—Skins are treated with water containing the residuary liquors from cultures of various bacteria, e.g., *B. subtilis*, *B. mesentericus*, *B. liquefaciens*. The liquor must be at 37°, and additions of 0.002% of ammonium chloride may be made for softening, or of sodium bicarbonate for unhairing and softening. The wool or hair is loose in a few hours. [Stat. ref.]

D. WOODROFFE.

**Preparation of protein colloids [adhesives, size, etc.].** C. ARNOLD. FROM I. F. LAUCKS, INC. (B.P. 298,511, 28.3.27).—Vegetable protein, e.g., ground

soya-bean flour, is treated with a compound containing sulphur linked to carbon, but not to oxygen, e.g., aliphatic or aromatic sulphides or disulphides, or alkali or alkaline-earth thiocarbonates, with or without the addition of alkali or alkaline-earth compounds, e.g., sodium or calcium hydroxide or sodium fluoride, and agents to retard the setting time. [Stat. ref.]

L. A. COLES.

**Composition for preserving and curing hides and skins.** H. DODGE (B.P. 298,435, 20.2.28).—See U.S.P. 1,680,136; B., 1928, 763.

#### XVI.—AGRICULTURE.

**Report of the Agricultural Research Station at Halle.** F. MÜNTER (*Landw. Jahrb.*, 1928, 67, 1—102; *Bied. Zentr.*, 1928, 57, 403—409).—Field trials with rye and potatoes on light sandy soils showed the value of farmyard manure used in conjunction with artificial fertilisers, its value being greater as an ameliorative factor than as a nutrient. Crop increases following the joint use of yard manure and artificials were greater than the sum of the increases resulting from their separate use. The increased assimilation of mineral fertilisers resulting from the simultaneous use of farmyard manure is most marked in the case of potassium. In green-manuring trials yellow lupins produced the largest increase in soil organic matter, and the greatest nitrogen accumulation. The efficiency of green manures depended more on favourable climatic conditions than on their organic and nitrogen contents. Occasional use of yard manure increased the efficiency of green manures. Physiologically acid fertilisers increased the assimilation of phosphates by crops, and subsequent liming retarded or eliminated this effect. Light top-dressings of nitrogenous fertiliser on legumes produced greater initial growth and increased resistance to bad climatic conditions and fungoid diseases. No stimulation of growth of sugar beet by iodine was observed.

A. G. POLLARD.

**"Single-value" soil properties: significance of certain soil constants.** B. A. KEEN and J. R. H. COURTS (*J. Agric. Sci.*, 1928, 18, 740—765).—A number of single-value soil determinations are discussed, and comparison is made of values obtained with natural soil samples and the same after treatment with hydrogen peroxide. The pore space of oven-dried, kneaded blocks of soil approximated to a mean value of 26% in all cases examined. This figure was reduced by 4—5% by treating the soil with hydrogen peroxide, which removes 75% of the soil organic matter. Correlation of various pairs of values obtained showed heavy clay soils to be characterised by high ignition losses, moisture contents, and "sticky points." Indications were obtained that the "sticky-point value" is controlled by the content of colloidal organic matter and clay. The moisture content of a soil at 50% R.H. was largely controlled by the actual clay content. The "sticky-point" value approaches a lower limit of 16% in sandy soils containing little organic matter. The approximate distribution of soil moisture as between organic and inorganic colloids is discussed.

A. G. POLLARD.

**Proteins of different types of peat soils.** W. L. DAVIES (*J. Agric. Sci.*, 1928, 18, 682—690).—Wet peat



deposits showed a greater degree of humification than dry deposits. Of the total nitrogen in peats, boiling hydrogen peroxide extracted 70–80%, and of this 60–70% was obtained as ammonia. Hydrochloric acid (constant-boiling mixture) extracted a similar amount of nitrogen consisting of ammonia, humin, mono- and di-amino-acids. Peat proteins yielded 3–5 times as much amide nitrogen as do pure animal or vegetable proteins. Protein decomposition in soil is reflected in the ratio of mono- to di-amino-acid nitrogen, which increases with protein degradation. Dry peats showed a narrower ratio. The presence of calcium bicarbonate and of moving water aids the decomposition of peat protein by removal of the products. Extracts of peat with 2.5% potassium hydroxide solution contain less nitrogen than the acid extracts, but the proportion of mono- to di-amino-acid nitrogen is similar. Soil conditions favouring humification also favour protein decomposition. A. G. POLLARD.

**Integral dissociation of silicates by carbonic and humic acids [in soils], and succeeding reactions.** R. GUILLIN (Compt. rend., 1928, 187, 673–675).—Carbonic acid acts on complex silicates to eliminate the alkalis with the formation of argillaceous silicates, and the subsequent breakdown of these has been investigated by a study of the compositions of different humiferous earths. These may be divided into two classes—non-calcareous and calcareous. The non-calcareous earths contain a high proportion of lime and iron oxide, but these are not combined with humic acids, which are united only to the alumina. The iron on liberation from the silicate is reduced to the ferrous state, but the alumina can be liberated only by the decomposition and combustion of the humates. In the calcareous humiferous earths more lime and less alumina are united with the humic acids as the earth becomes richer in limestone and poorer in silicates. It is concluded that whether the resulting earths are calcareous or not, carbonic and humic acids can cause the integral dissociation of rocks, with the elimination successively of potash, soda, lime, and magnesia, and finally of alumina which remains united with the humic acid, the iron being removed by reduction.

W. HUME-ROTHERY.

**Effect of colloidal silica on the [fertilising] efficiency of phosphates.** S. SEKI (Bul. Sci. Fak. Terkult. Kjusu, 1928, 2, 253–261).—In sand-culture experiments with rice, the addition of colloidal or precipitated silica markedly increased the efficiency of tricalcium phosphate, and slightly increased that of acid phosphate. The amount of ash and silica in the straw and in mixtures of husk and chaff increases with the supply of silica, as do also the amount of phosphate, and its percentage of total plant-phosphate, in the unhulled rice. CHEMICAL ABSTRACTS.

**Oxidation of sulphur in limed and unlimed soils.** O. M. SHEDD (Soil Sci., 1928, 26, 93–105).—Sulphur oxidation was little influenced by liming as adjudged by experiments on moist bottled soils. Very little consistent relation was found between the hydrogen-ion concentrations of the treated soils, either in their initial or final  $p_H$  values and their acidity or alkalinity

by titration or in the amounts of added sulphur oxidised by them. Increased aeration resulted in increased oxidation. H. J. G. HINES.

**Application of the antimony electrode to the determination of  $p_H$  values of soils.** E. F. SNYDER (Soil Sci., 1928, 26, 107–111).—From a comparison between the values obtained on eight soils it is concluded that substantially the same results are obtained with the antimony as with the hydrogen electrode. H. J. G. HINES.

**Revised official British method for mechanical analysis [of soils].** SUB-COMMITTEE OF THE AGRIC. EDUCATION ASSOC. (J. Agric. Sci., 1928, 18, 734–739).—The standard temperature for sedimentation experiments adopted is 20°. Fractions of soil are weighed in the oven-dried (100–105°) condition and not ignited as heretofore. The number of fractions is reduced to four, and the sampling depths and times are modified. The new scale includes (1) clay, settling 10 cm. in 18 hrs.; (2) silt, 10 cm. in 4 min. 48 sec.; (3) fine sand with maximum diam. 0.2 mm.; and (4) coarse sand with maximum diam. 2.0 mm. Fractions (3) and (4) are separated with sieves. The sieve used for the fine sand fraction is the standard No. 70 I.M.M. sieve.

A. G. POLLARD.

**Mechanical analysis of soils.** M. KÖHN (Landw. Jahrb., 1928, 67, 485–546; Bied. Zentr., 1928, 57, 385–386).—Standard methods for the mechanical analysis of soils are discussed from the point of view of their limitations and sources of error. Soil particles of diameter greater than 0.02 mm. can be satisfactorily fractionated by means of sieves; sedimentation methods are applicable only to particles of less diameter than 0.05 mm. Apparatus is described for the pipette method, in which the 10-c.c. pipette used for withdrawing the sample is fitted with a three-way stopcock and supported on a frame which can be raised or lowered on a ratchet attachment without undue vibration. The pipette is filled to above the mark and the excess of suspension is rinsed out through a side tube from the stopcock. The sample and rinse water is delivered through the third side tube directly to the vessel in which it can be evaporated. A. G. POLLARD.

**Mitscherlich's law of crop growth.** A. RIPPEL [with B. LEHMANN and A. STORCK] (Z. Pflanz. Düng., 1928, A12, 38–55).—Pot experiments with oats, mustard, and sunflowers, using on the same soil a rising series of (a) nitrogen dressings, (b) potash dressings, led to the following conclusions: The final yield varies according to the plant and is not a constant for a given nutrient, as Mitscherlich supposes. The Mitscherlich law could not be applied to any physiological characteristics such as time of flowering or time of ripening. It is concluded that a simple equation of the Mitscherlich type cannot account for the observed facts of growth.

H. J. G. HINES.

**Crop variation. V. Relation between yield and soil nutrients.** B. BALMUKAND (J. Agric. Sci., 1928, 18, 602–627).—Mathematical relationships between the growth of plants and the amount of nutrient material supplied are discussed. Formulae analogous to those expressing the relationships of electrical resist-



ance show close correlation with experimental data and are of practical value in that they express the results of variations of two independent factors simultaneously and yet contain constants largely independent of environmental conditions. Such mathematical representations are much more closely in agreement with experimental records than those put forward by Mitscherlich.  
A. G. POLLARD.

**Growth of cotton in various nutrient solutions.** H. J. HARPER and H. F. MURPHY (Soil Sci., 1928, 26, 139—145).—Several well-known nutrient solutions were tested in an endeavour to ascertain the best media for the growth of cotton in sand cultures. Of those tried, Tottinham's solution was the most satisfactory.

H. J. G. HINES.

**Nitrification and its relation to crop production on Carrington loam under different treatments.** L. W. ERDMAN and H. HUMFELD (Iowa Agric. Exp. Sta. Res. Bull., 1928, No. 110, 262—291).—Crop rotation did not appreciably affect the nitrifying power of untreated soils or those treated with ammonium sulphate, ammonium sulphate and calcium carbonate, or crop residues and lime. The nitrifying power as measured by ammonium sulphate, the reaction after thirty days' incubation, and the crop yield are related, but not perfectly when calcium carbonate is present. The presence of lime increased the nitrifying power of soils. Soil reaction and soil nitrifying power are related. Soil moisture was not affected by crop rotation or soil treatment.

CHEMICAL ABSTRACTS.

**Action of lime in the rendering available of soil nutrients.** J. SOUČEK (Z. Zuckerind. Czechoslov., 1928, 53, 101—104).—In pot experiments with oats a dressing of lime applied 3 weeks before sowing produced a considerable increase in the assimilable nitrogen of soils, but had no notable effect on the availability of potassium and phosphorus.

A. G. POLLARD.

**Selective absorption of inorganic elements by various crop plants.** J. D. NEWTON (Soil Sci., 1928, 26, 85—91).—Sunflowers, beans, peas, barley, wheat, and maize were grown together in carefully controlled water and soil cultures and showed differences and similarities characteristic of the species studied.

H. J. G. HINES.

**Neubauer seedling method [for determining plant nutrients in soil].** W. KROSS (Landw. Jahrb., 1928, 67, 629—662; Bied. Zentr., 1928, 57, 409—411).—To prevent the caking of surface soil in vegetation experiments, broken porcelain (2—4 mm.) was added. By increasing the proportion of soil or sand, it was found that the intake of phosphorus by plants was not proportional to the amount of soil phosphate used. Comparison of the assimilation of nutrients in fertilised soils showed the influence of existing soil potash and phosphate to be very small. There were considerable differences in the intake of easily soluble phosphates. The effect of nitrogenous fertilisers on the assimilation of tertiary calcium phosphate was very marked and was ascribed to chemical changes induced in the nutrient medium. The intake of phosphorus by plants supplied with calcium phosphate was not proportional to the amounts of phosphate added. Increasing quantities of

easily soluble phosphates used in conjunction with a basal fertiliser were never completely utilised by plants. Control experiments with sand and mineral salts are recommended. The "assimilation values" in seedling experiments are influenced by the excess of nutrients present. Experimental values obtained by the Neubauer method are not directly applicable to field work, and there is insufficient information as to variations in nutrient requirement and assimilative capacity of the roots among different crops. The Mitscherlich method for determining soil nutrient values is preferred.

A. G. POLLARD.

**Certain acid soils and growth of sugar beet.** G. NEULANDS (J. Agric. Sci., 1928, 18, 704—712).—Variations in the yield of sugar beet were compared with differences in mechanical analyses,  $p_H$  values, lime requirements, easily extractable calcium (0.05N-hydrochloric acid), and humified matter of a number of soils. No correlation was observed between crop yield and mechanical analysis. In soils with  $p_H$  less than 5.3 and easily extractable calcium less than 0.12%, growth of beet was poor or failed. In the range  $p_H$  5.3—6.2 growth was relatively good. In soils of different type there was no relationship between the lime requirement and other values examined, but in any one soil type changes in  $p_H$  value, lime requirement, and extractable calcium were comparable and in accord with crop yields. In soils with similar contents of easily extractable calcium those of higher humus content had the higher lime requirements. In a more detailed examination of different areas of one soil, the values for  $p_H$ , lime requirement, exchangeable calcium, titratable acidity, and degree of saturation correlated well with each other and with the crop yields of beet.

A. G. POLLARD.

See also A., Nov., 1205, **Calcimeter for gasometric determination of calcium carbonate** (HOCK). 1289, **Prolonging the germinative faculty of seeds** (GUILLAUMIN). **Angiosperm seeds and germination** (NIETHAMMER). **Nutrition of plants with aldehydes** (SABALITSCHKA). 1290, **Relation of boron to growth of tomato plants** (DORE). **Influence of sulphur on nitrogen and phosphoric acid in plants** (KALUSHSKI). **Nitrate reduction by plant roots** (SCHMUCK). **Effect of light on nitrate assimilation in wheat** (TOTTINGHAM and LOWSMA). 1291, **Influence of temperature on growth of fungi** (MEYER). "Lead disease" of plants (ALBIZZATI). **Spike disease of sandal** (IYENGAR).

**Ionic exchange in zeolitic silicates.** KAPPEN and FISCHER.—See VII. **Manganese content of vegetables.** PETERSON and LINDOW.—See XIX.

PATENTS.

**Production of fertilisers.** M. P. NITSCHKE (U.S.P. 1,684,712, 18.9.28. Appl., 25.9.26. Ger., 8.10.25).—An acid sulphate is added to waste sulphite-cellulose lye, and the mixture evaporated to remove sulphur dioxide.  
F. G. CLARKE.

**Production of mixed manures.** RHENANIA-KUNHEIM VER. CHEM. FABR. A.-G. (B.P. 283,194, 15.11.27. Ger., 8.1.27).—Ammonium salts are mixed, in the dry condition, with calcined phosphates, the alkalinity of



which is subsequently neutralised by the addition of acids or acid salts (e.g., triammonium monohydrogen disulphate, sulphuric acid, etc.). Other fertiliser salts may also be added.

A. G. POLLARD.

### XVII.—SUGARS; STARCHES; GUMS.

See A., Nov., 1186, Micellar state of starch (MALFITANO and CATOIRE). 1189, Transition between glassy and liquid states of dextrose (PARKS, HUFFMAN, and CATTOIR). 1194, Rôle of phosphates in oxidation of dextrose (KAPPANNA). 1213, Reactions relating to carbohydrates and polysaccharides (HILL, WHELEN, and HIBBERT). Mechanism of the acetal reaction (HILL and PIDGEON). 1219, Colour tests for sugars (WONG). 1220, Colour reactions of carbohydrates (EKKERT). Rotatory dispersion of sugars (WAGNER-JAUREGG). Degradation of dextrose by oxidation (BLEYER and BRAUN). 1222, Mechanism of carbohydrate oxidation (EVANS and O'DONNELL). 1223, Sucrose B (PICTET and VOGEL). Sucroses C and D (PICTET and VOGEL). 1224, New sugars of trehalose type (VOGEL and DEBOWSKA-KURNICKA). Sugar syntheses (HELPERICH and BREDERECK). Synthesis of raffinose (VOGEL and PICTET). Röntgen diagram of starch (VON NÁRAY-SZABÓ). 1225, Potato starch (HESS, FRIESE, and SMITH). Inulin (PRINGSHEIM and REILLY). 1281, Hydrolysis of sucrose by enzymes (WEIDENHAGEN). Enzymic decomposition of dextrose to lactic acid (BRUNJUS and PROFFE). 1284, Fermentation of sugar (KOBEL and TYCHOWSKI). 1285, Trehalosemonophosphoric ester from fermented sugars (ROBISON and MORGAN). Alcoholic fermentation of sugars (NEUBERG and SIMON).

Starch content of potatoes. PAROW; also VON SCHEELE and SVENSSON. Dextrins from honey and artificial honey. FIEHE and KORDATZKI.—See XIX.

#### PATENTS.

Recovery of sucrose from mixtures containing reducing sugars. H. W. DAHLBERG (U.S.P. 1,686,440, 2.10.28. Appl., 23.9.26).—Mixtures containing at least 2.8 pts. of sucrose per 1 pt. of reducing sugar are treated with an alkaline-earth metal to precipitate the sucrose as its saccharate, and this is removed and decomposed into an alkaline-earth compound and sugar syrup.

L. A. COLES.

Glueing wood with starch or starch-containing substances. J. FLASCHNER (B.P. 279,087, 12.10.27. Ger., 14.10.26).—Starch etc., alone or mixed with other substances, is applied to the wood surface at the ordinary temperature, and then heated at 90° under pressure.

L. A. COLES.

### XVIII.—FERMENTATION INDUSTRIES.

Substitution of ammonium salts for malt combs in the preparation of yeast. H. CLAASSEN (Z. angew. Chem., 1928, 41, 1161—1163).—The work of Wohl and Scherdel (B., 1921, 191 A) is unsatisfactory in that the calculated ratios of organic to ammoniacal nitrogen are based on the assumption that all the nitrogen of malt extracts is assimilable by yeast. Actually only 65% of

this nitrogen has any nutrient value. With the optimum concentration of assimilable nitrogen the replacement of organic nitrogen by ammonium salts up to 40% does not markedly affect the yield or nitrogen content of the yeast. When more than 40% of ammoniacal nitrogen is used the yield decreases and the nitrogen content of the yeast increases. With three times the optimum amount of nitrogen in the nutrient medium, the substitution of ammonium salts results, in all cases, in a decreased yield and higher nitrogen content of yeast, although the changes are irregular. Baking qualities of the yeast decline as a result of the use of excessive amounts of ammonium salts.

A. G. POLLARD.

Method of brewing with flaked potatoes. E. LÜHDER (Z. Spiritusind., 1928, 51, 289—290).—According to the method of heating, from 140 to 170 litres of water per cwt. of flaked potatoes are heated at 52—55° in the pre-mash vessel with the necessary amount of green malt for liquefaction and 2—4% of the flaked potatoes. The alkalinity of the mash may be corrected by the addition of sulphuric acid. After the gradual addition of the remainder of the flakes, the temperature is raised to and retained at 77—79° for 15 min. with constant stirring to facilitate liquefaction. When the mash is cooled to 61° the gradual addition is begun of the malt necessary for saccharification, the last portions being added at 56—57°, and the whole, after being energetically stirred for 15 min., allowed to remain for 45 min. The yeast is introduced at 29°, and at 22° the mash is pumped to the fermentation vessels. The longer time required for the mashing operations with flaked potatoes can be curtailed by mashing with a mixture of raw and flaked potatoes. C. RANKEN.

Determination of fusel oil in alcoholic fluids [low-grade wines]. W. KILP and B. LAMPE (Z. angew. Chem., 1928, 41, 1163—1164).—Röse's method is not applicable to large amounts of fusel oil owing to the separation of the oil on dilution with water. To eliminate this the original method is modified by using aliquot portions of the test liquor and diluting with ethyl alcohol free from amyl alcohol. The further dilution with water in the requisite proportion to give 24.68% by wt. may safely be made.

A. G. POLLARD.

Radioactivity of wines. A. NODON and G. CUVIER (Compt. rend., 1928, 187, 725—727).—Various red and white wines have been found to exhibit radioactivity of the order of 0.1—0.01 of that of uranium. The intensity of the radioactivity is approximately proportional to the amounts of dried extract and reducing sugars present, and inversely proportional to the alcohol content. Yearly variations occur, these being much greater for white wines than for red.

J. W. BAKER.

See also A., Nov., 1281, Specific nature of invertase (WEIDENHAGEN). Hydrolysis of sucrose by enzymes (WEIDENHAGEN). Enzymic decomposition of dextrose to lactic acid (BRUNJUS and PROFFE). Succinioxidase (CLUTTERBUCK). Specificity of the dehydrases (BERNHEIM). 1282, Oxidising enzymes (ONSLow and ROBINSON). Tyrosinase of *Beta vulgaris* (WEIDENHAGEN and HEINRICH). Stalagmometric



determination of lipases (KRIJGSMAN). Lipase activity (JOHNSON). Metaphosphatase (KITASATO). 1283, Determination of pepsin (BEER and PECZENIK). Urease (JACOBY). 1284, Yeast amylase (GOTTSCALK). Fermentation of sugar (KOBEL and TYCHOWSKI). Co-zymase and its determination (MYRBÄCK). 1285, Trehalosemonophosphoric ester from fermented sugars (ROBISON and MORGAN). Alcoholic fermentation of sugars (NEUBERG and SIMON). Formation of catalase by *B. coli* (FERNÁNDEZ and GARMÉNDIA). Catalase content of bacteria (VIRTANEN and WINTER). Oxidations by *B. xylinum* (BERNHAEUER and SCHÖN). Pyocyanine in *B. pyocyaneus* (WREDE and STRACK). 1289, Enzyme content of germinating wheat (PROKOPENKO). 1291, New enzyme, glucose-oxidase (MÜLLER). Production of invertase by *Penicillium glaucum* (KERTÉSZ).

## PATENTS.

Preparation of a mild, aromatic, Yoghurt-curdled milk or sweet yoghurt junket. A. ZIERER (B.P. 272,468, 19.5.27. Austr., 9.6.26).—Boiled or pasteurised milk, mixed with fruit essences if necessary, is fermented at 28–32° with a mixture of yoghurt bacteria (*Bacterium bulgaricum*), cocci which produce rennin and acid (*Micrococcus lactis acidii*, Löhnis), and certain *Torulæ* and *Mycodermæ*, which produce neither alcohol nor carbon dioxide. C. RANKEN.

Treatment of animal skins (B.P. 284,719).—See XV. Fodder and food (U.S.P. 1,685,004).—See XIX.

## XIX.—FOODS.

Some oxidising effects of flour bleaching. E. B. WORKING (Cereal Chem., 1928, 5, 431–435).—The bleaching of flour has a similar effect on the development of the dough to that of oxidising agents (cf. B., 1928, 621). The results after 3 weeks were found to be better than those immediately after treatment. The quality of normal flour improves for some time after milling, and then begins to deteriorate. This deterioration begins sooner in bleached than in unbleached flour. It is suggested that large bakeries should prolong the period of maximum quality by buying unbleached flour and bleaching it shortly before use.

W. J. BOYD.

Effect of stage of maturity on composition and baking quality of marquis wheat. C. E. MANGELS and T. E. STOA (Cereal Chem., 1928, 5, 385–394).—Cuttings were made at the dough, hard-dough, glazed, normal ripe, and dead ripe stages. Yield and weight per bushel increased up to the glazed stage, but protein content showed no consistent variation. Ash content and diastatic activity of the patent flour decreased as the wheat matured, but sugar content remained constant. Baking tests showed slightly better quality for the mature wheat. Nitrogen soluble in 70% alcohol increased consistently with advancing maturity. Nitrogen soluble in 5% potassium sulphate solution, amino-nitrogen, and nitrogen not precipitated by tungstic acid decreased in the dough and hard-dough stages. Glutenin attained a maximum in the hard-

dough stage and then decreased right up to the extralate stage. W. J. BOYD.

How the experimental baking test [for flour] has been developed. C. L. BROOKE and R. C. SHERWOOD (Cereal Chem., 1928, 5, 366–374).—A *résumé* of the literature regarding the evolution of the test.

W. J. BOYD.

Determination of moisture in wheat and flour. "Moisture testing" in water-ovens and electric ovens. E. A. FISHER and C. R. JONES (J. Agric. Sci., 1928, 18, 649–670).—Absolute values of the moisture content of wheat and flour are not obtainable by ordinary oven drying, but concordant results with an experimental error not exceeding 0.01% are conveniently obtained by the method following:—The sample (5 g.) is dried in an aluminium container fitted with a lid which is removed only in the oven. Electrically-heated ovens fitted with metal thermostats are recommended. Drying should occupy at 110° 3–12 hrs. for flour and 12–15 hrs. for wheat; or at 120° 1 hr. and 4 hrs., respectively; or for wheat at 140° 1½ hrs. The oven should not be opened during the drying period. Calcium carbide is as efficient a desiccating agent as sulphuric acid. A. G. POLLARD.

Criteria of the validity of analytical methods used by cereal chemists. A. E. TRELOAR and J. A. HARRIS (Cereal Chem., 1928, 5, 333–351).—Important criteria of the validity of methods of analysis of samples of unknown composition are: (1) average yields and differences of average yields of the same constituent of wheat or flour as determined by two or more methods, (2) consistency of the results obtainable by any method applied by various workers. Formulæ bearing on these points and illustrations of their application are given. Of the three main determinations carried out on wheat and flour, viz., those of moisture, ash, and protein, the determination of protein gives the most consistent results and that of ash the least. The presence of definite personal or laboratory equations is demonstrated, proving that concordance of results is no proof of correctness. W. J. BOYD.

Critical study of some methods used in flour colorimetry. F. V. HOOFT and F. J. G. DE LEEUW (Cereal Chem., 1928, 5, 351–365).—In determining the gasoline colour value of flour the adoption of official samples of organic dyes standardised against pure carotin solution is suggested as preferable to the use of potassium chromate. If a solution of the latter is used it should be buffered (cf. Jorgensen, A., 1927, 952). Errors arise in the use of the Kent-Jones colorimeter when samples of widely different gasoline colour value are compared, probably owing to differences in the  $p_H$  value of the standard at different dilutions. There is a direct relation between the bran content (and, in general, the ash content) and the methyl alcohol value suggested by Kent-Jones and Herd (B., 1927, 762), but with the Duboseq colorimeter, which is more convenient than that of Kent-Jones, it was found more satisfactory to use a buffered solution containing 0.005% of potassium chromate as standard instead of the mixture of potassium chromate and cobalt nitrite.



The temperature of extraction has a marked effect on the result.

W. J. BOYD.

**Lipoid phosphorus of wheat and its distribution.** B. SULLIVAN and C. NEAR (Cereal Chem., 1928, 5, 436; cf. B., 1928, 621).—A correction.

W. J. BOYD.

**Calculation of dry weight of milk.** R. SAAR (Z. Unters. Lebensm., 1928, 55, 573—577).—From Fleischmann's formula (J. Landw., 1914, 62, 167)  $t = 1.2f + 2.665(100 - 100/s)$ , where  $t$  is the total dry weight %,  $f$  the fat %, and  $s$  the sp. gr., is derived the formula  $r = 0.25d + 0.26 + 0.2f + c$  in which  $r$  is the fat-free dry weight %,  $d$  the lacto-densimeter reading, and  $c$  a value depending on the sp. gr. of the milk. For  $d = 21.7 - 23.7$ ,  $c = -0.02\%$ ; for  $d = 23.8 - 26.5$ ,  $c = -0.01\%$ ; for  $d = 26.6 - 38.4$ ,  $c = 0.00\%$ . It is thus shown that the Herz formula  $r = 0.25d + 0.2f + 0.26$  gives correct results except for highly diluted milk, for which the above small correction  $c$  should be applied.

W. J. BOYD.

**Potentiometric determination of chlorine in milk.** C. ROHMANN (Z. Unters. Lebensm., 1928, 55, 580—590).—A reversible adsorption of chlorine ions on the colloidal protein of the milk occurs which causes the values found by potentiometric titration to be slightly low. To avoid this source of error the following procedure is adopted. The titration is carried out slowly and the potential adjusted after 10 min. by further addition of silver nitrate solution. The liquid is then boiled and cooled and the potential readjusted within 10 min. This may be repeated. At higher concentrations an irreversible adsorption of silver ions occurs even in the presence of excess of chlorine ions, which causes high values to be obtained. This source of error becomes negligible at a dilution of 1 in 9. The amount of acid added is important, but concordant results are obtained with amounts varying from 2% to 10% of 2*N*-sulphuric acid or nitric acid.

W. J. BOYD.

**Determination of the f.p. of milk.** P. WEINSTEIN (Z. Unters. Lebensm., 1928, 55, 590—602).—Pritzker's method (A., 1917, ii, 549) gives good results, but its usefulness depends on the choice of a suitable thermometer. It is not of great importance whether the latter has a fixed or an adjustable zero point, but the bulb should be large and not too long and narrow. In agreement with Pritzker, the air-jacket is found to be unnecessary. For mixed milk of not less than four cows the lowest value for  $\Delta \times 10^2$  should be taken as 53.5. At most a 5% addition of water may thereby escape detection. The f.p. determination is equal in usefulness to the nitrate test. In cases of low refraction or fat-free dry substance it enables distinction to be made between milk which has been adjusted and milk of low value by nature. Abnormal milk from diseased udders which might appear to have received an addition of 20—30% of water has the same f.p. as normal milk.

W. J. BOYD.

**Determination of moisture in dry skim milk by the Bidwell-Sterling toluene distillation method.** P. A. WRIGHT (J. Dairy Sci., 1928, 11, 240—242).—Moisture is preferably determined by distillation with

toluene (2 hrs.), which gives slightly higher results than heating in a vacuum oven. CHEMICAL ABSTRACTS.

**Butter-fat tests on first and later lactations.** C. F. MONROE (Ohio Agric. Exp. Sta. Bull., 1927, No. 12, 34—38).—First-lactation milk of Holstein and Jersey cows contained, respectively, 3.4 and 5.4% of fat, later average values being within 0.1% of these; variations in individual lactations reached 0.9 and 1.1% (average difference 0.36 and 0.57%).

CHEMICAL ABSTRACTS.

**Detection of thickening agents in whipped cream.** O. BAUMANN (Z. Unters. Lebensm., 1928, 55, 577—580).—If the product has been shown to be free from calcium and magnesium saccharates, it is tested for tragacanth by diluting 5 g. of sample with an equal quantity of water, adding 2 c.c. of 10% ammonia solution, and shaking in a separating funnel successively with alcohol, ether, and light petroleum, according to the method of Gottlieb and Röse. The aqueous layer is then allowed to run off and the last drops are observed. If tragacanth is present these will be ropy and viscous. For the detection of gelatin, 25 c.c. of the sample are boiled with 25 c.c. of water and 5 c.c. of lead acetate and filtered hot. If the filtrate gives a yellow precipitate with concentrated picric acid solution gelatin is present. If gelatin is absent the filtrate is tested for agar-agar by adding a 5% tannic acid solution instead of the picric acid solution. A copious precipitate indicates the presence of agar-agar.

W. J. BOYD.

**Disintegration of rice straw.** H. IWATA (J. Dep. Agric. Kyushu, 1926, 1, 217—240).—The dry matter of rice straw has a starch value of about 20%. The composition and nutritive value are not changed by boiling the straw in water for 3 hrs. or soaking it in 0.25% sodium hydroxide solution for 4 hrs.; soaking in 0.75 or 1.5% sodium hydroxide solution or boiling in 1% milk of lime for 3 hrs. extracts incrusting substances, increases the digestible matter, and raises the starch value of the dry matter to 53—58%.

CHEMICAL ABSTRACTS.

**Evaluation of potatoes according to the starch content.** E. PAROW (Z. Spiritusind., 1928, 51, 290).—Although the yield of potato flakes increases and working costs relatively diminish when the content of starch calculated on the raw potato rises, the increase in price of the raw potato, if based on its starch content, more than counterbalances those factors. Accordingly, the manufacturers of potato flakes wish potatoes to be valued according to the starch content calculated on the dry matter in the potato, and not, as at present, according to the starch content in the raw potato.

C. RANKEN.

**Determination of starch in potato pulp.** C. VON SCHEELE and G. SVENSSON (Z. Spiritusind., 1928, 51, 290—291).—If the usual methods for the determination of starch in cereals are applied to potato pulp, the results obtained are much too high owing to the presence of appreciable quantities of substances of a pectinous nature, which are soluble and give rise during the hydrolysis of the starch to optically active and reducing substances. To minimise the possible degradation of the pectins during hydrolysis, the starch should be brought to the



soluble form as quickly as possible and the pectins precipitated by lead acetate. Any excess of lead acetate is removed by sodium phosphate and the starch determined in the filtrate by the polarimeter or refractometer. Maercker's method of bringing the starch into solution by diastase, and subsequently removing the pectins by lead acetate, although rather lengthy, gives the best results.  
C. RANKEN.

**Variations in the manganese content of certain vegetables.** W. H. PETERSON and C. W. LINDOW (Soil Sci., 1928, 26, 149—153).—The manganese content of cabbages, peas, beans, and tomatoes appears to bear no relation to type of soil, variety, size or date of harvest.  
H. J. G. HINES.

**Detection of excessive quantities of husk in cocoa and cocoa preparations.** J. GROSSFELD and A. SIMMER (Z. Unters. Lebensm., 1928, 55, 553—559).—Comparative determinations have been carried out on commercial samples of cocoa and cocoa preparations using the scleridæ count method of Griebel and Sonntag (B., 1926, 605) and the sedimentation—crude fibre method of Grossfeld (B., 1926, 688). Generally excessive husk content is detected by both processes, but in some samples, e.g., those to which husk with few scleridæ has been added or those in which excessive fineness of the husk causes loss in sedimentation, the abnormality is only detected by one or other of the two methods.  
W. J. BOYD.

**Cacao beans and cocoa products. V. Pigments of cacao beans and cocoa products. Ash content of cocoa paste.** H. FINCKE (Z. Unters. Lebensm., 1928, 55, 559—566, 567—568).—The two pigments of cacao beans have been designated cacao-red and cacao-brown. The former is easily soluble in alcohol. It is bright red in acid solution, violet in neutral solution, and green or greenish-blue in faintly alkaline solution. Cacao-brown, to which cocoa owes its colour, is very difficultly soluble in alcohol, but easily soluble in aqueous alkaline solution. Both are tannin substances. Cacao-red occurs in the fresh seeds, in commercial fermented beans, and in the finished products, in variable quantity. There are differences in this respect characteristic of beans of different origin, but even individual beans of the same fruit differ from one another. Cacao-brown does not occur in the fresh seeds, but is gradually produced from a colourless parent substance in the various processes of fermentation, drying, roasting, and further working of the material. Cacao-red is also transformed into cacao-brown in the fermentation process and in the preparation of cocoa powder with addition of alkali. Cacao-red is produced in the living plant, probably from the same parent substance as cacao-brown. It is also produced both from cacao-brown and its parent substance by the action of alcoholic hydrochloric acid.

Determinations on material from various sources show that the ash content of the dried paste varies from 2% to 4.5%. (Cf. Adam, B., 1928, 688.)  
W. J. BOYD.

**Dextrins of honey and artificial honey.** J. FIEHE and W. KORDATZKI (Z. Unters. Lebensm., 1928, 55, 602—608).—Dextrins were obtained from various natural and artificial honeys by precipitating proteins,

and other substances by methyl alcohol, and then precipitating the dextrins by adding alcohol and ether (cf. Lucius, B., 1926, 844). All gave Jolles' diphenylamine test for lævulose (Apoth.-Ztg., 1909, 719). Even after repeated precipitation and prolonged digestion with absolute alcohol to remove any traces of sucrose and lævulose a positive reaction for the latter substance was obtained. It is concluded that both in natural and artificial honey dextrins containing lævulose molecules occur. A method of determining the amount of the lævulose fraction approximately was found. A 1% dextrin solution is heated with two fifths of its volume of 5*N*-hydrochloric acid for 2½ hrs. on the boiling water-bath according to Lucius' method (*loc. cit.*) whereby the dextrose is unchanged but the lævulose forms among other substances hydroxy-methylfurfuraldehyde. The difference in the iodine value determined by the method of Auerbach and Bodländer (B., 1924, 567) before and after extraction of the solution with ethyl acetate is an approximate measure of the lævulose originally present. Comparison of the results with those obtained for synthetic mixtures of dextrose and lævulose indicate the presence of 20—30% of lævulose molecules in the dextrins of honey and artificial honey.  
W. J. BOYD.

See also A., Nov., 1192, **Electrochemistry of the proteins** (GREENBERG). 1271, **Second protein (livetin) of egg-yolk** (KAY and MARSHALL). 1272, **Freezing of milk and its fermentation** (WINTER). 1278, **Determination of tryptophan and tyrosine in proteins** (TILLMANS, HIRSCH, and STOPPEL). **Nutritive value of muscle-protein** (SEKINE). **Measuring the nutritive value of proteins** (MITCHELL). **Determination of coefficients of utilisation of foodstuffs** (HELLER, BREEDLOVE, and LIKELY). 1282, **Action of rennin on proteins in milk** (ZAYKOWSKY, FEDOROVA, and IWANKIN). 1289, **Enzyme content of germinating wheat** (PROKOPENKO). **Storage of carrots** (HASSELBRING). 1290, **Storage of mangels** (PYNE).

#### PATENTS.

**Treatment of wheat and other cereals.** J. A. HALL and W. F. C. GEORGE (B.P. 298,700, 19.7.27).—Wheat etc. is heated for 4—10 hrs. at 100—115° in a current of air saturated at about 40°, and after grinding is added to flour (¼—3 pts. per 100) to improve its baking properties.  
L. A. COLES.

**Production of nutrient material with a high vitamin content.** CHEM. FABR. DR. H. SANDER & CO. A.-G. (G.P. 448,870, 25.12.24).—Bran, yeast, etc. is extracted with phosphoric acid, the acid is neutralised with milk of lime, and the product is emulsified with cod-liver oil etc.  
L. A. COLES.

**Irradiating milk solids with ultra-violet rays.** G. M. CLARK. From DRY MILK CO. (B.P. 298,585, 11.6.27).—Milk, in dry or liquid form, is given anti-rachitic properties by agitation, e.g., by spraying, and simultaneous exposure to ultra-violet rays of such intensity and for such a period of time—which may be as little as 8 sec.—that at least 75% of the total anti-rachitic properties which can be produced in the milk



are developed before it acquires a disagreeable odour or taste.

J. S. G. THOMAS.

**Food preservation.** C. and J. MOHRENWEISER [C. BERTRAM] (B.P. 298,061, 14.5.28. Ger., 4.2.28).—Fresh fruit is treated either with a powder such as chalk, or with a glaze-like substance, *e.g.*, paraffin wax, neat's-foot oil, etc., to which are added small quantities of colophony, sodium benzoate, benzoic acid, salicylic acid, spiræin, and ammonium carbonate.

F. R. ENNOS.

**Treatment of vegetable substances [tea leaf].** CARRIER ENGINEERING CO., LTD., and K. J. R. ROBERTSON (B.P. 297,900—1, 7.7.27).—(A) Tea leaf is subjected to a current of warm air passing through a chamber in the same direction as the leaf, in order to effect "limping" by evaporation of the moisture of the leaf and reduction of the air temperature. After being slightly damped the leaf then passes into a cool, dry atmosphere, where vigorous evaporation of its moisture occurs, causing effective "withering." (B) The leaf obtained as in (A) is conditioned or fermented by passing a counter-current of air of pre-determined temperature and humidity across its surface.

F. R. ENNOS.

**Preservation of green fodder in silos, fermentation chambers, etc.** I. G. FARBENIND. A.-G., ASSEES. of K. VIERLING (G.P. 447,905, 2.2.23).—Electrolytes capable of maintaining a degree of acidity favourable to the development of lactic acid bacteria, but not of butyric acid bacteria, *e.g.*, alkali and alkaline-earth phosphates, are added to the material.

L. A. COLES.

**Increasing the usefulness of fodder and food.** E. MISLIN, Assr. to J. F. and G. DAUBEK (U.S.P. 1,685,004, 18.9.28. Appl., 7.4.25).—Pentosans, after treatment whereby the yeasts and bacteria thereon are cultivated without the addition of hexoses, are allowed to act on the fodder and foodstuffs, and the mixture is then gradually heated to 50°.

F. G. CLARKE.

[Pressure chamber for] curing of raw meats, such as hams, bacons, fish, etc. M. M. HERIOT (B.P. 298,802, 2.12.27).

**Pasteurising apparatus for liquids [*e.g.*, milk].** E. C. R. MARKS. From CREAMERY PACKAGE MANUF. Co. (B.P. 298,356, 23.9.27).

**Yoghurt curdled milk and junket** (B.P. 272,468).—See XVIII. **Theobromine from cacao etc.** (F.P. 584,781).—See XX.

## XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

**Examination of extracts etc. containing fat and mucilage.** J. HÜBSCHER (Süddeut. Apoth.-Ztg., 1928, 68, 205—206; Chem. Zentr., 1928, i, 2278).—For the examination of cod-liver oil and malt extracts the material is mixed with hot water, and boiled after addition of concentrated hydrochloric acid; after cooling, the liquid is shaken with ether, and the emulsion separated by addition of sodium chloride. The acid is washed out with water, and the ether evaporated. The residue, containing tragacanth mucilage and cod-

liver oil, is warmed for some time, dehydrated with sodium sulphate, and treated with ether.

A. A. ELDRIDGE.

**Synthesis of camphor. Concentration of isobornyl acetate.** M. TOMEO (Anal. Fis. Quim. Tecn., 1928, 26, 30—55).—Methods of producing isobornyl acetate of sufficient purity to give good yields in the synthesis of camphor are described and discussed. Criteria of purity which may be employed are, for the cruder material, the density, and, for the pure substance, the refractive index.

H. F. GILLBE.

**Activity and ageing of ergot preparations.** A. PRYBILL and K. MAURER (Arch. Pharm., 1928, 266, 464—479).—Fluid ergot extracts have been prepared according to directions given in various official pharmacopœias and tested for keeping qualities. All extracts deteriorate more or less rapidly, the biological activity decreasing, broadly speaking, with the alkaloid content. The extract from a dried drug which had been previously extracted with light petroleum was more stable than a similar extract from the untreated drug. Light petroleum extracts more than the fat present in the drug. Extracts made by the German and American methods have the highest alkaloid contents. Extracts rich in alkaloid are of no value so long as no means exist for stabilising such solutions, and stabilisation of the drug does not produce a stable extract.

S. COFFEY.

**Analysis of fluid extract of ergot.** H. KAUL (Süddeut. Apoth.-Ztg., 1928, 68, 195; Chem. Zentr., 1928, i, 2278).—For the determination of the total bases, the extract (40 g.) is shaken with magnesia (2 g.) and a mixture of equal parts of xylene and chloroform (40 c.c.). After some time 7 g. of powdered tragacanth are added, and 25 c.c. of the filtered solvent are mixed with 20 c.c. of 0.1N-hydrochloric acid and separated; the acid solution is titrated with 0.1N-potassium hydroxide solution, using methyl-orange.

A. A. ELDRIDGE.

**Determination of novocaine and codeine hydrochlorides in the presence of one another.** E. SCHULEK and G. VASTAGH (Arch. Pharm., 1928, 266, 452—455).—The mixed bases are extracted with chloroform from an ammoniacal solution and titrated with 0.02N-hydrochloric acid, methyl-red being used as indicator. The novocaine is then decomposed by warming with two equivalents of 0.02N-sodium hydroxide, the codeine being again extracted from the resulting solution with chloroform and titrated with 0.02N-acid under specified conditions.

S. COFFEY.

**Preparation and constitution of Hydrargyrum salicylicum [mercurisalicylic acid].** E. RUPP (Arch. Pharm., 1928, 266, 504—506. Cf. A., 1926, 534; 1927, 685).—Mercurisalicylic acid is prepared by warming equimolecular proportions of sodium salicylate and mercuric sulphate on the water-bath until the product is entirely soluble in sodium hydroxide solution. The product consists of almost equal parts of *o*- and *p*-mercurisalicylic acids, the amount of the latter being accurately determined by conversion into *p*-thiocyanomercurisalicylic acid on treatment with alkali thiocyanate.

S. COFFEY.



**Chemistry of mercury ointment.** R. DIETZEL and J. SEDLMEYER [with E. KREMBS] (Arch. Pharm., 1928, 266, 507—517).—The determination of small quantities of mercury in the presence of large amounts of organic matter can be carried out satisfactorily by completely oxidising the latter with excess of nitric acid in a bomb tube at 150—180° and titrating the mercury with ammonium thiocyanate. Oxidation with sulphuric acid and nitric acid or hydrogen peroxide, or with potassium chlorate and hydrochloric acid, furnishes untrustworthy results. Ointments prepared from pure mutton tallow and lard may be kept for long periods without undergoing change, but if wool fat, ivory nut oil, or olive oil is incorporated, the products become rancid and considerable amounts of mercury salts are formed. The presence of mercury in the ether extract from an ointment does not necessarily mean that mercury salts of higher fatty acids are present, since ether containing ethyl peroxide dissolves metallic mercury. Mercuric stearate, palmitate, and oleate are difficult to prepare in the wet way, the purest products being obtained by treating the acid in absolute alcohol with alcoholic potash and precipitating with alcoholic mercuric chloride. Pure mercuric stearate and palmitate are obtained by heating equivalent quantities of acid and mercuric oxide to 180° and recrystallising the product from a mixture of alcohol, chloroform, and pyridine, or by dissolving the crude melt in liquid paraffin at 180° and precipitating with ether. Pure mercuric oleate was not obtained. Accurate determinations of the solubility of mercuric stearate and palmitate in various solvents are recorded. Palmitic acid affords *acid potassium palmitate*,  $C_{32}H_{63}O_4K$ , when titrated with alcoholic potassium hydroxide in absolute alcohol, phenolphthalein being used as indicator. S. COFFEY.

**Essential oil of *Myrtus communis*, L.** F. L. VODRET (Annali Chim. Appl., 1928, 18, 421—428).—The constants of (1) Sardinian myrtle oil, and (2) the same oil after distillation in a current of steam are:  $d^{20}_D$  0.8961, 0.8914;  $\alpha^{20}_D$  +18.4°, +19.2°;  $n^{20}_D$  1.4702, 1.4708; viscosity at 20° 1.23, 1.27; solubility at 15° in 70%, 80%, and 90% alcohol 1:26, 1:11, 2:1 for each oil; acid value 1.36, 0.23; saponif. value 22.80, 36.40; acetyl saponif. value 53.10, 51.40; iodine value 201.10, 224.70; esters (as  $C_{10}H_{18}O$ ) 7.50, 12.66%; combined alcohols 5.29, 9.94; free alcohols 25.82, 20.63%  $C_{10}H_{18}O$ . Neither fluoresces in Wood's light and both contain phenols and minimal traces of aldehydes, and both solidify below -12°. The presence of *d*-pinene and of two isomeric compounds,  $C_{10}H_{18}O$ , b.p. 170—179° and above 200°, respectively, has been detected. T. H. POPE.

**Ethereal oil content of fragrant plants of the south-eastern territory.** O. SOBOLEVSKI (Ber. Sartov. Naturforscherges., 1925, 1, No. 2—3, 3—38).—The yields of ethereal oil from a number of plants are recorded. CHEMICAL ABSTRACTS.

**Conservation of the characteristics of emulsion of almonds.** M. BRIDEL and (Mlle.) M. DESMAREST (Bull. Soc. Chim. biol., 1928, 10, 1050—1055).—See B., 1928, 729.

See also A., Nov., 1214, **New vesicant** (KIRNER).

1217, **Auto-oxidation of citronellal** (ZIMMERMANN). 1224, **Methyl salicylate glucoside of *Gaitheria procumbens*, L.** (BRIDEL and GRILLON). **Amelarioside**, a new glucoside from *Amelanchier vulgaris*, Moench. (BRIDEL, CHARAUX, and RABATÉ). 1228, **Action of anhydrous chloral on amino-alcohols and -ethers** (FOURNEAU and BRYDOWNA). 1229, **Ureides of bromovaleric acids** (FOURNEAU and FLORENCE). 1230, **Organic compounds of arsenic** (STEINKOPF, DUDEK, and SCHMIDT). 1231,  **$\beta$ -Substituted alkylarsinic acids** (SCHERLIN and EPSTEIN). **Derivatives of  $\beta$ -aminoethyl- and  $\gamma$ -aminopropyl-arsinic acids** (GOUGH and KING). 1239, **Iodine values of sterols** (COPPING). 1240, **Oil-soluble bismuth salts** (PICON). 1253, **Indian essential oils** (RAO and SIMONSEN). 1254, **Aromadendrene** (BRIGGS and SHORT). 1265, **Strychnine phosphomolybdate** (ANTONIANI). **Alkaloids of Kurchi bark** (GHOSH and GHOSH). **Microchemistry of the alkaloids** (BECKMANN). **Aryl-arsenoxides and derivatives** (NEWBERY and PHILLIPS). 1266, **Organic compounds of arsenic** (STEINKOPF and DUDEK). **Mercuration of aromatic amines** (ALBERT and SCHNEIDER). 1280, **Toxicity of lead compounds** (BISCHOFF and others). 1287, **Action of heat on insulin solutions** (KROGH and HEMMINGSEN). 1288, **Extraction of ovarian hormone** (THAYER, JORDAN, and DOISY). **Irradiation of ergosterol** (WEBSTER and BOURDILLON).

**Tannin of *Geranium maculatum*.** PEACOCK and PEACOCK.—See XV.

#### PATENTS.

**Production of theobromine from cacao or cocoa waste.** L. M. ROUSSEAU (F.P. 584,781, 26.10.23).—The solution obtained by the exhaustive extraction of cacao etc. with calcium hydroxide solution is exactly neutralised with sulphuric acid, and ferrous sulphate is added whereby colloidal iron hydroxide is precipitated together with the theobromine and colouring matter. After drying the precipitate, theobromine is recovered from it by the usual method. L. A. COLES.

**Laxative.** R. PASTERNAK, Assr. to C. PFIZER & Co. (U.S.P. 1,681,361, 21.8.28. Appl., 30.10.25).—The residues from phenolphthalein manufacture, obtained by evaporation of the alcoholic mother-liquors, contain as much as 25% of phenolphthalein, but are 20—30 times as active in laxative properties. Ether extracts the active substance, m.p. 130—200°. C. HOLLINS.

**Thymol derivative** (B.P. 298,393).—See XXIII.

#### XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

See A., Nov., 1197, **Technique of photochemistry** (BEESLEY and RIDYARD). **Phototropic compounds of mercury** (RAO and WATSON). 1198, **Mechanism of photosensitisation and photo-inhibition** (MUKERJI and DHAR). **Photochemical decomposition of formic acid** (HERR and NOYES). **Velocity of certain photochemical reactions** (BHATTACHARYA and DHAR; MUKERJI and DHAR; EGGERT and SCHRÖTER). 1289, **Photo-oxidation with anthraquinone** (PEELSTICKER).

**Luminous flames.** CHAMBERLIN and ROSE.—See II.



## PATENTS.

**Photographic colour screens.** SOC. CIVILE POUR L'ÉTUDE DE LA PHOTOGRAPHIE ET DE LA CINÉMATOGRAPHIE EN COULEURS (B.P. 286,223, 24.2.28. Fr., 28.2.27).—To obtain even distribution of colour over the film and fastness of colours, the ordinary tinted gelatin filters used in the colour-projection of reticulated films are substituted by juxtaposed cylindrical tubes containing coloured salt solutions. The tubes may be immersed in a parallel-faced tank containing a liquid of higher refractive index than the solutions, the whole being cooled by a thermo-siphon device attached to the tank. J. W. GLASSETT.

**Providing photographic raw film with visible reproducible inscriptions.** I. G. FARBENIND. A.-G. (B.P. 287,124, 24.8.27. Ger., 16.3.27).—The inscriptions are impressed on the rear side of the support for the sensitive layer by means of a solution of dye in a solvent consisting of a mixture of (a) a slowly evaporating substance which is a swelling agent for the support, thereby securing penetration of the dye, and (b) a rapidly evaporating substance which accelerates the drying of the imprint. J. W. GLASSETT.

## XXII.—EXPLOSIVES; MATCHES.

**Decomposition of [propellant] powders and explosives, and the theory of stabilisers.** H. MARAOUR (Chim. et Ind., 1928, 20, 610—617).—The decomposition of powders is the result of a slow hydrolysis at ordinary temperatures of the nitric esters by the autocatalytic action of the nitric acid that is formed during manufacture, *e.g.*, when the powder is being incorporated or pressed or when the solvent is being driven off. No gas is evolved during hydrolytic decomposition, which distinguishes it from a thermolytic decomposition at high temperatures. Stabilisers act by neutralising the traces of nitrogen oxides that are formed during manufacture. All stability tests that depend on measuring the gas evolved when the powder is heated have no connexion with hydrolytic decomposition, but measure the amount of stabiliser in reserve. S. BINNING.

See also A., Nov., 1193, **Gaseous combustion at high pressures** (BONE, TOWNEND, and SCOTT). 1194, "**Explosion limits**" of carbonic oxide-air mixtures (BONE, NEWITT, and SMITH). 1229, **Nitroamino-guanidine** (PHILLIPS and WILLIAMS).

## PATENT.

**Mixing and spraying liquids** (B.P. 297,558).—See I.

## XXIII.—SANITATION; WATER PURIFICATION.

**Behaviour of permutit in the softening of waters for industrial use.** I. MUTTI and M. BASINI (Annali Chim. Appl., 1928, 18, 387—395).—In the reaction between sodium-permutit and calcium and magnesium salts separately, the replacement of calcium is always greater than that of magnesium, in accordance with the higher at. wt. Magnesium is replaced almost completely

from its salts by means of calcium-permutit, but only partly by sodium-permutit. From a solution containing both calcium and magnesium salts, sodium-permutit ultimately displaces a greater percentage of the magnesium than of the calcium cations, but this result appears to be brought about partly by the action on the magnesium salts of the calcium-permutit formed. T. H. POPE.

**Chemical and physical properties of water in relation to corrosion and protection against corrosion.** L. W. HAASE (Gas- u. Wasserfach, 1928, 71, 1009—1016).—The theory of the corrosion of iron pipes by water is discussed in some detail. Particular attention is directed to the method of prevention of such corrosion by treatment of the water with lime, and the results of a recent successful application of the method are given. A. B. MANNING.

## PATENTS.

**Indicating the termination of the period of use of breathing cartridges supplying oxygen.** DEUTS. GASGLÜHLICHT-AUER-GES. M.B.H., and HANSEATISCHE APPARATEBAU GES. (B.P. 287,562, 17.3.28. Ger., 25.3.27).—A small tube placed at a suitable point in the cartridge contains a strongly tasting or smelling substance, *e.g.*, menthol, which is liberated by the fusion of a seal of low-melting metal when the temperature reaches about 60° and is discharged by a spring into the apparatus, the presence of the vapour in the inhaled air indicating that the apparatus is nearly exhausted. L. A. COLES.

**Production of a derivative of 3-[hydr]oxy-1-methyl-4-isopropylbenzene [thymol].** S. EDELMAN (B.P. 298,393, 16.11.27).—Equimolecular amounts of pure, neutral, freshly-distilled trichloroacetaldehyde and pure thymol are heated at 100° to give a brown-grey, resinous, odourless product, m.p. 60°, which has disinfectant and germicidal properties. C. HOLLINS.

**Extraction of salts from aqueous solution [sea water].** D. G. ZALOCOSTAS, ASS. to SALT PRODUCTION SYND., LTD. (U.S.P. 1,684,935, 18.9.28. Appl., 28.3.25. Austral., 10.4.24).—Sea water is evaporated at high temperature until the concentration is just below that at which calcium sulphate is precipitated, the brine is transferred to another closed chamber and is evaporated at 38° under reduced pressure until the calcium sulphate is precipitated as mud, and the evaporation is continued in another evaporator to precipitate sodium chloride; finally the residual liquor is removed. W. G. CAREY.

**Water still.** E. V. OLIVER (U.S.P. 1,686,418, 2.10.28. Appl., 29.12.23. Renewed 14.6.28).—The conical condensing surface of a water still is provided on the cooling-water side at the upper part with a baffle causing circulation of the water. B. M. VENABLES.

**[Steam] sterilising process.** A. LESEURRE (B.P. 286,239, 9.7.27. Fr., 1.3.27).

**Device for softening or purifying water.** G. W. CONDUIT (B.P. 297,943, 18.2.28).

**Sterilising apparatus** (B.P. 297,589).—See I.