

BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

AUG. 14 and 21, 1931.*

I.—GENERAL; PLANT; MACHINERY.

Industrial furnaces. J. FALLON (*Fuel Econ. Rev.*, 1931, 10, 40—47).—Various types of metallurgical annealing furnaces are described and illustrated.

D. K. MOORE.

The Remmey fusion-test furnace. G. B. REMMEY (*J. Amer. Ceram. Soc.*, 1931, 14, 358—364).—A portable O_2 - C_2H_2 -fired furnace is described which can reach temp. up to cone 37 in an oxidising atm. Synchronised gas valves enable results to be reproduced within $\frac{1}{4}$ of a cone error.

J. A. SUGDEN.

Application of coke-oven surplus gas for boiler heating. H. GUTSMANN (*Gas- u. Wasserfach*, 1931, 74, 561—562).—Two water-tube boilers (transporter grates) were modified to burn surplus gas by enlarging the combustion chambers and fitting four "torsion" gas burners in the lower front part of the chamber. Elimination of fuel and ash transport costs, decreased attack of the chamber walls, and increased working control led to greater efficiency. Secondary gas burners were required for superheating. Two similar boilers were fitted with four gas burners above the grate and behind the coal feed. Gas burned in amounts up to 10% of the total fuel consumption allowed the use of second-rate and waste fuel and gave increased outputs from the boiler of up to 20%. Heating with coke-oven gas costs little more than with coal, but it is considered warrantable only when the interests of producer and user of the gas are combined.

H. E. BLAYDEN.

Prevention of boiler scale by trisodium phosphate. P. KOEPEL (*Oesterr. Chem.-Ztg.*, 1931, 34, 97).—The use of Na_3PO_4 for softening boiler feed-water effectively reduces the hardness to 0° by precipitating quantitatively the Ca, Mg, and Fe. The flocculent ppt. coagulates floating particles of dust and adsorbs any oil in the H_2O , thus preventing foaming. A slight excess of Na_3PO_4 is advantageous in reducing corrosion of the boiler parts.

A. R. POWELL.

Dangers of an imperfect water purification in steam plant. V. D. I. BELANI (*Petroleum*, 1931, 27, 469—474).—Experiences of the excessive scaling of a boiler are given and the causes of scaling and its elimination are discussed. The Steinmüller water-purifying plant is described in detail.

Measurement of smoke under industrial conditions. W. A. WORDLEY (*Fuel Econ. Rev.*, 1931, 10, 89—96).—The Ringelmann chart is not satisfactory for measuring the colour of smoke. Holes, diametrically opposite, are cut in the chimney and rays of light from a lamp pass through the smoke on to a Radiovisor bridge. The varying resistance of the bridge, due to

the varying intensity of the light, is used to operate a warning bell when a predetermined limit is exceeded, and also to give a chart which may be graduated in terms of smoke opacity.

D. K. MOORE.

Rapid method for the determination of the dew point of gases. A. N. GABE (*Gas World*, 1931, 94, Coking Sect., 66—67).—A mirror is attached to the bulb of a thermometer which is supported in a stopper inside a glass tube open at the bottom and provided with a side tube and tap at its upper end. The tube is lagged with asbestos in which two windows are cut opposite the mirror (about midway between the ends of the tube) at 90° to each other. The gas to be tested is made to flow slowly from the tap through the tube and the light from one window is viewed through the other window by reflection from the mirror. The temp. of formation of mist on the mirror is observed. A semi-circular wire covered with chamois leather serves as an internal wiper for the windows. The dew point of clean blast-furnace gas can be determined in 15—20 min. The results are generally higher than those of gravimetric methods, but a correction factor may be used. A filter may be required in some cases.

H. E. BLAYDEN.

Spectral colorimeter. O. SPENGLER and E. LANDT (*Z. Ver. deut. Zucker-Ind.*, 1931, 81, 13—24).—Schmidt and Haensch have elaborated from the Stammer or Duboseq type of colorimeter an instrument by which comparison of one liquid with another or with a Stammer colour-glass can be carried out with monochromatic light of three different wave-lengths, viz., 610, 560, and 480 $m\mu$. The authors recommend the instrument for technical sugar work.

J. H. LANE.

Laboratory furnace for coal distillation.—See II. Determining O_2 in gases.—See VII. Conservation of heat in the annealing of glass.—See VIII. Seitz deposited-fibre filter.—See XVII.

See also A., July, 793, Solubilities of gases in liquids. 795, Size of pores of ultra-filters. 799, $Na_2S_2O_3 \cdot 5H_2O$ as standard in thermometry.

PATENTS.

Reduction of dust losses from shaft furnaces. G. EICHENBERG and N. WARK (B.P. 349,092 and Addn. B.P. 349,093, [A] 13.2.30, [B] 14.2.30. Ger., [A] 14.9.29, [B] 4.10.29).—(A) A fluid under pressure is caused to act in a direction countercurrent to that of the furnace gases at the point, or just before, where they leave the furnace, so as to produce changes in speed and direction of the gases. Atomised H_2O and/or gases may be used as the accelerating fluid. Swivelling double nozzles are described for simultaneous use of air and H_2O . (B) The

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

forced currents are intermittent or pulsating. A form of nozzle for H_2O alone is described. B. M. VENABLES.

Heat accumulators. RUTHSACCUMULATOR AKTIEBOLAG (B.P. 349,350, 1.7.30. Ger., 6.7.29. Addn. to B.P. 298,601; B., 1929, 625).—The method of agitating the contents of a tall steam accumulator, as described in the prior patent, is modified by the addition of a mixing injector by which a small supply of high-pressure steam draws a larger quantity of vapour from the upper part of the accumulator and injects the mixture into the H_2O . The quantity of this high-pressure steam is so small that an electric boiler may be used to produce it, and the quantity injected is so large that it may be admitted through the main charging pipe. The high-pressure steam valve and the non-return valve in the main charging pipe are interconnected mechanically or electrically, so that when one is open the other is closed.

B. M. VENABLES.

Heat-interchanging apparatus. HOLDEN & BROOKE, LTD., and R. W. BROOKE (B.P. 349,234, 11.4.30).—A form of exchanger having spiral flow of the outer fluid and longitudinal flow of the inner, adapted to be made of cast metal, is described. The inner passage may be contracted longitudinally by tapered radial fins.

B. M. VENABLES.

Heat-exchanger intended particularly for heating water. P. H. MELLOR (B.P. 348,075, 6.2.30).—The exchanger comprises a flat casing having sinuous passages formed between ribs on the inside of the casing and spikes on the outside in continuation of the ribs.

B. M. VENABLES.

Tubulous heat exchangers particularly applicable to desuperheating steam. SUPERHEATER CO., LTD. From SUPERHEATER Co. (B.P. 349,327, 6.6.30).—The apparatus comprises a number of U-tubes of which the lower parts are submerged in H_2O , the vapour from which is allowed to mix with the steam partly as it enters and partly as it leaves the tubes.

B. M. VENABLES.

Separator. E. S. ROYER and R. J. O'DONNELL (B.P. 348,836, 14.4.30).—An apparatus for such purposes as reclaiming foundry sand is constructed with a sloping bed formed of intercalating discs rotating in the same direction. The shafts carrying the discs are capable of being moved nearer or further apart to vary the openings, and fingers between the discs are provided on the underside.

B. M. VENABLES.

Strainers and filters for liquids and gases. T. W. ELEY (B.P. 349,145, 1.3.30).—The filter comprises a cylindrical coil of wire supported so that the filtrate may pass inwards between the turns. The outside halves of the wires are machined off so that flat surfaces and sharp corners are presented to the prefit.

B. M. VENABLES.

Continuous filter drum. I. G. FARBENIND. A.-G. (B.P. 349,296, 21.5.30. Ger., 21.5.29).—The apparatus is of the type in which cake is removed from a filter drum by a number of belts running over it and another drum which is provided with scrapers, forks, or other means of detaching the cakes. In this invention the belts are combined in one continuous narrow length, the axes of the drums are not quite parallel, and a pair

of idle pulleys are provided to bring the belt from one end of a drum to the other and to tension it.

B. M. VENABLES.

Apparatus for (A) controlling the flow of fluids, (B) indicating the rate of flow of fluids. PATERSON ENG. CO., LTD., and W. SMALLEY (B.P. 349,569 and 349,631, [A] 19.2.30, [B] 3.12.29).—(A) The control desired, e.g., the addition of another fluid in strictly proportional quantity, is effected by a lever the other arm of which sustains a weight which is either slidable under the action of floats, of which the level is varied by connexion to a Venturi tube, a cam being introduced to secure movement of the weight proportional to the flow of the main liquid, or, if a V-notch is used to produce a variable head of the main fluid, the weight may take the form of a vessel connected to the main flow above the weir and shaped so that its content of liquid is proportional to the flow. (B) The bulk of the fluid is passed through a Venturi tube and a minor flow is permitted through a by-pass connected to the Venturi, and is measured by a known form of indicator comprising a plunger in a tapered or slotted tube. B. M. VENABLES.

Production of aqueous dispersions. A. L. CLAPP, ASSR. TO BENNETT INC. (U.S.P. 1,787,338, 30.12.30. Appl., 8.9.25).—Regulated streams of molten thermoplastic material, e.g., bitumen, waxes, or resins, and a hot aq. dispersing liquor, e.g., alkali silicate, are mixed in an elongated mixing chamber and chilled to the congealing point before leaving the chamber.

C. A. KING.

Furnace walls. F. B. BIGELOW (B.P. 351,349, 26.9.30. U.S., 7.10.29).

Insulating coverings for steam and similar heated pipes. CONCENTRIC AIR CELLS AUTOMATIC CO. (B.P. 350,956, 14.1.30. U.S., 30.1.29).

Storage and transport vessels for liquefied gas. L'AIR LIQUIDE SOC. ANON. POUR L'ETUDE ET L'EXPLOIT. DES PROC. G. CLAUDE (B.P. 351,158, 29.4.30. Fr., 30.4.29).

Boiler tubes.—See X. **Gas purifier.**—See XI.

II.—FUEL; GAS; TAR; MINERAL OILS.

Chemical and physical survey of coal seams. J. E. CHRISTOPHER, D. R. WATLEWORTH, and G. V. CARTER (Fuel, 1931, 10, 257—267).—Some Cumberland seams have been examined with special reference to their use in by-product coke ovens. The distribution of the banded constituents is shown graphically, and analyses of certain of the seams are tabulated. The seams high in durain gave strong and dense cokes. Float-and-sink and Henry tube tests have been carried out on the coals, and integrated ash-, S-, and P-content curves have been constructed, as well as charts showing the distribution of true coal, middlings, and dirt in the different sized fractions of the mine sample. From the data obtained it was possible to select seams or districts suitable for the specific requirements of the blast furnace.

A. B. MANNING.

Sampling of small coal. E. S. GRUMELL and A. C. DUNNINGHAM (Fuel Econ. Rev., 1931, 10, 4—8).—The number of wagons to be sampled to control deliveries and for the determination of the average calorific val.,

in the case of large and small plants, is given. This number is related to the average characteristic error of each coal. Each coal has a nearly const. calorific val., calc. on the dry ash-free basis, and this obviates frequent calorific determinations. D. K. MOORE.

Significance of solvent analysis as applied to coal. E. B. KESTER (Fuel, 1931, 10, 277—285; U.S. Bur. Mines Inform. Circ. No. 6486).—The investigations carried out up to the present on the solvent analysis of coal are critically surveyed. The desirability of attempting to correlate the results obtained by different systems of solvent analysis is emphasised. Such an investigation is being carried out on American coals at the Pittsburgh Experiment Station, U.S. Bureau of Mines. A. B. MANNING.

Importance of the degree of fineness of admixtures to coking coal. H. HOCK (Glückauf, 1931, 636; Fuel, 1931, 10, 254—256).—The effect of mixing a material, *e.g.*, dull coal, fusain, etc., with a coking coal for the purpose of lowering its swelling capacity and expansive pressure is considerably greater the finer the material is ground. A tentative explanation of this phenomenon is suggested, based on the consequent increased permeability of the mass to the escaping volatile products. Uniform mixing of the materials is essential in order to attain the max. effect. A. B. MANNING.

Utilisation of the sensible heat of the coke and the distillation gases in coke-oven operation. P. STOLLER (Brennstoff-Chem., 1931, 12, 212—213, 232—234).—The "Collin" system is described. The coke is discharged into cooling chambers through which flue gases are circulated. The gases leaving the chambers are burned with the requisite amount of air, passed to the waste-heat boiler, and, after passing through a cooling conduit, are returned to the cooling chambers. The coke is cooled to 250° in 6—7 hr., and the steam production amounts to 390 kg. per ton of coke. The coke is of better quality than when quenched wet. The ascension pipes are provided with boiler-like jackets, whereby the sensible heat of the gases is utilised for the production of steam, and the quality of the tar is improved. A. B. MANNING.

Determination of the expansion pressure exerted in laboratory and large-scale coking tests. H. KOPPERS and A. JENKNER (Glückauf, 1931, 67, 353; Fuel, 1931, 10, 232—239, 273—277. Cf. B., 1931, 373).—The laboratory determinations were carried out in an apparatus, developed from that used by Korten and Damm, in which the vol. of coal is maintained const. and the variation in pressure recorded by a hydraulic arrangement attached to the same lever as the piston in the coal crucible. A specially constructed coke-oven wall, 4.5 m. high and 2 m. long, was damaged when subjected to lateral pressures as low as 0.1 kg. per sq. cm. A coke-oven chamber with movable heating walls was constructed, one wall being provided with a hydraulic measuring apparatus for determining the pressure, or the expansion under const. pressure, produced during carbonisation. Tests carried out with this apparatus show that the expansive pressures determined in the laboratory are far higher than those

which actually occur in the oven. This is accounted for by the difference in the conditions of carbonisation, and especially by the difference in the relative widths of the plastic layer and its adjacent layers of coal and coke. Some coals which in the laboratory show a temporary expansion followed by a shrinkage have shown no expansive pressure in large-scale tests even with charges of higher bulk density. Except for such coals the large-scale and laboratory tests gave roughly parallel results. In particular, the large-scale results confirm the laboratory results: that the higher the bulk density the greater is the expansive pressure. The time of carbonisation has little influence on the expansive pressure, and the difficulties in oven operation observed in some plants with shorter carbonising times are due to reduced shrinkage of the coke following the expansion. The expansion pressure exerted by a coal can be reduced by suitable blending, especially with a dull coal. A. B. MANNING.

Regeneration of bone charcoal. N. S. VOLKOV (Nauk. Zapiski Tzuk. Prom., 1930, 10, 294—307).—A discussion of the washing process.

CHEMICAL ABSTRACTS.

Rate of evolution of gas from coke. G. E. FOXWELL (Fuel, 1931, 10, 285—287).—A sample of coal (20 g.) was heated to a definite coking temp. (700°, 800°, or 900°) and the subsequent rate of gas evolution from the coke at const. temp. was determined. After about the first hr. the rate of gas evolution can be represented by the equation for a unimol. reaction. It is concluded that the rate of evolution is dependent on the surface area of the coke, and that such measurements may be utilised to distinguish between different types of coke structure. A. B. MANNING.

Rapid generation of water-gas. L. V. POLONSKI (J. Chem. Ind. Russ., 1931, 8, 485—490).—The addition of 5% of Fe₂O₃ or Na₂CO₃ increases the velocity of generation of water-gas from coke tenfold, and of 5% of CaO about fivefold; the quality of the product is unaffected. R. TRUSZKOWSKI.

Influence of various forms of carbon on water-gas formation. B. NEUMANN, C. KRÖGER, and E. FINGAS (Gas- u. Wasserfach, 1931, 74, 565—572).—The action of steam, alone or diluted with N₂, on wood charcoal, graphite, graphite + 8% of Fe₂O₃, C black (from C₂H₂), and activated C, at temp. up to 1000° has been studied quantitatively. In the experiments with N₂ as a diluent a const. stream of N₂ (1.3 litres/hr.) was saturated with H₂O vapour at a definite temp. and passed through a superheater to the reaction tube (porcelain tube, 60 cm. long and 16 mm. in diam., heated electrically). The C was packed in the central 20 cm. of the tube. In each experiment the gases were passed for 1 hr., the excess steam and the CO₂ formed were absorbed and weighed, and the vol. and composition of the residual gas were determined. The initial temp. of reaction, *i.e.*, the temp. at which formation of CO₂ was first observed, was: wood charcoal 500°, C black 450°, graphite 730°, graphite + Fe₂O₃ 660°. At temp. in the neighbourhood of those at which the reaction began, small quantities of O₂ (and with wood charcoal some C₂H₄) appeared in the products. At

higher temp. appreciable quantities of CH_4 were formed. With graphite the % of steam decomposed at 810° and 987° were 7.1 and 95, respectively. With graphite + Fe_2O_3 12.0% of steam was decomposed at 810° . The following methods of obtaining a const. current of steam were tried: (a) combustion of a const. current of H_2 over CuO or PbO_2 , (b) combination of a H_2 - O_2 mixture ("Knallgas") over suitable contact substances, and (c) evaporation of H_2O in an "adiabatic flask," i.e., a flask with a capillary tube outlet, heated externally by the vapour of boiling PhMe . The first method was unsatisfactory, but either of the others yielded a sufficiently const. slow current of steam (about 1 g./hr.). The initial temp. of reaction of graphite in steam alone was 643° ; at 973° 95.9% of the steam was decomposed, producing a gas consisting of CO_2 2.44, CO 46.7, H_2 47.5, CH_4 3.36%, O_2 nil. A graphical method of representing the results is described.

A. B. MANNING.

Conversion of semi-coking gas. N. A. KLUKVIN and S. S. KLUKINA (J. Chem. Ind. Russ., 1931, 8, 337—342).—The gas obtained from the semi-coking of Moscow lignite has 5.2—8.6% H_2S , 13—19% CO_2 , 3—8% C_nH_{2n} , 0.8—3% O_2 , 5—10% CO , 5.5—12% H_2 , 27—31% CH_4 , and 21.8—23.8% N_2 . This gas is readily converted, by passing over coke with H_2O vapour at 900 — 950° , into a gas containing 7.8% CO_2 , 16.8% CO , 67.6% H_2 , and 7.6% N_2 , but no H_2S , C_nH_{2n} , CH_4 , or O_2 .

R. TRUSZKOWSKI.

Gasification of water hyacinth (*Eichornia crassipes*). H. K. SEN and H. N. CHATTERJEE (J. Indian Chem. Soc., 1931, 8, 1—7).—Water hyacinth containing 16% H_2O decomposes on heating to 700 — 980° in a current of moist air giving a gas of calorific val. 142 B.Th.U. in yield of 40,000 cu. ft./ton, the residue containing about 2 cwt. KCl (cf. A., 1929, 1348). Bacterial fermentation at 32° forms a gas of calorific value 602 B.Th.U., containing CH_4 , H_2 , and CO_2 in 50—70, 3—25, and 22—25% proportions, respectively, according to the period of fermentation. Pure cellulose yields a similar gas containing more CH_4 on fermentation under similar conditions.

G. DISCOMBE.

Use of non-corroding steel tubes in Jäger's method of determining nitrogen [in coal gas etc.]. W. ZWIEG (Gas- u. Wasserfach, 1931, 74, 576).—Owing to the rapid deterioration of the Si tubes which contain the CuO , it is recommended that they be replaced by tubes of Krupp's NCT_3 steel, which show no appreciable deterioration after 1 year's use. A. B. MANNING.

Continuous-action rotary laboratory furnace for low-temperature dry distillation of coal. W. SWIENTOSLAWSKI and H. NARKIEWICZ (Przemysl Chem., 1931, 15, 217—223).—A furnace adapted for temp. up to 700° is described. R. TRUSZKOWSKI.

Benzol refining. M. KREMER (Petroleum, 1931, 27, 459—464).—Methods applied for the purification of crude benzol are discussed. Refluxing gas-works' benzol with 1—3% of anhyd. AlCl_3 and washing, drying, and distilling removes most of the harmful unsaturated hydrocarbons and gives a product suitable for motor spirit (as indicated by the Br val. and H_2SO_4 test). Refluxing with larger amounts (up to 10%) of AlCl_3

gives benzol practically free from undesirable unsaturated compounds. The various fractions obtained after treatment with AlCl_3 and distilling are more uniformly suitable for motor spirit than before treatment. It is suggested that AlCl_3 reduces refining losses by inducing polymerisation of diolefines etc. to benzene hydrocarbons. Comparison of the action of AlCl_3 , FeCl_3 , and ZnCl_2 on the benzol showed AlCl_3 to be the most active and ZnCl_2 the least. The action of AlCl_3 on brown-coal tar benzol was investigated.

H. E. BLAYDEN.

Elimination of hydrogen sulphide from [gas-works] ammoniacal liquor by copper sulphate, and regeneration of the latter. M. A. MINIOVITSCH and J. F. DISHEVSKI (Ukrain. Chem. J., 1930, 5, [Tech.], 193—203).—Addition of CuSO_4 to the liquor gives the following ppt.: CuS , $(\text{NH}_4)_2\text{SO}_4$, $\text{Cu}(\text{OH})_2$, $(\text{NH}_4)_2\text{SO}_4$, CuS , Cu_2S , $\text{Cu}_2(\text{OH})_2\text{CO}_3$, CuCO_3 , and other complex salts. The ppt. on boiling with H_2O yields a mixture of sulphides, carbonate, and hydroxide of Cu , $(\text{NH}_4)_2\text{SO}_4$ passing into solution. The residue on roasting in air is converted into oxide, the SO_2 evolved being absorbed by NH_3 . CuO is converted into CuSO_4 by dissolution in H_2SO_4 .

R. TRUSZKOWSKI.

Absorption and retention of hydrocarbons by solid fuels. II. B. MOORE (Fuel, 1931, 10, 244—253. Cf. B., 1927, 593).—The rates of absorption of $\text{C}_n\text{H}_{2n+2}$ (where $n = 5$ — 10), from air charged with the vapour at the ordinary temp., by a bituminous coal, an anthracite, and a coke, respectively, and the rates of loss of the hydrocarbon on subsequent exposure of the saturated material to the air, have been determined. In general, the rate of absorption increased with decrease in mol. wt. of the hydrocarbon. Most of the absorbed hydrocarbon was easily removed, but a measurable amount was retained by the fuel even after prolonged exposure to the air. The hydrocarbon so retained slightly raised the spontaneous ignition temp. of the fuel, but did not affect its capacity for absorbing H_2O vapour.

A. B. MANNING.

Determination of benzene and *n*-hexane contents in a mid-continent petroleum. J. H. BRUUN and M. M. HICKS-BRUUN (Bur. Stand. J. Res., 1931, 6, 869—879).—A crude Oklahoma petroleum contained 0.08% of C_6H_6 and about 0.3% of *n*-hexane. R. CUTHILL.

Distillation of petroleum. R. FUSSTEIG (Petroleum, 1931, 27, 520—522).—The "Weymann" method, which permits continuous distillation and simultaneous cracking of hydrocarbons, is described. The advantages of the process are that no crude oil or cooled residuum from the distillation can enter the cracking process, considerably higher yields are obtained, and carbonisation of the tubes etc. is diminished. E. DOCTOR.

Suitability of nickel catalysts for the synthesis of benzene. F. FISCHER and K. MEYER (Brennstoff-Chem., 1931, 12, 225—232).—An efficient Ni catalyst has been prepared using ThO_2 as a promoter. The mixed Ni and Th nitrates were dissolved in H_2O , kieselguhr was added, and the metals were precipitated as carbonates; the product was then washed, dried, and reduced with H_2 at 450° . The optimum results were obtained with 18% of ThO_2 , calc. on the wt. of Ni , and

a quantity of kieselguhr equal to the wt. of Ni. K_2CO_3 was the best precipitating agent, and the catalyst was more effective if it was not washed completely free from K salts. The highest yield obtained with one passage of the gas (26% CO, 56% H_2) over the catalyst (at 178°) was 120 c.c. of liquid hydrocarbons per cu. m. Of the total CO consumed, 65% was converted into liquid and 35% into gaseous hydrocarbons. The catalyst was very stable; after 5 weeks' uninterrupted use the yield fell by only 17%. A very efficient catalyst was produced also by replacing the Th by Mn, and the Ni-Mn catalyst was further improved by a slight addition of Al.

A. B. MANNING.

Importance of ageing for transformer and switch oils. F. EVERS (*Z. angew. Chem.*, 1931, 44, 323—326).—A good mineral oil for electrical insulation should age at such a rate that its original saponif. val. of 2.0 increases by 0.1 or less per annum. By using the apparatus described previously (B., 1930, 801), with 60 g. of a catalyst comprising SiO_2 gel impregnated with 1 mol.-% Fe_2O_3 and 15.5 g. of oil, and maintaining the manometer at a const. value by introducing electrolytic O_2 from a cell working at a const. rate for 100 min., the rate of ageing of the oil can be determined; under these conditions the O_2 absorption in the test is approx. equal to that absorbed by the oil in a year under normal working conditions, and hence is a measure of the ageing rate of the oil.

A. R. POWELL.

Core oils [for foundries]. E. BRÜHL (*Chem. Ztg.*, 1931, 55, 442—443).—The various properties of an oil which render it of value for binding sand cores in the foundry are discussed.

A. R. POWELL.

Water content of power-generating substances and its determination. M. KREMER (*Petroleum*, 1931, 27, 443—445).—To determine H_2O from the clarification point is not possible in all cases. Henley's method (B., 1920, 501 A) is satisfactory for determining up to 0.05% H_2O in EtOH. In any mixture of petrol or benzol with EtOH, 0.2—0.6% H_2O can easily be ascertained. The Adickes method (A., 1931, 61) serves the same purpose, but as yet has not been applied to EtOH-hydrocarbon mixtures.

E. DOCTOR.

Boiler heating. Dew point of gases.—See I. $(NH_4)_2SO_4$. C_2H_2 in CaC_2 . Determining O_2 in gases.—See VII. Porcelain firing.—See VIII. Examinations with ultra-violet light.—See XI.

See also A., July, 793, Solubilities of gases in liquids. 796, Colloidal C. 804, Decomp. of H_2O vapour on C. 812, Volumetric determination of CO. 856, Identifying a mixture of hydrocarbons.

PATENTS.

Manufacture of mixed oil gas and water-gas. HUMPHREYS & GLASGOW, LTD., Assees. of H. G. TERZIAN (B.P. 349,376, 30.7.30. U.S., 3.9.29).—A carburetted water-gas generator is operated in the following steps: oil is vaporised and lightly cracked in the carburettor and superheater, and the resulting gases and vapours are passed through the ignited fuel bed, wherein they are cracked with the deposition of C; the fuel bed is then air-blasted and steamed for the production of blue

water-gas, part of which is burned, together with the blow gases, in the carburettor and superheater. In this manner the desired balance of temp. conditions is maintained and the excess C deposited in the fuel bed is progressively consumed.

A. B. MANNING.

Distillation of tar and like hydrocarbons. BARRETT CO., Assees. of S. P. MILLER (B.P. 349,088, 18.12.29. U.S., 18.12.29).—The hot gases from a number of individual coke ovens are mixed in a heat-insulated header or collecting pipe, and the mixed gases are passed into a still into which tar is sprayed or atomised at such a rate that a rapid heat exchange takes place between the gases and tar. The pitch residue is withdrawn continuously from the still while the gases and vapours are passed to a condenser.

A. B. MANNING.

Apparatus for distillation of hydrocarbon oils. C. C. MILLER, Assr. to STANDARD OIL CO. (U.S.P. 1,786,357, 23.12.30. Appl., 15.6.27).—Cracked oil leaving a pipe still is fed to a large chamber, in which the heavy portions collect, at the base of a fractionating column. Operation is controlled by a valve, of special construction, between the outlet of the still and the condensing system, which regulates not only the flow of oil, but also the pressures at different points.

R. H. GRIFFITH.

Distillation of hydrocarbon oils. G. W. WATTS, P. L. KRAUEL, and T. E. STOCKDALE, Assrs. to STANDARD OIL CO. (U.S.P. 1,784,561, 9.12.30. Appl., 3.4.25).—Heavy oil is mixed with superheated steam at about 450 — 500° and injected into a chamber so that it becomes atomised. The system is operated under reduced pressure and is attached to condensers in which oil fractions and H_2O are separated.

R. H. GRIFFITH.

Vacuum distillation of hydrocarbon oils. H. C. WIESS, Assr. to STANDARD OIL DEVELOPMENT CO. (U.S.P. 1,786,639, 30.12.30. Appl., 25.9.25).—High-boiling oils are heated in a still, at a pressure below 50 mm., while the vapour of a naphtha fraction, boiling above 100° , is injected into the still. Lubricants and other valuable products are thus recovered at a reasonable rate without overheating of the material.

R. H. GRIFFITH.

Fractional extraction of petroleum hydrocarbons with alcohol. T. A. WERKENTHIN, Assr. to SOLAR REFINING CO. (U.S.P. 1,783,203, 2.12.30. Appl., 30.12.27).—High-boiling hydrocarbons, especially distillation residues, are extracted with EtOH for the recovery of lubricants or waxes. The temp. of operation varies from 40° to 78° , but the solvent may be introduced as vapour. On cooling, the mixture separates into two layers and the alcoholic portion is worked up by further cooling. No distillation of the EtOH is necessary before it is used again. Traces of solvent left in the oil or wax have no deleterious effects.

R. H. GRIFFITH.

Decolorisation and stabilisation of distillate petroleum products with respect to colour and odour. STANDARD OIL CO. OF NEW YORK (B.P. 348,011, 29.10.29. U.S., 29.10.28).—Petroleum oils discoloured by internal pigmentation are improved and stabilised by the addition of reducing agents such as hydroxy-benzenes (e.g., quinol, orcinol, pyrogallol), hydroxylated

$C_{10}H_8$ (e.g., α - or β -naphthol), phenylhydrazine, Sn oleate, $SnCl_2$, MeONa, etc. If the reducing agent is solid it is dissolved in an aliphatic alcohol (EtOH or BuOH). One pt. by wt. of reagent is used to treat 50–100,000 pts. of oil. [Stat. ref.] T. A. SMITH.

Purification of hydrocarbon oils. E. B. HUNN, Assr. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 1,786,246, 23.12.30. Appl., 1.7.27).—Hydrocarbon oils are "sweetened" by agitation with a solution of PbO in NaOH, separating the oil, agitating with Me, Et, or Pr disulphide or a mixture of these, and filtering. When oils of high S content are to be treated a quantity of S insufficient to ppt. the contaminating Pb is added before treatment with alkyl disulphide.

H. E. BLAYDEN.

Treating hydrocarbon oil. J. M. GOODWIN, Assr. to TEXAS Co. (U.S.P. 1,786,650, 30.12.30. Appl., 16.3.28).—Petroleum naphtha (from which undesirable fractions of low b.p. may be removed by rectifying) is stabilised and purified by dissolving in it small amounts of H_2S , treating with cone. H_2SO_4 , and washing.

H. E. BLAYDEN.

Cracking of oils, tars, and the like. S. SEELIG (B.P. 348,242, 20.2.30).—Hot oil (etc.) after passing under pressure through a cracking tube is sprayed under released pressure on to a hot surface in a vaporiser. The hot surface is treated either by hot flue gases or by hot oil from the cracking plant before the oil spray enters the vaporiser.

T. A. SMITH.

[Petroleum] oil cracking. J. H. WELCH (U.S.P. 1,784,562, 9.12.30. Appl., 6.7.27).—Vapours obtained by heating hydrocarbons in a cracking apparatus are bubbled through a further quantity of heated oil. The products are separated centrifugally from entrained liquid before fractional condensation. The primary oil-heating tubes and the vertical reaction vessel are assembled so that they can all be heated from a single furnace.

R. H. GRIFFITH.

Cracking of petroleum oil. R. T. POLLOCK, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,783,259, 2.12.30. Appl., 14.11.29).—Oil is cracked under pressure at a raised temp. and the high-boiling residue is passed on, after removal of light products, to a second cracking stage at a higher temp. and pressure.

R. H. GRIFFITH.

Converting [cracking of] hydrocarbons. J. C. MORRELL and H. P. BENNER, Assrs. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,783,257, 2.12.30. Appl., 17.7.24).—Deposition of solid on the walls of the cracking chamber is prevented by forcing a stream of compressed light oil on to the surface of the residual oil so that the whole vessel is swept by a stream of liquid.

R. H. GRIFFITH.

Cracking of [hydrocarbon] oils. R. C. HOLMES and F. J. MANLEY, Assrs. to TEXAS Co. (U.S.P. 1,786,947, 30.12.30. Appl., 9.4.26).—Oil under treatment passes in series through a number of vertical converters, which are heated in their central portions and of which the first is at the highest working temp. The level of oil is maintained above the top of the heated zone, and heavy residue is withdrawn from the last vessel to be returned for further cracking.

R. H. GRIFFITH.

Cracking of hydrocarbons. E. W. BEARDSLEY and M. W. COLONY, Assrs. to PETROLEUM CONVERSION CORP. (U.S.P. 1,784,126, 9.12.30. Appl., 28.6.27. Cf. U.S.P. 1,715,239; B., 1929, 744).—Oils are cracked in the vapour phase by contact with preheated hydrocarbon gases; means are provided for thorough heat exchange between raw material, circulating gas, and reaction products.

R. H. GRIFFITH.

Apparatus for cracking hydrocarbons. W. MILLER, Assr. to CONTINENTAL OIL Co. (U.S.P. 1,785,042, 16.12.30. Appl., 8.6.27).—A fraction of intermediate b.p., obtained from a cracking plant, is separated in a dephlegmator and is not returned to the cracking zone, but is employed as fuel oil. As this fraction is the most difficult to crack, the procedure increases throughput and prolongs the life of the plant.

R. H. GRIFFITH.

Cracking of hydrocarbons. SINCLAIR REFINING Co., Asses. of H. L. PELZER (B.P. 348,764, 11.3.30. U.S., 14.5.29).—A stream of high-boiling oil is heated to cracking temp. under atm. pressure and the products are passed into a coking vessel. A stream of still higher-boiling oil is heated to a lower cracking temp. under pressure and then passed into the same coking vessel with reduction in pressure. Vapours from the coking vessel are then passed into a supply of oil in a scrubbing vessel, the unvaporised oil being returned to the coking vessel and reduced to coke. By further fractionation of the vapours discharged, gasoline may be obtained.

T. A. SMITH.

Apparatus for producing lower-b.p. hydrocarbons. C. P. DUBBS, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,783,185, 2.12.30. Appl., 4.11.18. Renewed 9.6.26).—Oil to be cracked is circulated rapidly, under pressure, through a heating coil and passes thence to an expansion chamber. In this its velocity is greatly reduced and low-boiling products are withdrawn; heavy residues are returned to the furnace and carbonaceous deposits are drained off as a sludge.

R. H. GRIFFITH.

Mineral oil composition. C. F. KAEGEBEHN, Assr. to R. T. VANDERBILT Co., Inc. (U.S.P. 1,784,359, 9.12.30. Appl., 31.1.29).—The decomp. of mineral oils due to air etc. is inhibited by addition of 0.2–0.5% of 2- or 4-hydroxydiphenyl.

H. E. BLAYDEN.

Motor fuel. F. J. KOBLITZ (B.P. 347,132, 22.1.30).—About 1–5% of a dope consisting of a mixture of NH_2Ph , $C_{14}H_{10}$, camphor, castor oil, $C_{10}H_8$ and its tetra-, hexa-, and deca-hydro- and nitro-derivatives, picric acid, Et_2SO_4 , and cresol is added to the fuel. The dope may be improved by the addition of such substances as $COMe_2$, quinol, acraldehyde, etc.

T. A. SMITH.

Production of non-knocking motor spirit. D. A. HOWES, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 347,380, 28.2.30).—The waste gases (preferably desulphurised) produced in the destructive hydrogenation of carbonaceous material are pyrolysed to produce aromatic substances. The products of pyrolysis of the gas are added to the oil obtained by hydrogenation, and may also be utilised as a source of H_2 for the hydrogenation process.

T. A. SMITH.

Production of lubricant. N. C. BEIM (U.S.P. 1,784,809, 16.12.30. Appl., 19.3.28).—Lubricating oil

for internal-combustion engines is prepared by intermixing two commercial grades of lubricating oils by injecting them under pressure into a closed, steam-heated chamber provided with baffles, heating the mixture under reduced pressure to about 218° to remove volatile fractions, mixing with approx. 0.3% of Mg stearate, and filtering the product. H. E. BLAYDEN.

Obtaining [oil-soluble] mineral oil sulphonates. W. T. REDDISH and L. D. MYERS (B.P. 347,164, 18.10.29).—Lubricating oil stocks are treated with 5–10 wt.-% of oleum in the preparation of technical or medicinal white oils. After treatment the oils are extracted with 70% EtOH. The alcoholic extract, which contains all the sulphonic acids, is exactly neutralised and evaporated, pure sulphonates being obtained. The oil is free from sulphonic acids, EtOH, and H₂O, and has good emulsifying and fat-splitting properties. T. A. SMITH.

Manufacture of sulphonated conversion products of higher paraffin hydrocarbons. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 344,829, 11.9.29. Cf. B.P. 343,948; B., 1931, 578).—Paraffin hydrocarbons (above C₈) are halogenated to introduce more than two halogen atoms per mol. and the product is treated with aqueous or alcoholic solutions or suspensions of alkali, alkali carbonates, etc., and finally with a sulphonating agent in the presence or absence of a diluent (e.g., CCl₄) or compounds which assist the reactions (e.g., fatty acids or their anhydrides or chlorides). H. E. BLAYDEN.

Production of [aqueous] bitumen emulsions. T. NESS, LTD., W. A. WALMSLEY, and R. H. THOMPSON (B.P. 350,744, 24.6.30).—Alkali salts of di- or tri-hydric phenols (e.g., resorcinol or pyrogallol), of α - or β -naphthol, or of carbazole, with the addition of soap etc., if desired, are used as emulsifying agents. L. A. COLES.

Manufacture of [bitumen] dispersions. R. W. LEWIS (U.S.P. 1,783,365—6 and 1,787,418, [A, B] 2.12.30, [C] 30.12.30. Appl., [A] 28.2.27, [B] 12.4.28, [C] 27.5.25).—(A) Portland cement with or without colloidal Al(OH)₃ forms the dispersion agent for bitumen and H₂O. (B) The dispersion consists of bitumen 9 pts., Al(OH)₃ 1–3 pts., and clay 1 pt., in H₂O. (C) A dispersion agent is used which may be formed in or wetted by H₂O, but which after drying will adhere to the dispersed bitumen particles, e.g., gelatinous metallic oxides. Such a dispersion in H₂O may contain bitumen 80%, Al(OH)₃ paste 80%, asbestos 10%. C. A. KING.

Checker blocks or the like fillers for regenerative coke ovens. GAS CHAMBERS & COKE OVENS, LTD. From COLLIN & Co. (B.P. 351,365, 17.10.30).

Apparatus for charging carbonising chambers. N.V. SILICA EN OVENBOUW MIJ., Assees. of DR. C. OTTO & COMP. G.M.B.H. (B.P. 350,781, 18.7.30. Ger., 20.7.29).

Fuel burners. J. F. HURLEY (B.P. 350,581, 20.8.30).

Burners for firing hot-blast stoves, furnaces, and the like with gaseous fuel. J. E. WEYMAN (B.P. 351,180, 10.5.30).

Aq. dispersions.—See I. Gas mixtures containing H₂.—See VII. Recovery of Mo.—See X. Mn rosinate.—See XIII. Insecticides.—See XVI.

III.—ORGANIC INTERMEDIATES.

Compound catalysts for synthesis of methyl alcohol. V. A. PLOTNIKOV, K. N. IVANOV, and D. A. POSPECHOV (J. Chem. Ind. Russ., 1931, 8, 472–478).—Cu has a feeble catalytic action in the prep. of MeOH from CO and H₂ under pressure; addition of ZnO slightly activates Cu. Cr₂O₃ has a more powerful action at 265°, chiefly catalysing the reaction 2CO + 2H₂ → CH₄ + CO₂. Mixtures of Cu and Cr₂O₃ are slightly more active than is Cu alone; the reaction proceeds at 265–285°, and the products contain up to 65% of MeOH. The activity of a catalyst containing Cu, ZnO, and Cr₂O₃ is twice as great as that of one containing Cu and either ZnO or Cr₂O₃. The further addition of Ag, Na₂CO₃, or MgO to the catalyst depresses its activity. The activity of the mixtures CuO, MgO, Cr₂O₃ and Cd, ZnO, Cr₂O₃ is of the same order as that of Cu, ZnO, Cr₂O₃, whilst that of Ag, ZnO, Cr₂O₃ is inferior. R. TRUSZKOWSKI.

Determination of pentaerythritol. M. J. KRAFT (J. Chem. Ind. Russ., 1931, 8, 507).—The solution containing pentaerythritol is strongly acidified with HCl, an equal vol. of PhCHO in EtOH is added, and the mixture is left overnight. The cryst. deposit of dibenzylidene-pentaerythritol is washed and dried to const. wt. R. TRUSZKOWSKI.

Anthraquinonesulphonic acids. I. Separation, identification, and quantitative determination. II. Fission of sulpho-groups from anthraquinone- α -sulphonic acids. III. Anthraquinone- β -sulphonic acids. IV. Anthraquinone- α -sulphonic acids. V. Use of mercury in sulphonation of anthraquinone. VI. Influence of impurities on sulphonation of anthraquinone. VII. Influence of inorganic sulphates on sulphonation of anthraquinone. K. LAUER (J. pr. Chem., 1931, [ii], 130, 185–194, 194–197, 198–213, 214–225, 225–239, 239–248, 248–254).—Anthraquinone-2-sulphonic acid is best separated either from neutral or acid solution as its Na salt, which is washed free from acid with “2:1” (i.e., two-thirds saturated) aq. NaCl, dried at 180°, and the NaCl determined by titration with AgNO₃. The 1-sulphonic acid is separated and determined as K salt by a similar method. The purity of these salts is checked by conversion into the corresponding chloroanthraquinones. The arylamine method (A., 1923, i, 234) is not applicable to technical mixtures, but is of use in removing the bulk of sulphonic acids from sulphonation liquors before determination of free H₂SO₄ as BaSO₄. A technical α -sulphonation mixture is best separated by conversion into K salts, and filtering at 60°, which gives pure 1-sulphonate; the filtrate is cooled, filtered, and the residue washed with 2:1 KCl, which removes disulphonic acids and leaves a residue of 1- and 2-sulphonates, which is converted into the chloroanthraquinones and analysed by a mixed-m.p. determination of the resulting mixture. The filtrate from the prep. of sodium anthraquinone-2-sulphonate contains all the 1- and some 2-sulphonate; these are isolated by Dünshmann's method (A., 1904, i, 326), and the mixed Na salts heated with 85% H₂SO₄ and Hg at 180°, whereby anthraquinone is regenerated from its 1-sulphonic acid without the 2-sulphonic acid being affected. The main products of disulphonation,

the 2:6- and 2:7-disulphonic acids, are separated almost completely from by-products on salting out, and on washing the Na salts obtained with saturated aq. NaCl only a little of the latter is dissolved. They may readily be separated from each other by crystallisation from H_2O , but are best determined by conversion into the corresponding dichloroanthraquinones by Ullmann's method. Small amounts of the 1:6- and 1:7-disulphonic acids occur in all the above cases and are completely extracted, together with the small amounts of hydroxy-acids also formed, by 2:1 NaCl. By desulphonation with aq. H_2SO_4 and Hg the 1:6- and 1:7-disulphonic acids are converted into the 2-sulphonic acid; a separate portion of the extract on chlorination gives a mixture of dichloro- and chlorohydroxy-anthraquinones from which the latter can be separated by aq. NaOH; by fractional crystallisation of the extracted materials the 1:4-derivative was isolated. Anthraquinone-1:5- and -1:8-disulphonic acids are by-products of α -monosulphonation, and the principal products of α -disulphonation. In the former case they are separated as already described, and are determined in part by conversion into dichloroanthraquinones, and in part by desulphonation. The disulphonation mixture gives the majority of the 1:5-disulphonic acid in a state of purity on salting out. The conversion of anthraquinonesulphonic acids into the corresponding chloroanthraquinones by Ullmann's method is reliable as an analytical method, and gives yields of 95–98% of the theoretical, but the presence of the salts of heavy metals must be avoided (cf. A., 1927, 463). New data are given for the solubility of Na or K salts of the above sulphonic acids in H_2O and various saline solutions, and also m.p.-composition curves for 1- and 2-chloroanthraquinones and 1:5- and 1:8-dichloroanthraquinones.

II. Treatment of anthraquinone-1-sulphonic acid with aq. H_2SO_4 and Hg at 170–200° displaces the sulpho-group with regeneration of anthraquinone. There is no tendency to rearrangement to the 2-sulphonic acid, but at 210° the anthraquinone produced is converted into the 2-sulphonic acid. α -Substitution of anthraquinone occurs normally, although to a limited extent as a result of the high temp., with oleum in presence of Hg, the normal yield of 2-sulphonic acid being also obtained; use of aq. H_2SO_4 and Hg, or dilution of the oleum sulphonation at a sufficiently high temp., however, gives 2-sulphonic acid exclusively. Similar treatment of $\alpha\beta$ -disulphonic acids removes the α -groups alone, and the non-occurrence of β -sulphonation below 200° makes the method valuable for the determination of α -sulpho-groups.

III (cf. A., 1927, 463). β -Monosulphonation is best effected with 20% oleum at 140° for 4 hr. Use of insufficient oleum for disulphonation leads always to a mixture of unchanged anthraquinone, mono- and di-sulphonic acids, sulphonation ending at a SO_3 concentration of 2–3% at 140°. A high conversion into monosulphonic acid is therefore accompanied by a relatively low degree of total sulphonation. Disulphonation is best effected with a 10% excess of 40% oleum at 190°, a yield of 85% of the theoretical of 2:6- and 2:7-disulphonic acids in the ratio 1:1.15, accompanied by about 10% of 1:6- and 1:7-disulphonic and hydroxysulphonic acids, being

obtained. Lower temps. favour slightly the formation of the 2:7-disulphonic acid, but no conversion of 2:6- into 2:7-acid was observed. Increase of the reaction time or of the SO_3 concentration produces oxidation at the expense of the disulphonic acids.

IV. Sulphonation in the α -positions is carried out in presence of Hg, although it occurs to the extent of 2–3% in its complete absence. The best yields of monosulphonic acid (53% overall, or 75% on anthraquinone actually used) are obtained with a 5% excess of 20–25% oleum at 140° for 2 hr. More SO_3 or a higher temp. causes disulphonation, but prolongation of the reaction time is without effect. As by-products are formed 2–3% of 2-mono- and probably also 1:6- and 1:7-di-sulphonic acids. Disulphonation is best carried out with 110–115% of the theoretical quantity of 40% oleum at 130° for 4 hr. The process of heating-up should be gradual. It yields approx. 47% of 1:5-, 27% of 1:8-, 11% of 1:7-, 5% of 1:6-disulphonic acids, and 2% of hydroxysulphonic acids. Formation of $\alpha\beta$ -disulphonic acids appears to occur rapidly in the initial stages, but soon ceases; its extent is not reduced by use of more Hg, the best results being given by 1% of Hg or an equiv. amount of a salt.

V. Under otherwise equal conditions the α -sulphonation of anthraquinone in presence of Hg is more rapid than β -sulphonation in its absence; the velocity increases with the concentration of Hg up to 1%, when $HgSO_4$ begins to separate. The Hg used is combined almost exclusively with the unchanged anthraquinone and the sulphonic acids. At a sufficiently high temp. the α -sulpho-group is split off, and β -sulphonation then occurs. In the sulphonation of recovered anthraquinone (with addition of Hg) an abnormally high proportion of disulphonic acid is formed; the same result is obtained if fresh anthraquinone is heated with Hg and H_2SO_4 at 100° before sulphonation. On the other hand the 1-sulphonic acid, if carefully freed from Hg, gives on further sulphonation the 1:6- and 1:7-disulphonic acids. The existence of an α -sulpho-group does not, therefore, render the other α -positions liable to substitution, and the phenomenon of α -substitution can be due only to the preliminary formation of α -mercurianthraquinone-derivatives, and direct replacement of the metallic group by the entering sulpho-group.

VI. The presence of 1% or more of 2-methylantraquinone in anthraquinone renders the isolation of the 2-sulphonic acid difficult, and considerably reduces the yield. The product is difficult to filter on account of the presence of methylantraquinonesulphonic acids, and much of the desired substance remains in solution. The effect of paraffins, anthracene, and sucrose is to reduce the amount of free SO_3 available for sulphonation, and so reduce the yield under normal working conditions, but no loss of anthraquinone occurs. Carbazole and dianthrone are without noticeable effect. Sulphonation of a technical anthraquinone of 96% purity gave a poor conversion and a low yield of isolated sulphonic acid, but again an abnormal amount of 2-sulphonic acid remained in solution. In this case also slightly better results were obtained with a greater excess of SO_3 .

VII. Addition of inorg. sulphates in mol. quantities during the β -sulphonation of anthraquinone favours formation of the monosulphonic acid, but the tendency

to sulphonation and the degree of sulphonation are considerably less, and a higher temp., but less time, is needed. The degree of sulphonation decreases in the order $\text{Na} > \text{K} > \text{Mg} > \text{Ca}$, and the yield of monosulphonic acid increases, but very slightly, in the same order. The best yield of 2-sulphonic acid is obtained with a 40% excess of oleum; beyond this point disulphonation is considerable. Under suitable conditions complete disulphonation can be effected, and appears to be unaccompanied by the formation of $\alpha\beta$ -disulphonic and hydroxy-sulphonic acids. Nevertheless, on account of the low degree of sulphonation, and the difficulties caused by the presence of inorg. salts during working up, it is considered that the process is without technical advantage.

H. A. PIGGOTT.

Beyer's formula for the titrimetric determination of saccharin. O. BEYER (Chem.-Ztg., 1931, 55, 509—510).—Saccharin and parasaccharin may be determined in admixture (*i.e.*, in commercial saccharin) by titration. Saccharin (%) = $(2.01256 C - 100) / 0.09868$, where C = c.c. of 0.1N-KOH per g. of substance. Parasaccharin = $100 - \% \text{ saccharin}$. E. H. SHARPLES.

Abs. EtOH.—See XVIII.

See also A., July, 793, System $n\text{-BuOH-MeOH-H}_2\text{O}$. 794, Adsorption of H_2O from aq. EtOH. 803, Prep. of catalysts for hydrogenation. 805, Liquid partial oxidation. 820, Prep. of isoamyl ether. 831, Prep. of aliphatic amides. 842, Prep. of phenylglyoxal. 844, Derivatives of benzanthrone. 852, Triazole compounds. 856, Colour test for *o*-dihydroxyphenols. Detection of BzOH . 877, COMe_2 -BuOH by fermentation.

PATENTS.

Production of acetone from acetylene. HOLZVERKOHLUNGS-IND. A.-G. (B.P. 347,695, 22.1.30. Ger., 24.1.29).— C_2H_2 and steam are passed through an Fe oxide catalyst layer about 10 cm. thick; *e.g.*, a series of Fe-gauze sheets superficially oxidised and impregnated with additional catalysts or promoters may be piled horizontally or rolled into a cylinder. C. HOLLINS.

Production of ketones [from alcohols etc.]. HOLZVERKOHLUNGS-IND. A.-G. (B.P. 347,593, 22.1.30. Ger., 29.1.29).—Alcohols, aldehydes, esters, acids, acetals, and aldols above C_1 are led with steam at 500° over a catalyst comprising oxides or carbonates of Ni and/or Co, preferably with Fe oxide, with or without oxides of Ca, Sr, Ba, or other light metals. EtOH with H_2O over rusted spongy Fe impregnated with NiO gives 88% yield of COMe_2 . C. HOLLINS.

Production of benzoylbenzoic acid derivatives and anthraquinone derivatives therefrom. R. J. LOVELACK, J. THOMAS, E. G. BECKETT, and SCOTTISH DYES, LTD. (B.P. 347,613, 17.10.29).—A dichlorobenzoylbenzoic acid, obtained from a dichlorophthalic anhydride and C_6H_6 , is heated with NH_3 or NH_2Me at 120 – 140° , and the product is cyclised to give a chloroaminoanthraquinone. 2-Chloro-1-aminoanthraquinone is prepared from 3:4-dichlorophthalic anhydride, the 2:3-isomeride and 2-chloro-3-methylaminoanthraquinone from the 4:5-dichloro-anhydride. C. HOLLINS.

Production of halogenophthalic anhydrides. P. F. BANGHAM, J. THOMAS, and SCOTTISH DYES, LTD. (B.P. 347,666, 24.12.29).—A salt, especially an acid salt, of 4-chloro(or other halogeno)-phthalic acid is heated with an equiv. of H_2SO_4 or HCl , H_2O is distilled off, and the anhydride is extracted, if desired, by solvents. 3- and 4-Chloro- and 3:4- and 3:6-dichloro-anhydrides are so prepared. C. HOLLINS.

Mineral oil etc. sulphonates.—See II.

IV.—DYESTUFFS.

Spectrophotometric measurements in the dye-stuffs industry. C. Z. DRAVES (J. Opt. Soc. Amer., 1931, 21, 336—346).—The applications of the spectrophotometer, and its limitations, are discussed.

C. W. GIBBY.

See also A., July, 804, Adsorption of org. dyes by ZnO . 806, Fastness to light of azo dyes. 835, Colour and constitution. New mordant azo dye. 840, Tetraphenylmethane derivatives. 844, Derivatives of benzanthrone. 853, Bilirubinoid dyes.

PATENTS.

Manufacture of a vat dye [of the dibenzanthrone series]. SOC. CHEM. IND. IN BASLE (B.P. 347,681, 27.1.30. Switz., 25.1.29).—Aminodibenzanthrone is condensed with tetrachloro- or 2:5-dichloro-*p*-benzoquinone in PhNO_2 at 190 – 200° to give a blue-green vat dye fast to Cl_2 . C. HOLLINS.

Manufacture of disazo dyes [for cotton and viscose silk]. SOC. CHEM. IND. IN BASLE (B.P. 347,742, 30.1.30. Switz., 2.2.29).—A diazo compound having no *o*- or *p*-OH group is coupled with a 1:2-aminonaphthol ether or its sulphonic acid, and the product is diazotised and coupled with J-acid or an aryl-J-acid, for blue cotton and viscose dyes. Examples are: aniline-*o*- or -*m*-sulphonic acid \rightarrow 2-methoxy-Cleve acid \rightarrow phenyl-J-acid; β -naphthylamine-4:8-disulphonic acid \rightarrow 2-ethoxy-Cleve acid \rightarrow J-acid. The dyes may be precoppered etc. C. HOLLINS.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Production of cellulose by means of chlorine. IV. Chlorolignin. J. KAWAMURA (J. Soc. Chem. Ind., Japan, 1931, 34, 173—174 B; cf. B., 1931, 581).—Increasing the concentration of Cl_2 or repetition of chlorination has no great influence on the Cl_2 content of chlorolignin or on its OMe content. Chlorination of the lignin hydrochloride obtained by the Kalb-Lieser method causes no removal of OMe groups. E. H. SHARPLES.

Sulphite-cellulose from pinewood. II. O. RUTALA and J. SEVÓN (Cellulosechem., 1931, 12, 131—137; cf. B., 1929, 592).—The addition of salts of weak acids to sulphite liquors enables woods high in resin content to be pulped satisfactorily. The liquors may even become alkaline during the digestion. Sulphite waste liquors are used as a cheap source of weak acids, Ca being precipitated by means of Na_2SO_4 , NaOAc being the principal buffer salt formed. Formation of H_2SO_4 during cooking is also minimised by the addition of

buffers. Experimental digestions of pinewood, employing this method, have produced pulps of good quality.

T. T. POTTS.

Colour specification in the pulp and paper industry. W. B. VAN ARSDEL (J. Opt. Soc. Amer., 1931, 21, 347—357).—A discussion of the conditions which must be satisfied by any method of colorimetry suggested for use in the pulp and paper industry.

C. W. GIBBY.

Cellulose bleaching. Hydrolysis number and alkali consumption of cellulose.—See VI. **Roasting of pyrites.**—See X. **Examinations with ultra-violet light.**—See XI. **Paper-sizing materials.**—See XIII. **Photochemistry on paper.**—See XXI.

See also A., July, 793, **Solvent power of alcohols for cellulose nitrate.** 828, **Viscosity of cellulose acetate solutions.** 849, **Cellulose furoate.** 886, **Cellulose films of fossil plants.**

PATENTS.

Preparation of artificial silk filaments. LUSTRAFIL, LTD., and S. W. BARKER (B.P. 349,658, 6.3. and 31.5.30).—Viscose silk of subdued lustre is obtained by adding to the viscose solution prior to spinning a preformed aq. emulsion of a chlorinated aliphatic hydrocarbon. *E.g.*, 3 lb. of CCl_4 emulsified in 2 gals. of H_2O with the aid of gum arabic or starch is a suitable quantity per 100 gals. of viscose solution. D. J. NORMAN.

Production of artificial filaments. BRIT. CELANESE, LTD., and W. I. TAYLOR (B.P. 349,999, 26.2.30).—Continuously with their production, filaments of cellulose acetate while in a sticky condition, brought about by incomplete evaporation of solvent, by treatment with a softener, or by heat, are stretched and caused to merge together into a single filament, which is afterwards treated with a lubricant to remove stickiness; other threads such as wool, metal, etc. may also be incorporated in the composite thread. F. R. ENNOS.

Dry-spinning of artificial fibres. I. G. FARBENIND. A.-G. (B.P. 349,793, 12.6.30. Ger., 13.6.29).—The filaments are extruded in the form of a ring and the evaporative medium is introduced or withdrawn at the centre of the ring close to the spinning nozzle, so that a current of evaporative medium flows radially across the filaments. Suitable devices are described. D. J. NORMAN.

Washing and after-treating [centrifugally produced] artificial silk spinning cakes. I. G. FARBENIND. A.-G. (B.P. 349,681, 14.3.30. Ger., 16.3.29).—A number of spinning cakes are mounted on a long horizontal perforated tube (optionally rotatable) and the washing or treating liquor is passed through the cake from the inside. In this way entanglement of the fibres during washing is avoided. D. J. NORMAN.

Manufacture of cellulose derivatives. SOC. CHEM. IND. IN BASLE (B.P. 350,137, 14.4.30. Switz., 13.4.29).—Cotton is immunised to direct dyes with retention of its structure by treatment first with a conc. solution of a salt having a swelling action (KCNS , CaCl_2 , MgCl_2) and then, after drying if desired, with hot Ac_2O in absence of a diluent. F. R. ENNOS.

Manufacture of cellulose acetate. KODAK, LTD., Assecs. of C. J. MALM (B.P. 349,959 and 350,310, [A] 1.2.30, [B] 25.7.30. U.S., [A] 1.2.29, [B] 10.8.29).—(A) After pretreatment of cellulosic material with AcOH , the mixture is distilled with a liquid ($\text{C}_2\text{H}_4\text{Cl}_2$) forming an azeotropic mixture with H_2O , and esterification is completed by addition of Ac_2O and a catalyst (H_2SO_4 and H_3PO_4). (B) After hydrolysis of the ester to the desired extent, a solution of HCl in AcOH is added to the hydrolysing bath, whereby a cellulose acetate free from haze is obtained. F. R. ENNOS.

Impregnated and/or smoothed articles and mixtures for their production. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 349,638, 3.3.30).—Wood, leather, paper, textiles, etc. are impregnated with solutions or emulsions of the viscous or solid polymerisation products of alkylene oxides (cf. B.P. 346,550; B., 1931, 666) either alone or in admixture with waxes, natural or artificial resins, cellulose derivatives, colouring agents, or the like. D. J. NORMAN.

Utilisation of celluloid waste. W. SATOR (B.P. 350,084, 21.3.40. Ger., 2.4.29).— C_2HCl_3 is added to a filtered solution of the waste in COMe_2 , to which the requisite amount of HCl has been added to dissolve the ZnO (in the case of white pigmented waste). The COMe_2 is distilled off and the nitrocellulose ppt. is separated, washed with C_2HCl_3 , and carefully dried. From the C_2HCl_3 -camphor solution, the camphor is recovered on distillation in steam. H. ROYAL-DAWSON.

Insulating material.—See XI. **Rubber substitute.**—See XIV. [Wrappers for] eggs.—See XIX.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Viscosity control in cellulose bleaching. H. OKADA and E. HAYAKAWA (Cellulose chem., 1931, 12, 153—162).—The cuprammonium method of determining the viscosity of a cellulose can be replaced by measuring the viscosity in a 1% COMe_2 solution of its nitrate prepared by nitration below 0° of cellulose (1 pt.) with mixed acid (75 pts.) containing 63% of H_2SO_4 , 27.5% of HNO_3 , and 9.5% of H_2O , washing first with ice water and then with luke-warm water, and drying over 40—50% H_2SO_4 . The Cu numbers, α -cellulose contents, and viscosities are given of celluloses unbleached and bleached with Cl_2 under various conditions. A. RENFREW.

Hydrolysis number [of cellulose]. O. FAUST (Cellulosechem., 1931, 12, 125—126).—The effect of mercerisation on the Schwalbe "hydrolysis number" of cotton linters is discussed. The starting material has α -cellulose 99.72—99.86%, Cu number 0.51, hydrolysis number 3.39. Treatment with mercerising solutions and "ripening" for varying periods shows that the hydrolysis number rises to 7.43 (max.) after 8 days' ripening, falling to 6.88 after 17 days, the Cu number falling to 0.09, due to dissolution of degradation products. T. T. POTTS.

Determination of alkali consumption of cellulose. W. SCHRAMEK, C. SCHUBERT, and H. VELTEN (Cellulosechem., 1931, 12, 126—131).—An analysis of the methods employed for determining the alkali adsorbed

from mercerising solutions by cellulose, with particular reference to the work of Schwarzkopf (B., 1931, 437).

T. T. POTTS.

Deterioration of fabrics exposed on a roof after treatment with fishing-net preservatives. W. R. G. ATKINS (J. Marine Biol. Assoc., 1931, 17, 473—477).—Cotton and linen fabrics exposed to the air at Plymouth lose $\frac{1}{3}$ — $\frac{2}{3}$ of their strength in two years. Cu oleate, mixed Cu soaps, and mixtures of the latter with tar or resin have very little effect in preventing deterioration.

C. W. GIBBY.

Spectrophotometric measurements in the dye-stuffs industry.—See IV.

See also A., July, 798, **Effect of gelatin and salts on Congo-red.** 802, **Kinetics of chlorine bleaching.**

PATENTS.

Degumming of silk [before dyeing]. Treatment of rayon. L. MELLERSH-JACKSON. From TWITCHELL PROCESS Co. (B.P. 349,961—2, 3.2.30).—(A) Sericin is rendered sol. with a 0.01—0.03% NaOH solution and emulsified by addition of mineral oil (mahogany) sulphonates. (B) Prior to weaving and knitting, rayon fibres are given a protective coating of mineral oil and true mahogany sulphonates, which is removed by immersion in H₂O before dyeing and finishing.

F. R. ENNOS.

Dyeing [of knitted tubular fabrics]. J. H. HEAP (B.P. 347,235, 26.10.29 and 22.3.30).—Fabric is passed through a dye liquor while being simultaneously exposed to submerged jets of the liquor. Tubular fabric is dyed while being drawn along a submerged perforated pipe through which dye liquor is forced. A. J. HALL.

Decorative treatment of [cellulose acetate silk] fabrics. CALICO PRINTERS' ASSOC., LTD., and J. R. WHINFIELD (B.P. 348,715, 21.2.30).—White resist or discharge effects are obtained by overall-printing cellulose acetate materials, before or after the printing with Zn(OAc)₂, ZnO, or other metal compound, with dyes which have an affinity for cellulose acetate and are capable of forming insol. complexes with such metal compounds, then steaming and heating with a dil. acid to remove the insol. complex. Coloured effects are obtained by adding to the Zn(OAc)₂ printing paste dyes which have an affinity for cellulose acetate but form no insol. complex with metal compounds.

A. J. HALL.

Impermeable cloth. IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 350,358, 3.10.30. U.S., 3.10.29).—The cloth, suitable as a substitute for 'goldbeaters' skin etc., is prepared by coating a fabric with a mixture of viscose, rubber latex, and glycerin, drying the coating, and regenerating the cellulose from the viscose by exposure to an acid gas (e.g., SO₂) at room temp. It is advantageous to coat the fabric with a rubber composition, and then to size it with an adhesive such as gelatin before applying the viscose-latex mixture.

D. F. TWISS.

Treatment [sizing and finishing] of textile materials and the like. H. BOLLMANN and B. REWALD (B.P. 348,783, 20.3.30. Ger., 20.4.29).—Yarns and fabrics are impregnated with fatty acids and oils

which have been emulsified with vegetable phosphatides extracted from soya beans

A. J. HALL.

Treatment of wool [to give non-shrink finish]. L. B. SMITH and C. E. RUBY (U.S.P. 1,781,415, 11.11.30. Appl., 3.6.24).—More accurate control of the chlorination non-shrink finish for wool materials is obtained by using solutions of NaOCl in which the concentration of OH ion is 10⁻³—10⁻⁵ molal equiv. per litre. A satisfactory solution in which the [OH⁻] is 10⁻³ is prepared by adding 0.2 g. of NaOH to 1 litre of a 0.0185% solution of NaOCl.

A. J. HALL.

Apparatus for wet treatment of textiles. F. H. ROGERS. From SMITH, DRUM & Co. (B.P. 350,556, 14.3.30).

Drying and carbonising machines [for textiles]. H. KRANTZ (B.P. 351, 212, 2.6.30).

Rubberised fibres. Rubberised sheet.—See XIV.

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

New contact [sulphuric] acid plant. D. S. DINSMOOR (Chem. Met. Eng., 1931, 38, 330—333).—A plant recently erected for use with a V catalyst occupies a floor space of 112 sq. ft./ton of S/day as against 1000 sq. ft. for an older contact plant. S is melted by steam in brick-lined pits and pumped by plunger pumps, the barrels of which are immersed in the liquid. A stationary S burner is used consisting of a vertical steel cylinder lined with fire-brick packed with chequerwork and having primary and secondary air inlets. The gases are air-cooled in a cast Fe shell surrounded by a steel shell and after dust filtration pass to two cast Fe converters in series. The first effects 80% conversion and the second a further 16.5—17.0%. The granular catalyst mass is packed on Fe screen shelves having baffles between them. Absorption takes place in a steel tower lined with acid bricks and packed with rings. The total back-pressure is 3 in. Hg, and one operator can handle the plant.

C. IRWIN.

Preparation of potassium carbonate by the magnesia process. G. I. TSCHUFAROV and V. S. KNUTAREV (J. Chem. Ind. Russ., 1931, 8, 232—238).—Engel's process, depending on the conversion of MgCO₃.3H₂O and KCl into MgCO₃.KHCO₃.4H₂O, is studied. The optimal conditions for prep. of MgCO₃.3H₂O from MgO and CO₂ are: 1000 c.c. H₂O per 40 g. MgO, the presence of 10% KCl in the reaction mixture, effective stirring, and a partial pressure of 0.5—1 atm. CO₂. Optimal yields of double salt are obtained under the following conditions: 17—24°, const. stirring, and use of 22.5 g. of KCl per 18.36 g. of MgO. A max. of 62% of the KCl present is converted into double salt, keeping the concentration of MgO const. and varying that of KCl (optimal 14%), whilst a max. of 75% of the Mg present is combined using 33% KCl and 12% MgO. The double salt dissolves to the extent of 1 g. per 100 c.c. of wash-water. Washing removes chlorides but not Mg from the double salt. K₂CO₃ may be prepared from the double salt by heating in an autoclave at 140°, or in open vessels at 150—180°, or by the action of Mg(OH)₂. The first two methods yield conc. solutions (20%), but

the residue of inactive $MgCO_3$ has to be calcined for the regeneration of MgO , whilst using the third method $MgCO_3 \cdot 3H_2O$ remains, but the concentration of K_2CO_3 obtained does not exceed 7%. R. TRUSZKOWSKI.

Preparation of potassium nitrate by action of nitric acid or oxides of nitrogen on chloride. I. A. MIRKIN (J. Chem. Ind. Russ., 1931, 8, 351—359).—The purity of the product obtained by the action of HNO_3 on KCl increases with the relative concentration of HNO_3 . The higher the temp. and the more dil. the acid used, the smaller is the ratio $HNO_3 : KCl$ necessary to obtain pure KNO_3 . The quantity and composition of the gases evolved during the reaction depend on the reaction temp. and the concentration of acid taken; using 65% acid at 60° , about 10% of the N added is lost as $NOCl$, whilst using 30% acid at 60° very little gas at all is evolved. The yield of KNO_3 amounts to 45% on the acid used, and to 60—75% on the KCl taken, according to the concentration of HNO_3 . If oxides of N are passed through KCl , the yield of nitrate increases with the moisture content of the KCl ; where this is small, $NOCl$ and Cl_2 are evolved, whilst with excess H_2O neither Cl_2 nor $NOCl$ is evolved. The max. yields by this method are 60%. R. TRUSZKOWSKI.

Neutralisation of [gasworks'] ammonia sulphate by gaseous ammonia. W. E. BUCKLEY (Gas World, 1931, 95, Coking Sect., 83—85).—The $(NH_4)_2SO_4$ is fed into a neutraliser supplied with NH_3 gas, and dried by passing into a Phillipson machine fitted with an Archimedean screw and a steam-jacket. The crystals are more uniform in composition and structure than those ordinarily obtained, and if steel is used min. corrosion of machinery takes place.

A. H. EDWARDS.

Bromometric determination of nitrogen in ammonium salts. B. I. LEVI (J. Chem. Ind. Russ., 1931, 8, 393—396).— NH_3 is oxidised by Br in the presence of $N-NaHCO_3$, and excess Br is determined iodometrically by addition of KI . Where $NaOH$ is used in place of $NaHCO_3$ a definite end-point is not obtained, owing to formation of $NaNO_2$. The pH of the solution should not exceed 8. R. TRUSZKOWSKI.

Bromometric determination of nitrogen in ammonium salts. M. L. TSCHPELEVETS, S. I. POZDNIKOV, and R. D. FAIN (J. Chem. Ind. Russ., 1931, 8, 396—401).—At below pH 7 the oxidation of NH_4 salts by Br is incomplete, between pH 7.5 and 9.5 it proceeds quantitatively, between pH 10 and 12 nitrite is formed, whilst at over pH 12 both NH_3 and nitrite are found in the reaction mixture. Levi's method, using phosphate buffer at pH 8.5 in place of $NaHCO_3$, gives accurate results in the analysis of $NH_4H_2PO_4$, $(NH_4)_2SO_4$, NH_4Cl , NH_4HCO_3 , and of Kjeldahl- NH_3 originating from the combustion of foodstuffs.

R. TRUSZKOWSKI.

Gravimetric determination of acetylene in calcium carbide. A. A. VASSILIEV (Z. anal. Chem., 1931, 84, 217—220).—An improved form of Bamberger's method (B., 1898, 382) is described. R. CUTHILL.

Stability of magnesium peroxide. A. WOHLK (Dansk Tidsskr. Farm., 1931, 5, 106—108).— MgO_2 slowly loses O_2 on preservation, a number of samples

showing a loss of from 3—4% MgO_2 in 6 months. The decomp. is increased by exposure to air.

H. F. HARWOOD.

Use of hot flue gases in manufacture of copper sulphate. V. ZEMLANITZIN and P. DOBROVLSKI (J. Chem. Ind. Russ., 1931, 8, 277—279).—Flue gases from Humboldt furnaces may be substituted for steam for passing through vats in which Cu is undergoing dissolution in H_2SO_4 .

R. TRUSZKOWSKI.

Manufacture of basic lead carbonate. J. F. SACHER (Z. angew. Chem., 1931, 44, 549—550).— PbO is ground finely with H_2O in a pressure vessel and a mixture of NH_3 and CO_2 is passed into the pulp. The PbO is thus quantitatively converted into $2PbCO_3 \cdot Pb(OH)_2$. The excess NH_3 and CO_2 are recovered by heating the white-lead paste above 60° and are used again in the process.

A. R. POWELL.

Utilisation of the gases obtained in the process of volatilising phosphorus and the production of soluble phosphates. A. P. DUNAIEV (Udobr. Urozhai, 1930, 2, 397—409).—The oxidation of P with H_2O over CaO at 550 — 950° is completed to H_3PO_4 at a fairly high gas velocity; very little PH_3 is present, and the sum $CO + H_2$ is not decreased. In the oxidation of the gases no air in excess of that needed for oxidation of P was necessary. When $NaCl$ was used, the temp. had to be kept at 400 — 500° ; oxidation of P took place with O_2 , but not with H_2O .

CHEMICAL ABSTRACTS.

Superphosphates enriched with ammonia. S. I. VOLFKOVICH, L. E. BERLIN, I. L. HOFMAN, and A. A. IONAS (Udobr. Urozhai, 1930, 2, 495—504).—The H_2O -sol. and citrate-sol. P_2O_5 in the products obtained by mixing H_2SO_4 with $NH_4H_2PO_4$, $(NH_4)_2HPO_4$, and $(NH_4)_3PO_4$ under various conditions were determined.

CHEMICAL ABSTRACTS.

Constitution and citrate-solubility of tricalcium phosphate and phosphate rock. K. D. JACOB (Phosphorus Digest, 1931, Apr., 7—9).—When 0.5-g. samples are used, 65—75% of the total P_2O_5 in precipitated $Ca_3(PO_4)_2$ and steamed bone meal is sol. in neutral NH_4 citrate solution; for 2.0 g., 25—30% is sol. The citrate-solubility of ground phosphate rock is only about 12% of that of $Ca_3(PO_4)_2$ or bone, principally owing to the presence of F as Ca fluophosphate.

CHEMICAL ABSTRACTS.

Determination of small quantities of oxygen in gases. J. WIERCIŃSKI (Przemysl Chem., 1931, 15, 188—191).— O_2 is absorbed by $Fe(OH)_2$ in aq. NH_3 , the mixed hydroxides are dissolved in conc. HCl , and residual Fe^{++} is determined by potentiometric titration with $KMnO_4$. 0.0002% of O_2 in a gaseous mixture can thus be determined with an accuracy of 0.001%.

R. TRUSZKOWSKI.

Ammoniacal liquor.—See II. Catalysts for $MeOH$ synthesis.—See III. Titanium-white.—See XIII. Salt for curing hides etc.—See XV. Fungicide.—See XVI. Solubility of CaO in sucrose solutions.—See XVII.

See also A., July, 793, Solubilities of gases in liquids. 796, Screening smokes. 797, Sols and gels of $Th(OH)_4$ and $Fe(OH)_3$. Colloidal $Fe(OH)_3$.

803, Absorption of O_2 in conc. system $HNO_3-NO_2-H_2O$. Kinetics of decomp. of NH_3 on Cu. Prep. of Cu-Cr $_2O_3$ catalysts for hydrogenation. 805, (CN) $_2$ synthesis. 806, Na_2O . 807, Prep. of pure Ca(Mg)CN $_2$. 809, Removal of traces of O_2 from N_2 . Formation of N fluorides. 810, Prep. of HI. 812, Electrometric titration of H_3PO_4 . Determination of H_3BO_3 . 813, Determination of Hg_2Cl_2 . Prep. of Er oxide. 855, Trichlorosilicane and SiCl $_2$.

PATENTS.

Elimination of arsenic from acids, particularly sulphuric acid. METALLGES. A.-G. (B.P. 349,472, 26.2.30. Ger., 13.11.29).—Precipitation of the As as sulphide by means of an oxyacid of S or a salt thereof, e.g., $Na_2S_2O_3$, is effective even with acids of *d* 1.526 or over, if the temp. is kept below 60–70°.

W. J. WRIGHT.

Separation of arsenic sulphide precipitates from acids. A. L. MOND. From METALLGES. A.-G. (B.P. 349,715, 10.4.30).—Separation is facilitated by stirring with a finely-divided substance, such as sand, or an org. liquid, e.g., benzol, in conjunction with a frothing agent, e.g., turpentine oil, or by introducing N_2 , H_2 , O_2 , or air in a dispersed form.

W. J. WRIGHT.

Purification of phosphoric acid and the like. A. H. FISKE, Ass. to RUMFORD CHEM. WORKS (U.S.P. 1,787,192, 30.12.30. Appl., 11.8.28).— H_2S or a sol. sulphide is added to dil. H_3PO_4 and, after removal of the ppt., more H_2S etc. is added prior to and during concentration of the acid in apparatus with a corrodible lining, means being provided for sedimentation.

L. A. COLES.

Apparatus for the manufacture of ammonia. SOC. ANON. INDUSTRIA AMMONIACA, and F. LOPEZ (B.P. 350,643, 9.4.30).—The upper and lower cylinders containing the reaction chamber and the heat exchanger are separated by a perforated disc which serves to support these operative parts and protect them from deformation. The chamber containing the catalyst is provided with a flange, resting in a seat on the surrounding tubular chamber, and an airtight joint, so that it can be readily lifted and replaced.

W. J. WRIGHT.

Purification of gases for synthesis of ammonia. L'AIR LIQUIDE SOC. ANON. POUR L'ETUDE ET L'EXPLOIT. DES PROC. G. CLAUDE, Assees. of SOC. CHIM. DE LA GRANDE PAROISSE AZOTE ET PROD. CHIM. (B.P. 350,120, 4.4.30. Fr., 9.7.29).—Sufficient H_2O vapour is admitted with the fresh gas to dissolve on condensation the $(NH_4)_2CO_3$ formed by combination of the traces of CO_2 in the fresh gas with the NH_3 in the returned gas, and the solution is withdrawn from the apparatus.

L. A. COLES.

Working up of sylvinitic crude salts to a mixture of potassium and sodium nitrates or this mixture and soda. CHEMIEVERFAHREN GES.M.B.H. (B.P. 349,823, 11.7.30. Ger., 23.8.29).—KCl is mixed with the sylvinite to make the K : Na ratio equal to that in glaserite, and the mixture is stirred with NH_4Cl solution containing $(NH_4)_2SO_4$, NH_3 being passed in. The glaserite ppt. is treated with $CaCO_3$ and HNO_3 , the

gypsum separated, and the solution evaporated to dryness. The mother-liquor from the glaserite precipitation is treated with CO_2 and the gypsum added, the $(NH_4)_2SO_4$ produced being added to the original NH_4Cl solution.

W. J. WRIGHT.

Production of sodium nitrate and ammonium chloride. CHEMIEVERFAHREN GES.M.B.H. (B.P. 350,343, 12.9.30. Ger., 3.10.29).—The mother-liquor from the process, which contains $(NH_4)_2SO_4$, NH_4Cl , and NaCl in solution together with $CaCO_3$ in suspension, is treated with a wt. of NaCl equiv. to the $(NH_4)_2SO_4$ and with NH_3 ; precipitated Na_2SO_4 and the $CaCO_3$ are removed together and treated with HNO_3 ; precipitated $CaSO_4$ is removed, and the solution is evaporated or cooled to recover $NaNO_3$. The Na_2SO_4 mother-liquor is cooled, preferably after addition of NaCl, to crystallise and remove NH_4Cl , and the residual liquor is saturated with CO_2 and then stirred with $CaSO_4$ to yield a liquor for re-use in the process.

L. A. COLES.

Manufacture of easily-soluble stable hypochlorites. P. R. HERSHMAN, Ass. to C. O. and C. H. SETHNES and P. RUDNICK (U.S.P. 1,784,286, 9.12.30. Appl., 15.4.27).— $Ca(OCl)_2$ or $Mg(OCl)_2$ is mixed with 1 equiv. of NaOAc in the presence of H_2O , preferably with the addition of a solid acid or, e.g., 15% of sol. starch, and the product is dried.

L. A. COLES.

Production of sulphates. METALLGES. A.-G., C. (BARON) VON GIRSEWALD, and E. STAHL (B.P. 350,050, 13.3.30).— SO_2 and an excess of air or O_2 are introduced as extremely fine bubbles, e.g., by passage through porous material or by comminution by rapidly rotating vanes, into H_2O to which NH_3 , CuO, ZnO, etc. is added simultaneously at a rate such as to maintain *p*_H 4–5; the process may be effected at room or at a raised temp., e.g., 80°, and catalysts ($CuSO_4$, $FeSO_4$, Cu_2Cl_2) may be present. Alternatively, air alone is introduced as described into sulphite solutions.

L. A. COLES.

Treatment [purification] of barytes. C. P. DE LORE and B. B. MCHAN (U.S.P. 1,783,778, 2.12.30. Appl., 7.3.27).—Finely-divided barytes, after treatment with H_2SO_4 , is treated with SO_2 solution to reduce Fe^{+++} to Fe^{++} , and is then washed and dried.

L. A. COLES.

Production [precipitation] of sodium stannate. W. T. LITTLE (U.S.P. 1,787,078, 30.12.30. Appl., 10.9.29).— Na_2SnO_3 is salted out of solution by the addition of conc. NaOH solution (>50 g./100 c.c.) and the mother-liquor is conc. for re-use.

L. A. COLES.

Decomposition of zirconium ores. DEUTS. GAS-GLÜHLICHT-AUER-GES.M.B.H. (B.P. 350,728, 18.6.30. Ger., 29.6.29).—Ores containing ZrO_2 and SiO_2 are treated with alkali oxide (or carbonate) in the proportion of 1 mol. of the latter per mol. of ZrO_2 .

W. J. WRIGHT.

[Production of] granular [mono]calcium phosphate. H. ADLER and G. A. McDONALD, Asss. to VICTOR CHEM. WORKS (U.S.P. 1,785,473, 16.12.30. Appl., 7.1.29).—Granular $CaH_4(PO_4)_2$ containing <0.5% $FePO_4$, suitable for use in baking powders, is obtained by treating H_3PO_4 prepared by volatilisation processes with CaO , $CaCO_3$, etc. containing sufficient Mg compounds to yield

a product containing 0.6—2% (preferably 1—1.5%) Mg compounds, calc. as MgO. L. A. COLES.

Production of dicalcium phosphate from sulphurous solutions. E. THILLO, Assr. to A. HEICKE (U.S.P. 1,786,097, 23.12.30. Appl., 24.9.29. Ger., 11.2.28).—An aq. suspension of crude $\text{Ca}_3(\text{PO}_4)_2$ is saturated with SO_2 , filtered after about 24 hr., treated with HCl, and blown with air at room temp. to expel the SO_2 ; the ppt. of CaHPO_4 is removed. L. A. COLES.

Manufacture of solid carbon dioxide products. DRY-ICE CORP. OF AMERICA, Assees. of C. L. JONES and J. D. SMALL (B.P. 350,532, 11.3.30. U.S., 28.3.29).—Liquid CO_2 is evaporated at or near the triple point and cryst. under such conditions as to give crystals not exceeding 0.01 in. in length, these being compressed at a temp. and pressure to cause partial recrystallisation. The resultant blocks are of uniform density and do not crumble. W. J. WRIGHT.

Treatment of recovered sulphur. Removal of arsenic and chlorine from sulphur. S. I. LEVY (B.P. 350,573—4, 15.3.30).—(A) Purification from As is effected by treating the molten S with an alkali compound, such as Na_2S , either in the solid state or as an aq. solution, the S being separated and the As compound removed from the residue by treatment with H_2O . (B) Cl_2 or S_2Cl_2 is added to the vaporised or molten S, the product being fractionated to separate the greater part of the volatile chlorides and then subjected to reduced pressure or passed down a scrubbing tower in countercurrent to air or an inert gas, the exit gases being decomposed by scrubbing with H_2O . Any remaining traces of impurities are removed by steam treatment. W. J. WRIGHT.

Production of sulphur [from sulphur dioxide]. D. TYRER, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 350,124, 5.4.30).—Gases containing, e.g., 5—15% SO_2 are passed into the lower end of a shaft furnace containing coke at 1000—1300°, and the escaping gases, before treatment for recovery of S, pass around the furnace through annular flues supplied with secondary air containing insufficient O_2 to combine with all the CO. L. A. COLES.

Preparation of sulphur dioxide. BRIT. THOMSON-HOUSTON Co., LTD., Assees. of B. W. NORDLANDER (B.P. 350,739, 23.6.30. U.S., 22.6.29).— O_2 , preferably preheated, is conducted in the form of fine bubbles into a S burner containing liquid S, supplied from a jacketed container. A vessel, filled with pebbles, above the burner serves to condense S carried up with the SO_2 . The burner is provided with a lateral device for determining the level of the liquid S. W. J. WRIGHT.

Production of hydrogen or gas mixtures containing the same. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 349,060, 18.11.29).—Hydrocarbons, e.g., gases containing CH_4 , are burned with sufficient O_2 or air to oxidise them completely, and the hot gases formed, to which a further quantity of steam may be added if desired, are brought into contact with coke at a temp. at which the steam is converted completely into H_2 and CO. The gases may then be passed together with H_2O vapour over a catalyst, in known manner, to remove the CO. A. B. MANNING.

Complete separation of liquid air into oxygen and nitrogen. A. MESSER (U.S.P. 1,785,491, 16.12.30. Appl., 18.2.27. Ger., 18.2.26).—In a two-column apparatus in which the upper column is operated at a lower pressure than the lower, the liquid rich in O_2 collecting in the lower column enters the upper at an intermediate point through a reduction valve, the liquid O_2 collecting in the upper column passes through and evaporates in a coil in the top section of the lower column, and liquid N_2 collecting in the upper column is conveyed to a reduction valve at the top of the column. L. A. COLES.

Purification of hydrogen peroxide solutions. KALI-CHEMIE A.-G. (B.P. 349,771, 26.5.30. Ger., 15.6.29).—The solutions are purified by electro-osmosis and then conc. by evaporation or distillation. W. J. WRIGHT.

Apparatus for the production of ozone. V. GAMBAROTTA (B.P. 350,774, 16.7.30. Ger., 18.7.29).—The electrodes and the dielectric between them are mounted on an insulating base, which fits into a socket, contacts being provided on the latter and the outer surface of the base. W. J. WRIGHT.

Electrolytic manufacture of chlorine. F. S. LOW (B.P. 350,479, 7.3.30).—See U.S.P. 1,746,542; B., 1930, 1065.

Cellulose derivatives.—See V. Fertilisers.—See XVI.

VIII.—GLASS; CERAMICS.

Conservation of heat in the annealing of glass. T. C. MOORSHEAD and E. A. COAD-PRYOR (Fuel Econ. Rev., 1931, 10, 35—38).—The improvement in annealing furnaces has been from updraught kilns using 90—100 therms per ton of glass to tunnel furnaces with endless belts of both the open and muffle type using 20 therms per ton; to efficiently insulated tunnel furnaces consuming 5.5 therms per ton, rendered possible by the speeding up of the process of glass manufacture; and to furnaces requiring no auxiliary heating. The last-named are tunnel furnaces heavily insulated at the inlet end and fitted with a conveyor of endless wire mattress. The return part of the conveyor is preheated by the cooling glassware. When operating with light loads heat is supplied by electric heaters. D. K. MOORE.

Direct determination of soda in soda-lime glasses by precipitation as uranyl zinc sodium acetate. F. W. GLAZE (J. Amer. Ceram. Soc., 1931, 14, 450—453).—Full details are given of the precipitation of Na_2O in the presence of other basic oxides, as $(\text{UO}_2)_3\text{ZnNa}(\text{OAc})_9 \cdot 6\text{H}_2\text{O}$, according to Barber and Kolthoff's method (A., 1928, 859). J. A. SUGDEN.

Selenium dioxide as a constituent of glasses. L. NAVIAS and J. GALLUP (J. Amer. Ceram. Soc., 1931, 14, 441—449).—Melts with SeO_2 , H_2SeO_3 , or Na_2SeO_3 as a major constituent of the batch lose a large proportion of the SeO_2 by volatilisation. Approx. 25% SeO_2 can be retained in low-melting $\text{Na}_2\text{O}-\text{CaO}-\text{B}_2\text{O}_3$ and $\text{Na}_2\text{O}-\text{Pb}_2\text{O}_3-\text{B}_2\text{O}_3$ glasses, but these glasses are readily affected by H_2O . Addition of SiO_2 produces a stable glass, but causes a lowering of the SeO_2 content to approx. 10%, due to the higher melting temp. required. J. A. SUGDEN.

Granular and ground felspar with a uniformly low iron content. J. H. WEIS (J. Amer. Ceram. Soc., 1931, 14, 413—418).—The crushed mineral is passed through a Rowand-Wetherill magnetic separator. The output of this machine is low because the Fe impurities must be picked up against gravity. In an improved induction type of machine more efficient action of the magnetic flux is attained by passing the material over the actual surface of a series of magnetic rotors, the polarity of which is automatically changed during rotation, thus facilitating the release of the separated magnetic particles. The plant delivers a material extremely low in Fe and equal or superior to the hand-picked product. J. A. SUGDEN.

Method for eliminating water-marks from table-ware. G. A. BOLE (J. Amer. Ceram. Soc., 1931, 14, 454—456).—Drops of H₂O which collect on the glazed surface after decoration leave a residue which causes a dull spot on the surface after firing. More efficient draining of the ware is obtained if it is dipped in a saponin solution (1 pt. in 4000) after the decorating process. The tendency of the saponin solution to foam is overcome by the addition of small amounts of a solution (1 pt. in 3000) of Turkey-red oil. J. A. SUGDEN.

Development of porcelain firing in the tunnel oven. W. HENTSCHEL (Gas- u. Wasserfach, 1931, 74, 549—553).—The evolution of the tunnel oven, the substitution of gaseous for solid fuels in the firing process, and the comparative costs of the process with tunnel and chamber ovens are discussed. The use of gaseous fuel is more economical and gives more uniform temperatures. Utilisation of producer gas in a tunnel oven necessitated frequent cleaning of the gas inlets from dust and tar; this disadvantage was overcome and greater control of the oven condition was obtained by substitution of the producer gas by gas from the mains (grid system). H. E. BLAYDEN.

Effect of flint on the modulus of elasticity of a soft-fired material. C. G. HARMAN (J. Amer. Ceram. Soc., 1931, 14, 356—357).—The well-known break in the elasticity-temp. curve of quartz at 573° is not exhibited by a soft-fired clay-quartz body. The elasticity is dependent on the size and quantity and not on the kind of grog. J. A. SUGDEN.

Effect of furnace atmospheres on the quality of certain types of glazes. A. P. WATTS (J. Amer. Ceram. Soc., 1931, 14, 460—468).—Laboratory tests on Pb and leadless glazes show that H₂O vapour, SO₂, CO, and unburnt hydrocarbons produce discoloured and sometimes scummed and dull glazes and that an oxidising atm. is essential for good results. J. A. SUGDEN.

Opacity of enamels in terms of colours. R. E. STARK (J. Amer. Ceram. Soc., 1931, 14, 457—459).—The opacities of both white and coloured enamels have been measured with a Pfund colorimeter. J. A. SUGDEN.

Service spalling test for refractories. S. M. PHELPS, S. M. SWAIN, and R. F. FERGUSON (J. Amer. Ceram. Soc., 1931, 14, 389—402).—The test panel comprising 10 bricks (stretchers) held under a pressure of 10 lb./sq. in. in a vertical metal frame is first pre-

heated to 1600° for 24 hr. While in the preheating furnace the panel is backed by 8 in. of diatomite. After cooling and photographing, the panel is treated in the spalling furnace (gas-fired), where it is alternately heated to 1000° and rapidly cooled by exposure to a blast of air carrying a spray of H₂O, each period lasting 10 min. After 12 cycles the panel is cooled, dismantled, and the spalling expressed as % loss in wt. The test differentiates between structural and thermal spalling. The data obtained emphasise the influence of insulation in increasing spalling, owing to the greater temp. gradients. J. A. SUGDEN.

Fusion-test furnace.—See I. Photochemistry on glass.—See XXI.

See also A., July, 800, Reaction between Na₂CO₃ and SiO₂. 802, Velocity of hydrolysis of Na silicates.

PATENTS.

Conduits for use in the production of glass. PILKINGTON BROS., LTD., and E. B. LEMARE (B.P. 350,480, 11.3.30).—The conduits are constructed of semi-fused, dense refractory material of the porcelain type. L. A. COLES.

Prevention of steaming and the formation of raindrops and the like on glass surfaces etc. COMP. INTERNAT. DES INDUSTRIES CHIM. "INTERCHIMIC," SOC. ANON. (B.P. 350,847, 18.9.30. Belg., 28.9.29).—A coating of cellulose or a derivative, glycerin and/or solution of nicotine in EtOH, and diluents is applied. L. A. COLES.

Spall-burning kiln. M. E. SQUIRE (U.S.P. 1,783,632, 2.12.30. Appl., 25.11.27).—The upper and lower halves of a vertical kiln are connected by a passageway inclined at an angle of 60°, below the lower end of which are situated the gas ports and combustion chambers. While traversing the slanting passageway the descending charge of limestone rolls over and becomes thoroughly mixed and the ascending flames also cross over and give uniform distribution of the heat. Poke and observation holes are provided in case of sticking of the charge, and the rate of discharge of CaO is regulated by a discharge door. J. A. SUGDEN.

Drying and burning of moulded ware. J. M. PILLATZKE (U.S.P. 1,786,364, 23.12.30. Appl., 18.3.29).—A chamberless continuous kiln is provided with a series of outlets in the roof, which are connected by means of removable pipes to the main waste-gas flue running down the length of the kiln. The ware is set so that longitudinal fire spaces are provided, along which the fires creep. The removable connecting flues are moved forward when the gases entering the first set of flues reach approx. 100°. As each fresh section of "green" ware is set, the forward end is sealed with paper, which is later burned off by the fires. The cooling ware preheats the air to the fires. J. A. SUGDEN.

Sintering of clay. J. E. GREENAWALT (U.S.P. 1,786,714, 30.12.30. Appl., 16.2.29).—The argillaceous mixture is granulated (with or without passing through the intermediate stage of slurry), covered with pulverised (or mixed with crushed) fuel, and spread as a

porous bed upon a porous hearth. The fuel is ignited and combustion propagated throughout the mass by air drawn downward through the hearth. A material suitable for use as a light, porous aggregate for concrete is rapidly and economically produced. J. A. SUGDEN.

Device for testing [the bonding strength of] clays and the like. J. F. MACKIN (U.S.P. 1,785,521, 16.12.30. Appl., 15.11.28).—A beam pivoted about its mid point carries on each arm a vertical pivoted thrust member terminating in a thrust head lying a short distance above a companion head on the base plate. A wt. is provided to slide across the graduated beam, so that pressure may be applied to the test material placed on the pressure heads on the base plate. Either single or comparative tests may be carried out.

J. A. SUGDEN.

Prevention of efflorescence in ceramics. A. HOUGH and J. G. HARRISON (U.S.P. 1,785,309, 16.12.30. Appl., 15.6.27).—BaSiO₃ (or other silicate of Ba) is substituted for the usual and more expensive BaCO₃, BaCl₂, etc.

J. A. SUGDEN.

Recrystallised refractory composition. T. S. CURTIS, Assr. to VITREFRAX CORP. (U.S.P. 1,786,482, 30.12.30. Appl., 26.6.28).—A cryst. mullite aggregate is bonded with amorphous mullite and fired to cone 17.

J. A. SUGDEN.

Aluminous abrasive. NORTON CO. (B.P. 350,561, 14.3.30. U.S., 8.4.29).—Crude Al₂O₃ mixed with about 1% of FeS is fused with sufficient C to reduce extraneous oxides, to convert the FeS into Al₂S₃ and Fe, and to reduce about 2–4% of the Al₂O₃ to Al₄C₃, Al, etc.; the product, after it has been disintegrated by wetting and exposure to the air, is washed, screened, dried, passed through a magnetic separator, calcined, and then fused under superheating conditions and cooled slowly to yield large crystals of α -Al₂O₃, *d* 3.97.

L. A. COLES.

Reheating and cooling glass in sheets or slabs. SOC. ANON. DES MANUF. DES GLACES ET PROD. CHIM. DE ST.-GOBAIN, CHAUNY ET CIREY (B.P. 350,422, 9.2.30. Fr. 7.2.29).

Electric furnaces. Crucibles.—See XI.

IX.—BUILDING MATERIALS.

Composition of Portland cement. A. C. DAVIS (Cement, 1931, 4, 637–641).—A digest of Brit. Standard and other specifications with relation to the SiO₂ and hydraulic moduli, together with analyses of representative cements, is given.

C. A. KING.

Resistance of concrete to chemical attack. K. MANDE (I Comm. New Int. Assoc. Testing Mat., 1930, B, 149–156).—A discussion of deterioration by H₂O containing sulphate.

CHEMICAL ABSTRACTS.

Compactness of concrete and its resistance to chemical action. A. POULSEN (I Comm. New Int. Assoc. Testing Mat., 1930, B, 157–161).—A discussion, relating particularly to addition of SiO₂ sol. in alkalis.

CHEMICAL ABSTRACTS.

Strengths of brick and other structural silicates. J. H. GRIFFITH (J. Amer. Ceram. Soc., 1931, 14, 325–355).—The stress-strain relationship of the average

group of the system CaO–SiO₂–Al₂O₃ (+ Mg, Fe, Na, etc.) is treated as being nothing more than a pressure–vol. relationship as defined by the Boyle–Mariotte law. If the strength at the stress limit is expressed in terms of density, porosity, or adsorption (these being mutually convertible), the data on the strengths of structural silicates collected during the last 50 years can be correlated by the formula $p = cS(A + A_0)^{-1}(1 \pm e)$, where p is the stress at rupture, c a const., S dimension stress, A porosity (H₂O adsorption), A_0 insensible or colloidal pore space, and e the probable error for a single datum. The strength of a structural silicate is therefore a function of the density and will be equal to that of (say) granite if it has the adsorption or porosity of granite or equal to that of limestone if it has the porosity of limestone etc.

J. A. SUGDEN.

Thermal conductivity coefficient of "Eternit." G. BOZZA and I. SECCHI (Giorn. Chim. Ind. Appl., 1931, 13, 212–215).—The thermal conductivity coeff. of "Eternit" (highly compressed mixture of cement and asbestos) between room temp. and 40° is 0.45 kg.-cal. per m./hr./°C.

O. J. WALKER.

Healthy and frozen wood. K. BRASS and W. EHM (Cellulosechem., 1931, 12, 173–178).—Analysis of frozen and unfrozen wood of *Gleditschia monosperma* are given. The effect of freezing is similar to that of certain fungi and bacteria. From the COM₂-sol. fractions of frozen wood and unfrozen wood compounds, m.p. 203–204° and about 185°, and 280–282°, respectively, can be isolated.

A. RENFREW.

See also A., July, 802, **Velocity of hydrolysis of Na silicates.** 807, **Ca sulphate hydrate.** 886, **Dry rot in wood.**

PATENTS.

Manufacture of Portland cement. G. S. LA FORGE (U.S.P. 1,784,840, 16.12.30. Appl., 23.7.29).—The raw components of cement are mixed with 10–50% of Portland cement clinker, and the mixture is pulverised prior to calcination.

C. A. KING.

Production of Portland cement. E. R. WILNER, Assr. to EDDYSTONE CEMENT CORP. (U.S.P. 1,785,508, 16.12.30. Appl., 28.7.28).—CaO and clay or other silicious earths are heated separately to a much lower temp. than is necessary in the production of Portland cement, and are then mixed and ground together. A jet of H₂O or steam is then introduced into the mixture under agitation to produce active SiO₂ which will combine with free CaO in the mixture.

C. A. KING.

Production of ground raw material for Portland cement manufacture. J. A. MILLER and E. P. NEWHARD (U.S.P. 1,784,462, 9.12.30. Appl., 10.5.27).—The raw batch is ground and graded, e.g., by air separation, the coarser portion being reground and again separated. After a final fine grinding of the residue the various portions are mixed together.

C. A. KING.

Manufacture of cementitious material. H. BERRY (B.P. 350,129, 10.4.30).—Natural CaCO₃ or MgCO₃ is calcined in the presence of HCl admitted either directly into the kiln or in the form of chlorides, e.g., AlCl₃, H₂SO₄, Al salts, or sol. SiO₂ may also be introduced.

C. A. KING.

[Light] mortar, concrete, etc. F. E. MARECHAL (B.P.349,957, 1.1.30. Belg., 2.1.29).—Insol. material, e.g., sand, is pulverised until colloidal and mixed with a binder, e.g., CaO, cement, plaster, or MgO, so as to entrap air bubbles. Chemicals to produce additional gas in the mixture may be added. C. A. KING.

Treatment of brick, concrete, tile, or the like surfaces. H. E. DOUGHTY (B.P. 350,445, 8. and 28.3.30).—Dry cement powder and colouring matter are sprinkled or blown by compressed air on to the wetted surfaces. L. A. COLES.

Forming greyish-black slate granules. H. C. FISHER, Assr. to PHILIP CAREY MANUFG. Co. (U.S.P. 1,782,649, 25.11.30. Appl., 20.6.25).—Greenish slate granules are wetted with a solution of alkali dichromate, metallic sulphates, and other pigments which on heating to incipient fusion impregnate the slate with the oxides of the reacting substances. Fe and Cu are suitable metals. C. A. KING.

Treatment of wood. A. P. ALLEN (U.S.P. 1,785,571, 16.12.30. Appl., 23.5.25).—Wood is immersed in a 20% solution of mono-, di-, or poly-saccharide at 90–150° under pressure. Protecting oils or chemicals and latex may be added to the solution. C. A. KING.

Aq. dispersions.—See I. Bitumen dispersions.—See II. Impregnated articles.—See V. Sintering of clay.—See VIII. Nitrocellulose products.—See XIII.

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

Quality and fuel-consumption factors in smelting and remelting processes for production of wrought iron and iron castings. J. E. FLETCHER (Fuel Econ. Rev., 1931, 10, 51–57).—The remelting of scrap Fe increases the S content by 0.03–0.07% and its use, in large proportion, in the production of castings is to be deprecated. To obtain pig Fe of uniform composition, homogeneous structure, and low in total C, necessary for the production of high-class cast and wrought Fe, lean ores containing sufficient Si, Mn, and P, and regular charging rates into slowly-driven small furnaces with cool blast at a pressure barely sufficient to generate CO in the hearth, are required and the furnaces should be tapped about once every 12 hr. Good-quality cast Fe is being produced from blast-furnace flue dust and fine ores. Open-hearth furnaces of the rotating or oscillating type, with oil, gas, or powdered-coal firing, are in use for remelting cast Fe and producing wrought Fe. An improved cupola has several rows of tuyères connected to the wind belt, the bottom row being fitted with valves. The reduction of the air supply at the bottom tuyères increases the CO content of the gases in the lower portion of the coke bed and reduces metal oxidation and erosion of the furnace lining. The air introduced through the higher tuyères raises the temp. as the top of the coke bed is approached. D. K. MOORE.

Influence of the cooling velocity and melting temperature on the graphitisation of cast iron. H. TANIMURA (Mem. Coll. Eng. Kyushu, 1931, 6, 115–188).—Measurements of the influence of the rate of

cooling on the graphitisation of cast Fe containing various quantities of C and Si show that for each series of const. C content there is a limiting Si content above which graphitisation takes place readily at any rate of cooling. At a lower Si content slower cooling is necessary, and at the lowest Si contents separation of graphite takes place only with difficulty. The cooling rate necessary to produce white cast Fe diminishes with increase of the melting temp., whilst with slow cooling the influence of melting temp. on the degree of graphitisation varies considerably with the composition of the Fe. Melting at high temp. produces frequently a heterogeneous structure in the cast Fe, and if the cooling is rapid or the C content low the graphite separates in a fine granular form; it is probable that indirect graphitisation takes place, whereas the separation of graphite is direct when the Fe is melted at a low temp. The influence of the melting temp. on the stability of the cementite of a white cast Fe has been studied. H. F. GILLBE.

Steel production in large coreless induction furnaces. F. PÖLZGUTER (Stahl u. Eisen, 1931, 51, 513–520).—A medium-frequency induction furnace for melting 1 ton of steel is described with reference to numerous diagrams and its efficiency is compared with that of a 7-ton arc furnace. The relative energy efficiencies are 63 and 66%, respectively, but 66% of the total energy loss in the first case is accounted for by transforming losses. On the other hand, oxidation and casting losses are only 1–2% in the induction furnace as compared with 2.5–4.5% in the arc furnace, and the former permits a more rapid and efficient removal of S and P and a greater and more ready control of the composition of the finished steel. A. R. POWELL.

Effect of degree of reduction by rolling, final rolling temperature, and heat treatment on the mechanical properties, sensitivity to ageing, and structure of thick [steel] sheets. F. KÖRBER and K. WALLMANN (Stahl u. Eisen, 1931, 51, 491–497).—The elastic limit and yield point of mild Si steel are raised without affecting the ultimate strength by severe hot-rolling, finishing at a low temp. (e.g., 700°), and the resulting sheet has a close fine-grained structure. A low finishing temp. for rolling Si steel with a low C content (0.09%) results in low values being obtained in the notched-bar impact test, but for steel containing 0.2–0.4% C this treatment has little effect on the impact strength. Annealing just below the A3 point produces a fine-grained structure without greatly improving the elongation and reduction in area values obtained in the tensile test, but retarded cooling produces a coarser grain structure and poor mechanical properties. The sensitivity to ageing decreases with severity of rolling, i.e., thin sheets are less prone to suffer deterioration from ageing phenomena than are thick sheets. A. R. POWELL.

Crystallographical investigation of some mechanical properties of metals. V. Fatigue of metals under alternating torsion. Y. KIDANI (J. Fac. Eng., Tokyo, 1931, 19, 177–190).—The behaviour of annealed steel with 0.1, 0.3, and 0.6% C and of Cu under a const. alternating torque up to the plastic range has been

investigated. The repetition curve shows that the transition point between the hardening and fatigue effects coincides with the beginning of fatigue in the individual grains and indicates that there is an energy relation between the slip strain corresponding to the applied torque and the number of repetitions required to cause fracture. The fatigue of Cu is chiefly due to the growth of twinning slip bands which develop in the axial or peripheral direction of the grains according to their orientation. The rate of damping of the vibration of the specimens in a measure of the degree of fatigue of the metal.

A. R. POWELL.

Determination of sulphur [in iron and steel] by the evolution method; influence of volatile phosphorus [compounds]. F. JUNGBLUT (Ann. Chim. analyt., 1931, [ii], 13, 161—170).—The chief cause of error in the determination of S in ferrous alloys by the evolution method is the absorption of PH_3 by the $\text{Cd}(\text{OAc})_2$ solution. This may be avoided by passing a rapid current of CO_2 through the absorption vessel before the addition of the I solution. The amount of P evolved from mild steels is 60—70% of the total present, whereas <20% of the total P is evolved on dissolving cast Fe in HCl.

A. R. POWELL.

Detection of traces of nickel and cobalt in steel without destruction of the sample. R. JIRKOVSKY (Chem. Listy, 1931, 25, 254—256).—A current is passed from an anode made of the steel under examination, through a filter paper soaked in ammoniacal dimethylglyoxime solution, to a metal anode. The paper is then soaked in a solution containing $\text{K}_2\text{C}_2\text{O}_4$ and $\text{K}_4\text{Fe}(\text{CN})_6$, washed, and the blue coloration due to Fe is removed by 10% KOH; a red coloration indicates the presence of Ni. Co is detected similarly by using paper soaked in a solution containing NH_4CNS , NH_4OAc , and tartaric acid. An orange stain, due to Fe, appears; this changes to blue on extraction with Et_2O (in presence of Co), or green (Ni), or blue-green (Co + Ni).

R. TRUSZKOWSKI.

Determination of molybdenum in steel. H. C. WEIRICK and C. H. MCCOLLAM (Heat Treat. Forg., 1930, 16, 1145—1146, 1155).—If Al or V is present the sulphide precipitation or Maag and McCollam's colorimetric method should be used. Precautions are indicated.

CHEMICAL ABSTRACTS.

Relation of the moisture in rust to the critical corrosion humidity. W. S. PATTERSON and L. HEBBS (Trans. Faraday Soc., 1931, 27, 277—283).—Samples of natural rust from various sources have been dried and then exposed to atm. of gradually increasing and then gradually decreasing humidity, the change in wt. under these conditions being observed. The marked hysteresis which is observed in the values obtained in the two cases are interpreted as indicating that Fe rust has a gel structure, the results being almost identical with those obtained with precipitated $\text{Fe}(\text{OH})_3$. The H_2O first absorbed by the gel must be held very tenaciously, and not be available for promoting the corrosion. At above the crit. humidity it is supposed that the capillaries in the gel commence to fill with H_2O , which furthers the corrosion process.

J. W. SMITH.

Reaction for the detection of corrosion of underground water-pipes and cables by stray currents.

MEDINGER (Z. angew. Chem., 1931, 44, 550—551).—Several cases of corrosion of underground Fe water-pipes were found to be due to migration of Cl ions towards the Fe pipe under the action of stray d.c.; in one case, although the surrounding earth contained only traces of chlorides, the corrosion product on the Fe contained 23.5% Cl. It is therefore concluded that the accelerating action of stray currents on corrosion is due entirely to anodic migration of Cl ions, and, conversely, the fact that a corrosion product contains a high % of Cl is regarded as sufficient indication of the presence of stray currents.

A. R. POWELL.

Evans pile and protection [of iron] by buffer action. E. HERZOG and G. CHAUDRON (Bull. Soc. chim., 1931, [iv], 49, 702—703).—The Evans pile (cf. A., 1930, 1126) has been constructed with 0.5N-NaCl as the electrolyte, a horizontal cathode of which the upper surface functions as the oxygenated electrode and the lower is insulated by a film of varnish, a vertical sol. electrode, and a diaphragm. The e.m.f. increases at first to a const. value of 0.4—0.43 volt, whereas the current increases with rise of the O_2 pressure. The effect is due to the formation of alkaline and acid films at the cathode and anode, respectively, and, unlike the Fe-C pile, the pile is almost completely polarised by buffer agents.

H. F. GILLBE.

The Parker and Bonderite processes [for protecting iron], and their bearing in paint technology. F. KOLKE (Farben-Ztg., 1931, 36, 1687—1690, 1727—1728).—These proprietary processes, depositing films of Fe Mn phosphates and Cu phosphates, respectively, on Fe, are described in detail. "Parkerising" is a rustproofing treatment, which, however, is usually "fixed" by application of suitable oils etc., whilst "Bonderising" provides a chemical undercoat for subsequent painting etc. The results of comparative tests of lacquers, varnishes, and japans over parkerised and unparkerised plates are tabulated: they show that in some cases parkerising delays the breakdown of the system. Bonderising of metal is shown to improve the adhesion of paint films thereto.

S. S. WOOLF.

Flash-combustion roasting of pyrites. M. FREEMAN (Chem. Met. Eng., 1931, 38, 334—336).—Pyrites ground to 200-mesh, as produced by flotation, is difficult to roast in ordinary mechanical furnaces on account of the very rapid combustion. In the flash-combustion process the ore is passed through a ball mill and then blown with warm air into a firebrick combustion chamber, where it meets a further upward current of air. The gases, after passing through a dust chamber and a fire-tube boiler, are rapidly cooled from 1100° to 400°. The rapid cooling minimises SO_3 formation. No trouble with slag occurs in the combustion chamber if sufficient space is given. The yield of S as SO_2 exceeds 98%, and 1 lb. of steam is produced per lb. of pyrites burned. The burnt residue contains 0.2% S. The process is intended for use in paper mills.

C. IRWIN.

Combustion of pyrites in a Herreshoff furnace. F. W. ADAMS (Chem. Met. Eng., 1931, 38, 337—338).—

Analyses of pyrites fines passing through a 12-shelf air-cooled Herreshoff furnace were made for total sulphide- and sulphate-S on each shelf, the temp. being recorded. At no point was more than 3% of the S present in the form of sulphide (*i.e.*, FeS [?]). Sulphate formation does not occur above 600°. In the furnace studied it was found desirable to fit radiation coolers to the top six shelves to distribute the heat more evenly through the furnace. C. IRWIN.

Laboratory study of the atmospheric corrosion of metals. I. Corrosion of copper in certain synthetic atmospheres, with particular reference to the influence of sulphur dioxide in air of various relative humidities. W. H. J. VERNON (Trans. Faraday Soc., 1931, 27, 255—277).—In dry air, concentrations of SO₂ up to 10% produce no visible corrosion of Cu. In the presence of H₂O vapour corrosion occurs at all concentrations. The process is controlled by the catalytic oxidation of SO₂ at the metal surface, the rate of attack falling off as the active centres are used up. Between 63 and 75% R.H. there is generally a great increase in the rate of attack, indicating the existence of a crit. humidity lying between these values. The corrosion is minimal at about 1% SO₂, at which concentration the product is CuSO₄. At lower concentrations it is accompanied by excess of base, and at higher by excess of H₂SO₄. CO₂ present in large excess over the SO₂ has no influence, but HCl pursues an independent attack on the metal. High-conductivity Cu is more easily attacked by SO₂ than is arsenical Cu. The hygroscopicity of the dried corrosion product shows a marked increase between 50 and 75% R.H., corresponding with the crit. humidity. The influence of the latter is less pronounced with arsenical Cu than with high-conductivity Cu, but the products are less hygroscopic, providing an additional explanation for the greater corrosion-resistance of arsenical Cu. J. W. SMITH.

Aluminium light alloy "Chlumin." I. JITAKA (Proc. Imp. Akad. Tokyo, 1931, 7, 161—164).—An Al alloy containing Cr, Mg, and Fe has been made which is extremely resistant to corrosion by sea-water. The composition is not given. W. E. DOWNEY.

Changes in the dimensions of metallic wires produced by torsion. II. Silver, gold, aluminium, and nickel. III. Lead. T. LONSDALE (Phil. Mag., 1931, [vii], 11, 1169—1187, 1187—1196; cf. A., 1930, 23).—Full data are tabulated, and an expression is found relating the elongation, twist, initial tension, and diam. for wires of the 4 metals of the face-centred cubic class twisted under a small const. load.

III. Corresponding investigations were made for Pb. The elongations are considerably greater, and depend on the rate of twisting. N. M. BLYTH.

Determination of the precious metals in Transvaal platinum ores and concentrates. H. R. ADAM and R. J. WESTWOOD (J. Chem. Met. Soc. S. Afr., 1931, 270—273; cf. B., 1929, 213).—The precious metals are collected in Pb in the usual way and the button is cupelled without addition of Ag; the resulting leady bead is heated at 1300° in a gentle current of air for 1—2 hr. to remove the remaining Pb. The bead is

then dissolved in 1:3 aqua regia, the solution evaporated repeatedly with HCl to remove HNO₃, any insol. material collected (A), and the filtrate treated with solid NH₄Cl to ppt. the Pt. The (NH₄)₂PtCl₆ ppt. is washed with saturated NH₄Cl and dissolved in hot H₂O, the solution boiled with formic acid and NH₄ formate, and the Pt ppt. collected, ignited, and weighed. The NH₄Cl filtrate is diluted and treated with 1% nitroso-β-naphthol to ppt. Au and Pd; the ppt. is washed with 5% AcOH, ignited, weighed (Au + Pd), and cupelled with Ag. The bead is parted in HNO₃ to obtain Au, Pd being obtained by diff. The filtrate from the Au + Pd is treated with HCl, Pb(OAc)₂, and Zn dust, the ppt. is scorified with residue A and cupelled with Ag, and the bead parted in 1:1 HNO₃ to obtain a residue of "other Pt metals." A. R. POWELL.

Rumanian ores and improved extraction of metals. N. METTA (An. Minelor România, 1931, 14, 57—61; Chem. Zentr., 1931, i, 1896).—A discussion of Transylvanian mines and minerals. A. A. ELDRIDGE.

Buffer action in nickel-plating solutions. K. PITTSCHNER (Metal Ind., 1931, 29, 119—120).—In the usual plating range of *p*_H 6—5 the buffer effect of H₃BO₃ and NH₄Cl is greater when alkali is added, whilst about *p*_H 2.5 the reverse is the case. The NH₄Cl content of Ni solutions is kept high enough for the anode corrosion to keep the trend of the *p*_H val. towards the upper limit of the range. Addition of acid only is necessary. CHEMICAL ABSTRACTS.

[Ore] flotation. B. KAMIEŃSKI (Przemysl Chem., 1931, 15, 201—202).—The separation of galena by flotation with oil is due to adsorption of positively-charged galena particles on the oil-water interface. The addition of CuSO₄ to a blende suspension changes the negative charge of the particles to a positive one, as a result of the formation of a coating of CuS. R. TRUSZKOWSKI.

Effect of particle size on flotation. A. M. GAUDIN, J. O. GROH, and H. B. HENDERSON (Amer. Inst. Min. Met. Eng. Tech. Pub., 1931, No. 414, 3—23).—There is a time sequence of flotation with regard to size, the medium coarse particles floating first. Extremely fine pulps were not successfully floated. Recovery is optimal in one range and selective in another. CHEMICAL ABSTRACTS.

Furnaces.—See I. Coal seams [for blast furnaces]. Steel tubes for N determinations. Core oils for foundries.—See II. Ferrum reductum and pulveratum.—See XX. Protecting water-conduits.—See XXIII.

See also A., July, 791, Single crystals of Ag. Allotropism of Rh. 794, Solubility of Au in Hg, and of Cu in Ag. 805, Prep. of α- and β-W, and of La and Nd. 813, Determination of Cu, of CuSeO₃ in presence of Cu₂Se, and of Al₂O₃ in Al and its alloys. 814, Assaying of Pt and Pd. Determination of Os. 816, Ni-Fe alloys for instruments.

PATENTS.

Manufacture of coated iron or steel articles. PARKER RUST PROOF Co. (B.P. 350,560, 14.3.30. U.S., 22.4.29).—The articles are boiled in a dil. solution

containing H_3PO_4 , $Fe_3P_2O_8$, and a small amount of $Cu_3P_2O_8$, whereby they become coated with an insol. phosphate film impregnated with metallic Cu. After drying, the surface is heated with an oxidising flame to convert the Cu into CuO .
A. R. POWELL.

Manufacture of coated iron and steel articles. W. W. TRIGGS. From PARKER RUST PROOF Co. (B.P. 350,559, 14.3.30).—The articles are boiled in a dil. acid phosphate solution containing colloidal H_4SiO_4 .
A. R. POWELL.

Case-hardening of metals [iron]. W. W. TRIGGS. From AMER. CYANAMID Co. (B.P. 349,547, 21.11.29).—The case-hardening bath comprises a fused mixture of 2 pts. of $CaCl_2$ and 1 pt. of $NaCl$ to which is added occasionally 0.5–1% of $Ca(CN)_2$. [Stat. ref.]
A. R. POWELL.

Manufacture of ferro-metal magnetic alloys. INTERNAT. NICKEL CO., INC., Assees. of A. S. SHOFFSTALL and A. E. KAYES (B.P. 350,603, 21.3.30. U.S., 19.4.29).—Fe and Ni in the desired ratio are melted together with enough C to give an alloy containing 0.02–0.03% C, the liquid is covered with a refining flux consisting of CaO , CaF_2 , and a little tar coke, and 0.25% Mn is added to assist in removing P and S. The refined alloy is then deoxidised with a Ca-Si or Zr-Si alloy when the Ni content is 45–55% and with a 25 : 5 : 70 Mg-Si-Ni alloy when the Ni content is 70–80%. The resulting ingots have a high ductility and are readily forged or rolled hot.
A. R. POWELL.

Manufacture of [iron] alloys from pulverulent initial materials. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 349,587, 23.12.29).—Finely-divided Fe or Fe_2O_3 from $Fe(CO)_5$ is mixed with a solution containing a compound of the alloying metal and the mixture is heated under conditions which result in the reduction of the mass to a porous sinter, which is then consolidated by pressure and worked into sheet by sintering in a reducing atm. and hot-working. *E.g.*, 4 pts. of Fe powder are made into a paste with 1 pt. of a 20% solution of $Cr(NO_3)_3$ and the mixture is slowly heated to 500° until N_2O_4 ceases to be evolved, then reduced in H_2 at 1000° for 24 hr. to obtain a sintered Fe-Cr alloy. An alloy of Fe with Co and Ni is made by heating Fe_2O_3 from $Fe(CO)_5$ with a solution of $Ni(CO)_4$ and $Co(CO)_4$ in C_6H_6 at 400° under pressure and reducing the resulting powder with H_2 at 1000°.
A. R. POWELL.

Manufacture of [chromium] steel [for boiler tubes]. D. COLVILLE & SONS, LTD., and A. McCANCE (B.P. 350,048, 12.3.30).—Steel containing 4–10 (7.36)% Cr, 0.2–0.7 (0.36)% Si, 0.05–0.20 (0.105)% C, and 0.2–0.45 (0.33)% Mn is claimed. The Brinell hardness remains const. at 121 between 15° and 760°.
A. R. POWELL.

Treatment of wire and rods to be drawn with simultaneous use of trisodium phosphate lyes as neutralisation means and drain oils as lubricant. R. W. MOLL and H. VOM BRUCK (B.P. 350,275, 2.7.30. Ger., 27.11.29).—The material to be prepared for drawing is first pickled in an acid bath, then washed in H_2O , dipped in Na_3PO_4 lye, and subsequently dried in air; as lubricants for cold-drawing, drain oils (*i.e.*, oils which

have already been used as lubricant and drained off) are employed.
H. ROYAL-DAWSON.

Protection of iron or steel. H. SUTTON and A. J. SIDERY (B.P. 350,469, 3.3.30).—A thin film of Zn is electrodeposited on the cleaned surface of the iron (*etc.*) before the latter is immersed in a bath of molten Al or Al alloy maintained at 600–800° for 1–2 min. [Stat. ref.]
H. ROYAL-DAWSON.

[Copper-zinc-manganese] alloy. J. N. WHITE (U.S.P. 1,785,372, 16.12.30. Appl., 12.11.29).—An alloy comprising at least 88 (93–95)% Cu, 0.5–4 (1–1.25)% Mn, and the remainder Zn is suitable in the construction of flexible tubes *etc.*
H. ROYAL-DAWSON.

Roasting and sintering of pulverulent ores having a high sulphur content. METALLGES. A.-G. (B.P. 350,828, 1.9.30. Ger., 28.9.29).—A furnace of the powdered-coal-burning type is arranged above the hearth of a blast-roasting apparatus and fired with these ores instead of with coal dust. The burning ore thus falls on to the ore charge on the hearth and the two are roasted *etc.* together. Additional fuels may be necessary.
H. ROYAL-DAWSON.

Froth-flotation concentration of [zinc-lead] minerals. MINERALS SEPARATION, LTD., H. LAVERS, and A. H. HIGGINS (B.P. 349,591, 31.1.30).—The addition of small quantities of Na_3AsS_4 or of a mixture of Na_2S_x and As_2S_3 to the ore pulp to prevent flotation of ZnS in the selective flotation of PbS from complex Pb-Zn ores is claimed.
A. R. POWELL.

Treatment of materials [old accumulator plates] containing lead. C. R. HAYWARD (B.P. 349,607, 28.2.30).—The material is smelted at 800° with a flux consisting of Na_2CO_3 , $Na_2B_4O_7$, and CaF_2 and air is blown through the mass to remove As, Sb, and Sn. The flux is removed and regenerated by heating with carbonaceous material to reduce its metal content to an Sb-As-Sn-Pb alloy.
A. R. POWELL.

Electrodeposition of zinc. U. C. TAINTON (B.P. 349,432, 26.11.29).—Electrolysis of $ZnSO_4$ solutions is improved by the use of Pb anodes containing 1% of Ag, Bi, or As and by adding to the bath Na_2SiO_3 equiv. to 5 lb. of SiO_2 and 1–2 lb. of gum arabic per ton of Zn deposited.
A. R. POWELL.

Extraction of metals from ores and other materials. NAT. PROCESSES, LTD., and A. R. GIBSON (B.P. 349,563, 29.11.29).—The valuable metal is leached out by means of a cold solution containing NH_3 and SO_2 . *E.g.*, ZnO is extracted from Waelz flue dust with a solution containing 7.5% NH_3 and 9.2% SO_2 ; Sn is removed from tinplate with a solution containing 7.5% NH_3 and 27% SO_2 ; Ni, Co, and Cu from hydroxide residues with a solution containing 6% NH_3 and 8% SO_2 ; and Cu from roasted material containing Sb and As with the same solution. Sb and As are removed from the residues from the last-named operation by extraction with a solution containing 7.5% NH_3 and 27% SO_2 .
A. R. POWELL.

Aluminium alloy. H. C. HALL (B.P. 350,110, 1.4.30).—The alloy consists of Fe 1.5–3.0%, Mg 0.7–3.0%, Cu 0.3–2.5%, Si 1.0–4.5%, and remainder Al with <0.2% Ni.
H. ROYAL-DAWSON.

Electrolytically depositing aluminium. ALUMINIUM-IND. A.-G. (B.P. 349,842, 30.7.30. Ger., 24.8.29).—Articles may be electroplated with Al in a bath comprising a molten 1 : 3 mixture of NaCl and AlCl₃ containing a small quantity of PbCl₂, using an Al anode and a c.d. of < 9.3 amp./sq. ft. Better adhesion is obtained by making the article the anode for a short time before reversing the current.

A. R. POWELL.

Production of self-improving aluminium alloys. A.-G. DER EISEN- U. STAHLWERKE VORM. G. FISCHER, and MESSINGWERK SCHWARZWALD A.-G. (B.P. 349,463, 24.2.30. Ger., 27.2.29).—An alloy of Al with 1—25% Cu and 0.1% Ni is treated in the ladle, just prior to casting, with 0.2—5.0% of a binary alloy of Mg with Ni, Cu, Zn, or Sn so that the resulting casting may contain 0.1—0.25% Mg.

A. R. POWELL.

Surface treatment of aluminium and its alloys. R. W. CARTER (B.P. 349,596, 21.2.30).—The surface of rolled Al having been rubbed with a mixture of fine pumice powder and Ca(OH)₂, the metal is immersed in a hot bath containing 2 oz. of NaOH and 0.5 oz. of Na₂HPO₄ per gal. and then washed with a solution containing 0.5 oz. of HNO₃ and 2 oz. of alum per gal.

A. R. POWELL.

Aluminium alloys. H. C. HALL and T. F. BRADBURY (B.P. 350,446—7, 8.3.30. Addn. [A] to B.P. 323,353; B., 1930, 198; [B] to B.P. 334,430; B., 1930, 1034).—The alloys previously claimed are modified by replacing 0.01—5% of the Al content with a corresponding amount of Zn.

A. R. POWELL.

Aluminium alloys. H. C. HALL and T. F. BRADBURY (B.P. 350,021—2, 8.3.30. [A] Addn. to B.P. 323,353; B., 1930, 198; [B] to B.P. 334,430; B., 1930, 1034).—The alloys of the prior patents are altered so that, in (A), the Ni content is 2.5—4.5% and the Si 2.8—5%, and in (B) the alloy contains 2.5—5.5% Ni.

H. ROYAL-DAWSON.

[Aluminium-bronze] alloys. H. C. ANSTEY and T. BOLTON (B.P. 349,734, 23.4.30).—Al bronze containing 4—11% Al, 0.02—0.25% V, about 2% Ni, and about 1% Fe is claimed. Alloys with 4—7.35% Al and free from Fe and Ni may be worked readily cold, but for hot-working alloys with 7.35—11% Al, 0.1% V, 2% Ni, and 1% Fe are preferred.

A. R. POWELL.

Bessemerising of nickel-containing mattes. H. WADE. FROM INTERNAT. NICKEL CO., INC. (B.P. 349,700, 28.3.30).—Ni or Ni-Cu matte containing 18—20% S is blown in a converter at 1330—1500° with a 9 : 1 mixture of steam and air preheated to 500° until the S is reduced to 2—4%. The temp. is then raised to about 1600° and the material blown with superheated steam without air until the resulting metal contains 0.005—0.02% S. The charge is then deoxidised with C, Si, Mg, Al, or Ca. The two-stage blowing operation is preferable to the known single-stage process in that it prevents excessive corrosion of the refractory lining.

A. R. POWELL.

Tank for chromium plating. C. R. GLEASON (U.S.P. 1,784,987, 16.12.30. Appl., 3.6.27. Renewed 14.3.30).—Electrolyte is contained in a Pb-lined wooden container having an inner lining of glass.

J. S. G. THOMAS.

Control of electroplating. R. J. PIERSOL (U.S.P. 1,785,389, 16.12.30. Appl., 14.1.29).—An undulating d.c. is employed to reduce the effects of polarisation, e.g., in Cr-plating.

J. S. G. THOMAS.

Union of [tungsten-nickel wire] metal surfaces by welding. WESTINGHOUSE LAMP Co., Assees. of J. B. FITZPATRICK (B.P. 350,296, 16.7.30. U.S., 17.7.29).—W filaments are joined to Ni lead-in wires by spot-welding with 75 amp. at 0.6 volt for 10 sec. so that the molten Ni covers the whole of the portion of recryst. W wire and part of the surrounding non-recryst. portions of the wire.

A. R. POWELL.

Recovery of molybdenum from mixtures of molybdenum or molybdenum compounds with other metals or metal compounds. J. Y. JOHNSON. FROM I. G. FARBENIND. A.-G. (B.P. 350,135, 14.4. and 24.10.30).—MoO₃ catalysts which have been used for the hydrogenation of oils are extracted with a solvent for the oil, heated at 350° to remove the solvent, and roasted at 400—600°, preferably 480°, in a current of air or of N oxides, any sol. metal oxide, e.g., ZnO, is removed by heating with a mixture of 12% HCl and 25% HNO₃, and the MoO₃ extracted from the residue with aq. NH₃ and sufficient (NH₄)₂S to ppt. any other sol. metal as sulphide. The Mo is recovered from the filtered solution by addition of a slight excess of HCl.

A. R. POWELL.

Solder [for aluminium etc.]. F. J. LENSSENS (B.P. 350,649, 11.4.30).—An alloy melted in the presence of a small quantity of resin and tallow containing, approx., 40—60 pts. each of Zn and Sn, 1—10 pts. Cd, and 0.5—5 pts. Fe is claimed.

H. ROYAL-DAWSON.

[Soft-]soldering fluxes. GRASSELLI CHEM. Co., Assees. of (A) H. B. DYKSTRA, (B) H. J. BARRETT (U.S.P. 1,785,115 and 1,785,173, 16.12.30. Appl., 7.5.30).—The fluxes claimed are, in (A), chlorinated rosin and, in (B), polymerised vinyl esters of aliphatic acids, e.g., vinyl formate, acetate, propionate, and butyrate.

H. ROYAL-DAWSON.

Soldering materials. GEN. ELECTRIC Co., LTD., Assees. of PATENT-TREUHAND GES. F. ELEKTR. GLÜHLAMPEN M.B.H. (B.P. 349,873, 17.9.30. Ger., 28.9.29).—Moulded pellets, comprising a mixture of the powdered soldering metal with an org. amine, acetamide, urea, or a cyanamide derivative and a flux, e.g., NH₄Cl, ZnCl₂, or (NH₄)₂HPO₄, are claimed.

A. R. POWELL.

Casting of ingots. T. D. STAY and W. HOLZHAUER (B.P. 348,531, 10.2.30. U.S., 11.2.29).—See U.S.P. 1,777,657; B., 1931, 639.

Producing a phosphate coating on metal. PARKER RUST PROOF Co. (B.P. 350,565, 14.3.30. U.S., 29.4.29).—See U.S.P. 1,755,391; B., 1930, 1034.

Protectively coating the external surface of pipes and other externally cylindrical bodies. SOUTH DURHAM STEEL & IRON Co., LTD., and D. ROSS (B.P. 350,601, 20.3.30).

Zr ores.—See VIII. Magnetic separators.—See XI.

XI.—ELECTROTECHNICS.

Examinations with ultra-violet light. M. GUYOT (Ann. Falsif., 1931, 24, 196—207).—A résumé of the various methods which have been used for examining

both solids and liquids in ultra-violet light. Recommended procedure is given for various classes of materials. The characteristic colours of the fluorescence exhibited by various types of artificial silk are tabulated. A method for determining the fluorescence of liquid extracts of drugs and also of oils is given; it is stated to be applicable to the analysis of mixtures.

E. B. HUGHES.

Measurement of smoke.—See I. Switch oils.—See II. Felspar.—See VIII. Steel production. Detecting Ni and Co in steel. Evans pile and protection of Fe. Ni-plating.—See X.

See also A., July, 785, Photo-electric cells. 790, Magnetisation-temp. curves of Fe, Co, and Ni. 795, "Getters." 805, Prep. of α - and β -W, and of La and Nd. Method of rapid electrolysis. (CN)₂ synthesis. Cathodic projection of elements. Light sources for photochemical reactions. 809, Formation of N fluorides.

PATENTS.

Electric furnaces [for glass]. BRIT. HARTFORD-FAIRMONT SYND., LTD., and E. MEIGH (B.P. 350,474 and 350,476, 6.3.30).—(A) The distance between opposed electrode surfaces making contact with the material to be heated and forming the resistance is greater where the material is more fluid. (B) Continuous electrodes extending along substantially the whole length of the melting chamber are arranged along the direction of motion of the material being treated.

J. S. G. THOMAS.

Manufacture of crucibles [for electric induction furnaces etc.]. W. R. WHITNEY, ASSR. to GEN. ELECTRIC CO. (U.S.P. 1,784,647, 9.12.30. Appl., 3.11.26).—Refractory material, e.g., fireclay, mixed with C or graphite is moulded and fired in a reducing atm. and finally heated in the air to burn out the C or graphite from the outer layer of refractory material.

J. S. G. THOMAS.

Electromagnetic separators. Magnetic separators. H. H. THOMSON, A. E. DAVIES, and W. E. BOX (B.P. [A] 350,281, 7.7.30, and [B] 350,049, 13.3.30).—(A) Transverse magnetic bars having upper surfaces of convex or other form alternating with spaced armature bars having lower surfaces of similar form are arranged on the floor of an inclined trough or tray, to form a sinuous passage of substantially uniform cross-section for passage of material under treatment. (B) A pair of spaced magnet plates provided with staggered or interspaced projections are arranged within a recess in a non-magnetic bench for testing scrap metal, and an electromagnet having its poles in contact with the plates is arranged beneath the bench. [Stat. ref. to (B).]

J. S. G. THOMAS.

[Copper oxide-caustic alkali] galvanic cell. G. W. HEISE and C. W. BROKATE, ASSRS. to NAT. CARBON CO., INC. (U.S.P. 1,786,406, 23.12.30. Appl., 16.2.23).—Org. materials, e.g., the product obtained by treating wood with NaOH, are added to the electrolyte of a cell comprising a container, a metallic anode, caustic electrolyte, and a layer of cryst. material substantially insol. in the electrolyte, e.g., sand or alundum, which

presents a surface favourable to crystallisation of compounds of the anode metal. J. S. G. THOMAS.

Means for reinforcing dry-battery electrolyte. G. W. HEISE and E. A. SCHUMACHER, ASSRS. to NAT. CARBON CO., INC. (U.S.P. 1,784,592, 9.12.30. Appl., 28.5.28).—The caustic alkali gel forming the electrolyte in a Zn-Cu cell with CuO depolariser is reinforced with fibrous material, e.g., glass wool, asbestos, or "excelsior."

J. S. G. THOMAS.

[Gas-filled] light-sensitive cells. L. KECSKEMETI-KAYE (B.P. 350,032, 17.11.30).—The envelope contains a mixture of He, Ne, Xe, Kr, and H₂, about equal vols. of the gases being employed. H. ROYAL-DAWSON.

[Hot-cathode] electronic-discharge apparatus. RADIOTECHNIQUE (B.P. 350,605, 21.3.30. Fr., 9.4.29).—An indirectly heated cathode comprising at least one layer containing Co, e.g., Ni-Co alloy, is, in operation, heated below the Curie point of that layer.

J. S. G. THOMAS.

[Gas-filled] electric glow-discharge lamps. WESTINGHOUSE ELECTRIC & MANUF. CO., ASSEES. OF D. D. KNOWLES (B.P. 349,013, 5.2.30. U.S., 5.2.29).—A gas-filling composed of about 90% of Ne and about 10% of H₂, or other gas having a critical energy level for a change of physical state which is less than the energy level for excitation of Ne, is claimed. [Stat. ref.]

J. S. G. THOMAS.

Electric-discharge tubes. N.V. PHILIPS GLOEI-LAMPENFABR. (B.P. 350,273, 1.7.30. Holl., 18.7.29).—The wall of the tube consists, at least in part, of one or more windows of Zr metal, which permit the X-rays or cathode rays to pass from the vacuum space into that surrounding the tube. H. ROYAL-DAWSON.

Arc-quenching material. G. STEERUP, ASSR. to ELECTRICAL ENGINEERS EQUIPMENT CO. (U.S.P. 1,786,581, 30.12.30. Appl., 19.3.28).—A mixture composed of CCl₄ (85–97%) and 15–3% of a mixture of Al stearate (70%) and Al palmitate (30%) is claimed.

J. S. G. THOMAS.

Incandescence body for electrical incandescence lamps, vacuum tubes, etc. L. MELERSH-JACKSON. From SIEMENS & HALSKE A.-G. (B.P. 350,204, 20.5.30).—The body throughout consists of Re or Re-W alloy. [Stat. ref.]

H. ROYAL-DAWSON.

Film formation and operation of electrolytic condensers etc. R. D. MERSHON (U.S.P. 1,784,674, 9.12.30. Appl., 14.7.23).—A filmed anode is immersed in an electrolyte contained in a Cu vessel and means are provided for electroplating injurious metals, e.g., Ni, Sn, Ag, contained in the electrolyte on to the Cu vessel.

J. S. G. THOMAS.

Electrical sealing compositions. BAKELITE CORP., ASSEES. OF M. E. DELANEY (B.P. 349,982, 5.3.30. U.S., 6.3.29).—A composition composed of about 39% of a chlorinated C₁₀H₈ (especially C₁₀H₄Cl₄), 27% of gilsonite, and 34% of montan wax is claimed.

J. S. G. THOMAS.

Formation of an insulating coating on parts of electrical apparatus. P. BRABANT (B.P. 315,798, 10.11.30).—Apparatus made of Al, Mg, or their alloys is immersed in an oxidising bath and heated electrically until the liquid in the bath boils. J. S. G. THOMAS.

Manufacture of electric insulating material. INTERNAT. GEN. ELECTRIC CO., INC., Assees. of ALLGEM. ELEKTRICITÄTS-GES. (B.P. 350,429, 4.3.30. Ger., 4.3.29).—Strips of paper, impregnated with a solution of an artificial resin and subjected to heat treatment which renders the resin less readily fusible and insol., are coated on one side with the same or another artificial resin and wound under pressure and heat treatment.

J. S. G. THOMAS.

Insulators for sparking plugs. I. G. FARBENIND. A.-G. (B.P. 344,256, 3.4.30. Ger., 22.4.29. Addn. to B.P. 340,865).—The head piece of the insulators, which is exposed to high temp. in the combustion chamber, is made of corundum, the surface of which is made smooth by treatment with fused borax.

J. S. G. THOMAS.

Electric gas purifier. H. F. J. NOLZE (U.S.P. 1,785,592, 16.12.30. Appl., 24.5.26).—Apparatus comprising electrodes between which the gas is subjected to an electric discharge, an exhaustor having baffles which can be moved into or out of the exhaustor according to the temp. of the gas from the purifier, nozzles for injecting water in the exhaustor, and means for controlling the amount of spray according to the temp. of the plant is claimed.

J. S. G. THOMAS.

Treatment of colloids. A. M. HERBSMAN (U.S.P. 1,783,471, 2.12.30. Appl., 15.4.29).—A stream of colloid is exposed to radiation of short wave-length, *e.g.*, to the radiation from a quartz-Hg-vapour lamp or X-ray tube, and the various phases are separated gravitationally.

J. S. G. THOMAS.

[Electrical] testing of gas. BRIT. THOMSON-HOUSTON Co., LTD., Assees. of G. E. INMAN (B.P. 349,204, 22.3.30. U.S., 23.3.29).—The purity of a gas which is being supplied for a manufacturing operation, *e.g.*, for filling electric incandescence lamps, is controlled by passing the gas through a vessel through which a high-frequency electric discharge is also being passed, and measuring or recording the variation in current in the high-frequency circuit.

A. B. MANNING.

[Cell vessels for] electrolytic cells. ELEKTRIZITÄTS A.-G., VORM. SCHUCKERT & Co., and A. FISCHER (B.P. 350,639, 8.4.30. Ger., 11.4.29).

[Synthetic resin-covered carrying frames for] electrolytic processes. BIRMINGHAM SMALL ARMS Co., LTD., and S. C. WILSDON (B.P. 350,072, 18.3.30).

[Holding devices for] electrolytic etching apparatus. E. G. HARTEL (B.P. 350,658, 17.4.30).

Photoelectric cells. L. D. J. A. DUNOYER (B.P. 351,142, 14.4.30. Fr., 13.4.29).

Luminous electric-discharge tubes. GEN. ELECTRIC Co., LTD., Assees. of PATENT TREUHAND GES. F. ELEKTR. GLÜHLAMPEN M.B.H. (B.P. 344,072, 5.12.29. Addn. to B.P. 343,053).

[Automatic switch for extinguishing back-arc in] metallic-vapour rectifiers. A.-G. BROWN, BOVERI & Co. (B.P. 350,005, 3.3.30. Ger., 20.3.29. Addn. to B.P. 279,045).

Cathodes of vacuum electric tube devices. E. Y. ROBINSON, and ASSOCIATED ELECTRICAL INDUSTRIES, LTD. (B.P. 350,545, 13.3.30).

Pure H₂O₂. O₃.—See VII. Protection of Fe. Magnetic alloys. Welding of wires. Zn. Old accumulator plates. Al. Cr-plating. Control of electroplating.—See X. Rubber compositions. Articles containing rubber.—See XIV. Tobacco etc.—See XX. Blasting cap.—See XXII.

XII.—FATS; OILS; WAXES.

Structure viscosimetry of vegetable oils. Y. NISIZAWA (Kolloid-Z., 1931, 55, 343—347).—Measurements with the overflow viscosimeter show that linseed oil and sunflower oil alone or dissolved in C₆H₆ or COMe₂ exhibit structure viscosity. The phenomenon is specially marked after the addition of resin. The results point to an isocolloidal nature of the oils.

E. S. HEDGES.

Polymerisation and isomerisation of tung oil. H. DECKERT (Farbe u. Lack, 1931, 36, 307—308).—A summary of a paper by R. Semmig (Diss., Techn. Hochschule, Dresden, 1923). The extent of formation of β -elæostearin in tung oil by successive irradiations and filtrations, the variation of time of gelatinisation with temp. of heating of the oil, the decrease of β -elæostearin formation with increase in polymerisation, and the relation between these factors and "frosting" of films etc. are discussed.

S. S. WOOLF.

Technical emulsions of oils and waxes with water. H. BENNETT (Oil & Fat Ind., 1931, 8, 219—221).—Excellent emulsions, *e.g.*, of carnauba wax, are produced by mixing oils or waxes into an aq. solution (8—12%) of NH₄ linoleate. Formulæ and technique of preparation are described.

E. LEWKOWITSCH.

Oil of sumac. H. P. TREVITHICK (Oil & Fat Ind., 1931, 8, 220).—Light petroleum extracted 17.54% of a viscous dark oil having: $d^{15.5}$ 0.9256, n^{25} 1.4726, acid val. 21.4, I val. (Wijs) 96.1, saponif. val. 183.2, unsaponifiable matter 2.38%. The total fatty acids (92.72%) had titer 23.7°, neutralisation val. 193.2.

E. LEWKOWITSCH.

Hydrolysis of fats in alkaline alcoholic solution in relation to the determination of unsaponifiable matter. J. DAVIDSOHN and E. J. BETTER (Z. angew. Chem., 1931, 44, 565—567).—The residue from the light petroleum extract of a fat after saponification with alcoholic KOH solution contained a mixture of Et esters; to the presence of which the frequent irregularities amongst determinations of unsaponifiable matter are ascribed. A refractometric test of the petroleum extract is recommended.

H. F. GILLBE.

Aq. dispersions.—See I. Treatment of textiles.—See VI. Examinations with ultra-violet light.—See XI.

See also A., July, 820, Palmitostearoazelain from cacao butter. 822, Separation of fatty acids. Catalytic decomp. of olive oil etc. Tetracosic acid of peanut oil. 861, Acid formation in wool fat. 867, Nutritive values of hardened oils. 881, Vitamins of fish oils.

PATENT.

Mineral oil sulphonates.—See II.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Reflectance measurements in the paint industry.

G. F. A. STUTZ (J. Opt. Soc. Amer., 1931, 21, 323—335).—A discussion of current practice in the measurement of colour, and of the report of a Sub-Committee of the American Society for Testing Materials.

C. W. GIBBY.

Measurement of obliterating power of paints.

E. TICHONOV (Farben-Ztg., 1931, 36, 1469—1470).—The thickness of layer of a known vol. of paint is adjusted to the crit. val. at which the light from a standard light source just passes through the layer, and the area covered by unit wt. is calc. The apparatus is illustrated by photograph and diagram.

S. S. WOOLF.

Paint resistant to flue gases. W. VAN WÜLLEN-SCHOLTEN (Farben-Ztg., 1931, 36, 1690—1691).—Experiments are described in which the interval between the time of application of the priming (Pb_3O_4) and finishing coats and the time allowed for the system to harden before submission to chimney tests was increased in comparison with the author's previous tests (cf. B., 1929, 254). Paint based on tung oil stand oil again proved inferior when applied over red-lead primer to that when applied on bare metal, and ageing achieved improved fume-resistance in the latter case, but not in the former. Red-lead paint alone is readily broken down and the problem is largely one of vehicle.

S. S. WOOLF.

Durable red-lead paint. J. SCHEIBER (Farbe u. Lack, 1931, 36, 303—304).—The use of solutions of "Supraresen," a proprietary resinous material derived from dammar, as vehicle for red-lead paints achieves improved storage properties without decreased durability in comparison with the normal Pb_3O_4 -linseed oil paints.

S. S. WOOLF.

Pigment and oil. E. KLUMPP (Kolloid-Z., 1931, 55, 348—351).—A discussion of the relations of pigment and oil in paints leads to the conclusion that the amount of oil required depends on the shape of the pigment particles rather than on their surface or size. For spherical particles the oil required is 66% of the vol. of pigment particles, but angular particles require more oil.

E. S. HEDGES.

Poisonous action of new lead pigments. M. RAGG and A. RIEDEMANN (Farben-Ztg., 1931, 36, 1647—1649).—The solubilities of white lead, and red leads of normal and "disperse" type in pepsin hydrochloride and in blood-serum are greater than those of the new "grey-red lead" pigments, e.g., "Arcanol," "Subox." These various Pb pigments when administered to mice showed that Subox and Arcanol were $\frac{1}{3}$ — $\frac{1}{2}$ as poisonous as red and white leads.

S. S. WOOLF.

[German] specification for titanium-white. ANON. (Farben-Ztg., 1931, 36, 1464—1465).—Four grades of titanium-white are detailed, that "for paint use" containing at least 18% TiO_2 and 25% ZnO , whilst three industrial grades contain 96—100%, 50%, and 25% TiO_2 , respectively, the remainder being $BaSO_4$ in every case, with the exception of a max. allowance of 3% of total CaO , Al_2O_3 , and SiO_2 . An oil paste of the paint-type pigment ground in refined bleached linseed oil is also defined. Fineness, sampling, and packing are

specified and details of analysis of the pigment and oil paste are given.

S. S. WOOLF.

"Blooming" of oil varnishes. A. W. C. HARRISON and E. FONROBERT (Farben-Ztg., 1931, 36, 1467—1469, 1512—1514, 1554—1556, 1601—1603, 1645—1646).—"Bloom" is considered as a surface effect to be clearly distinguished from such causes of loss of gloss as surface distortion, water deposition, opalescence, incipient disintegration, etc. The possible factors in varnish making that cause or support bloom are driers, free resin or fatty acids, thinners (i.e., normal constituents), and badly refined or cooked oil, badly run gum, free glycerin, neutral oils, high-boiling solvent or diluent residues (i.e., abnormal constituents). The influences of film thickness, priming and undercoats, atm. conditions, etc. are discussed. Typical formulations and making instructions for non-blooming varnishes are quoted.

S. S. WOOLF.

Light sensitivity of rosin paper-sizing materials.

A. E. KIMBERLY and J. F. G. HICKS (Bur. Stand. J. Res., 1931, 6, 819—827).—Rosin darkens on exposure to the light from a C arc, both bleached and unbleached rosin behaving similarly. Ferrous rosinate is also sensitive to light, probably owing to photochemical oxidation to the ferric state. A mixture of rosin with an amount of ferrous rosinate even less than is likely to occur in a rosin size is more sensitive than rosin alone, an observation which probably has a bearing on the yellowing of papers on exposure to light.

R. CUTHILL.

Resins. XI. Donath's reaction. E. STOCK (Farben-Ztg., 1931, 36, 1473).—The Donath rosin reaction is given by ester gum (cf. B., 1931, 553) to an extent dependent on the acid val. of the latter; thus a pale yellow coloration only was given with an ester gum of acid val. < 5.

S. S. WOOLF.

Philippine turpentine from *Pinus insularis*, Endlicher. I. DE SANTOS and A. P. WEST (Philippine J. Sci., 1931, 45, 233—238).—Benguet pines gave variable amounts of resin, yielding 85—83 wt.-% of rosin and 15—17% of colourless turpentine which differed considerably in composition. The pinene content was high, but the physical properties of the pinene fraction from different trees varied appreciably.

E. LEWKOWITSCH.

Oxidation of turpentine oils. J. TERPOUGOV (Bull. Inst. Pin, 1931, 103—108; cf. B., 1929, 218).—Further examination of Portuguese turpentine after long keeping confirms the previous results. In presence of air resins are formed, the oil-sol. resins decomposing into formic, acetic, and butyric acids. The acidity of a Swedish turpentine from dead wood rose in 3 yrs. from 0.49 to 45.05; distillation of the oil gave an aq. and an oily layer, both containing formic and acetic acids in quantity much greater than corresponded with the higher acid val. French, Greek, and Siamese turpentine oils showed a similar production of acid on keeping.

C. HOLLINS.

Protecting Fe.—See X. Tung oil.—See XII.

See also A., July, 846, Orange skin pigment. 847, Red and yellow paint pigments. Prep. of Pb rosinate. Euphorbium resin.

PATENTS.

Impregnating and coating compositions. IMPERIAL CHEM. INDUSTRIES, LTD., W. BAIRD, and H. M. BUNBURY (B.P. 349,903, 27.12.29).—Aq. emulsions of "glyptal" type resins, initially dissolved in org. solvents if desired, and rubber or substitutes therefor, *e.g.*, "Gloria" aq. rubber-substitute emulsion, together with an emulsifying agent (a sulphonated oil) and colloidal clay (bentonite), giving matte or semi-matte finishes, are claimed. S. S. WOOLF.

Manufacture of compounds of manganese and rosin. BRIT. THOMSON-HOUSTON Co., LTD., Assees. of P. S. MILLER (B.P. 350,735, 20.6.30. U.S., 20.6.29).—Rosin, melted at 250°, is heated in contact with dry MnO₂ up to 315°; the resulting resinates contains at least 4.5 wt.-% Mn and is sol. in mineral oil up to 20 wt.-% of solution. Palmitic acid aids the dissolution of the resinates. H. ROYAL-DAWSON.

Emulsions of resins of the polyhydric alcohol-polybasic acid type, and application thereof. IMPERIAL CHEM. INDUSTRIES, LTD., and W. BAIRD (B.P. 349,988, 27.12.29).—A solution of a "glyptal"-type resin in an org. solvent is emulsified with H₂O, with or without the addition of an emulsifying agent and/or a protective colloid, *e.g.*, bentonite, soaps, gelatin. A flattening agent, *e.g.*, Al stearate, which may also act as an emulsifier, is added if desired, whilst colouring matter, plasticisers, driers, and an acid catalyst may also be incorporated. S. S. WOOLF.

Composition of matter [from hardenable phenol-aldehyde resin]. BAKELITE GES.M.B.H. (B.P. 349,931, 25.2.30. Ger., 25.2.29).—A potentially active phenol-aldehyde resin in the resole (fusible, sol.) stage is mixed with oxidised (*e.g.*, blown) drying oils in a suitable mutual solvent, yielding varnishes etc. which dry to clear resistant products without any separation of the oil and resin. E. LEWKOWITSCH.

Manufacture of nitrocellulose [plastic] products. IMPERIAL CHEM. INDUSTRIES, LTD., and A. RENFREW (B.P. 349,984, 28.11.29).—Nitrocellulose (35 pts.) of viscosity 1—100 c.g.s. units in a solution of 20 g. in 100 c.c. of 95% C₂H₅OMe₂ at 20°, having been prepared in a mechanical dipper plant by nitrating cellulose in at least 40 times its wt. of mixed acid until the product contains 11.5—12.5% N, is gelatinised with a non-volatile gelatiniser (50 pts.), *e.g.*, tolyl phosphate. The nitrocellulose may be pretreated in known manner to reduce the viscosity to the above range. Floor coverings are obtained by incorporating fillers (1½—2½ pts.) with the above plastic (1 pt.). S. S. WOOLF.

Plastic material. N. M. MNOOKIN (B.P. 350,456, 10.3.30. U.S., 6.5.29).—The plastic product from the chemical interaction of olefine-halogen additive compounds, *e.g.*, C₂H₄Cl₂, and a sol. polysulphide, *e.g.*, of Na or Ca, particularly the soft type containing 74—85% S, is stabilised against loss of flexibility and development of brittleness by heating, *e.g.*, at 138° for 1 hr. (Cf. B.P. 302,270; B., 1929, 826.) D. F. TWISS.

Thermoplastic cements. BAKELITE CORP., Assees. of M. E. DELANEY (B.P. 349,981, 5.3.30. U.S., 6.3.29).—Natural resins, ester gum, etc. (70 pts.) are melted with

a solid halogenated polycyclic hydrocarbon, *e.g.*, trichloronaphthalene (30 pts.); 5% of rubber latex and plasticisers may be added as desired.

E. LEWKOWITSCH.

Aq. dispersions.—See I.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Chemistry of [rubber] latex. III. P. SCHOLZ and K. KLOTZ (Kautschuk, 1931, 7, 110—115; cf. B., 1931, 554).—The relative magnitude of the figures for "total solids" and crêpe-rubber yield of latex is of important physiological significance. With latex obtained by tapping on alternate days, the difference between the two figures, *i.e.*, the proportion of non-rubber constituents, is approx. 2.9%, but it tends to be a little lower for latex containing more than 43% of rubber and a little higher for latex below 37% rubber. For latex from *Ficus*, gutta-percha, and *Euphorbia*, as well as from *Hevea* fruits, the difference is between 6% and 8%. For *Hevea* trees at their first tapping or at the opening of a new tapping cut, the proportion of non-rubber constituents in the latex is about 3.5%; latex from over-tapped trees gives a figure below the normal. During the wintering period of the trees the proportion of non-rubber constituents in latex is much affected, whilst the rubber content is substantially unaltered.

D. F. TWISS.

Crystallised caoutchouc. R. PUMMERER and G. VON SUSICH (Kautschuk, 1931, 7, 117—119).—Spontaneous crystallisation occurs more readily in crêpe rubber than in smoked sheet and many samples of the former under X-ray examination reveal a cryst. structure without being stretched. The X-ray diagram of the cryst. rubber obtained by Pummerer and Koch by purification and separation from solution is closely similar to that of the α -modification of gutta-percha, and it is believed that the so-called cryst. rubber was identical with gutta-percha. The origin of this gutta-percha in the rubber is not certain, but the formation from the rubber is unlikely. It is improbable that rubber has ever been caused to separate from solution in a cryst. condition; cryst. caoutchouc occurs only in stretched and in "frozen" rubber. D. F. TWISS.

Piperidine accelerators [of vulcanisation of rubber]. P. SCHIDROWITZ and M. W. PHILPOTT (India-rubber J., 1931, 82, 25—30).—Piperidine piperidino-carbothionolate is probably the most active ultra-accelerator known. Thus using 1% in a mixture containing also rubber 100, ZnO 2.5, and stearic acid 0.5 lb., good results are obtained with as little as 0.75% of S; alternatively, with 2% S, excellent results are obtained with 0.35% of accelerator. Zinc piperidino-carbothionolate, unlike the piperidine salt, is insol. in H₂O; it is slightly less active, but again there is no great advantage in increasing the proportion of S beyond 2%. Lead piperidino-carbothionolate approaches the Zn salt in activity, and, indeed, if judged by equimol. proportions, is distinctly the more active; it shows, however, marked resistance to scorching and prevulcanisation. It is further activated by PbO. D. F. TWISS.

Identifying rubber quantitatively in compositions of rubber and asphalt. New "ebonite method."

F. C. VAN HEURN and M. A. BEGHEYN (India-rubber J., 1931, 81, 847—851).—Rubber reacts rapidly with S at 150° to give vulcanite, whereas asphalt and S begin to react appreciably at about 175°. For the analysis of asphalt-rubber mixtures about 2½ g. are extracted with xylene for about 8 hr. The extract after evaporation to dryness and weighing is heated with twice its wt. of S in a pyrex tube for 4—5 hr. at 160° (or lower if H₂S is developed) with stirring. After extracting this product in an alundum thimble with xylene the insol. residue of vulcanite is dried at 150°. The S content of the impure vulcanite is then determined by direct analysis. The rubber content of the original material is then 0.02125*ab*, where *a* is the % of impure vulcanite obtained and *b* its content of S. If the proportion of rubber in the material is large, it is advisable to reduce it by adding asphalt before proceeding with the analysis. D. F. TWISS.

PATENTS.

Manufacture of goods of rubber or similar material. DUNLOP RUBBER CO., LTD., ANODE RUBBER CO., LTD., E. A. MURPHY, A. NIVEN, and D. F. TWISS (B.P. 350,450, 10.3.30).—Articles to be provided with a matte or granular surface finish are coated, *e.g.*, by spraying or dipping, with a granular dispersion obtained by effecting coagulation of an aq. rubber dispersion such as latex by precipitation therein of one or more compounding ingredients, *e.g.*, Mg silicate or carbonate, by double decomp. For this purpose one of the sol. reagents, *e.g.*, Na₂CO₃ or Na silicate, normally has no coagulating effect, whilst the other, *e.g.*, sulphate of Mg or Al, may incidentally possess coagulating influence. D. F. TWISS.

Manufacture of articles containing rubber or similar material. DUNLOP RUBBER CO., LTD., ANODE RUBBER CO., LTD., D. F. TWISS, and R. G. JAMES (B.P. 350,106, 31.3.30).—Semi-permeable material such as fabric is coated with rubber by contracting one side with a normally alkaline aq. dispersion of electronegative rubber and the other with an acid aq. dispersion in which the particles have assumed a positive electric charge. The mutual coagulation of the two dispersions at the surface of the separating material may be aided by electrophoresis with the anode and cathode in the acidic and alkaline dispersions, respectively. D. F. TWISS.

Manufacture of rubber articles. SOC. ITAL. PIRELLI (B.P. 350,227, 2.6.30. Italy, 7.6.29).—The article to be manufactured is formed on a core of a water-dispersible inorg. colloid such as a smectic clay or bentonite, which may be covered with an adherent protective coating, *e.g.*, of paper or thin linen. The core is eventually removed after disintegration with the aid of H₂O. D. F. TWISS.

Manufacture of rubber compositions. J. C. PATRICK (B.P. 350,472, 5.3.30).—The plastic product from an olefine dihalide and a metal polysulphide, preferably the soft type of product (*cf.* B.P. 350,456; B., 1931, 769), is mixed with rubber and heated without the addition of free S. The vulcanised products so obtained contain no free S and are of value for electrical insulating purposes. D. F. TWISS.

Manufacture of vulcanisable compounds. J. C. PATRICK and N. M. MNOOKIN (B.P. 350,549, 13.3.30).—

A mixture of rubber or plastic olefine polysulphide (*cf.* preceding abstract) and a proportion of S in excess of that normally required for vulcanisation of the rubber in the mixture is vulcanised by heat. The products, which may contain 50% or more total S, resemble soft vulcanised rubber in mechanical properties and do not exhibit "blooming." D. F. TWISS.

Manufacture of cellular compositions [from rubber]. H. L. FISHER, Assr. to B. F. GOODRICH Co. (U.S.P. 1,786,563, 30.12.30. Appl., 28.12.26).—A porous or cellular product is obtained by treating rubber at a raised temp., *e.g.*, at 150°, with an isomerising agent such as H₂SO₄ or an org. sulphonic acid or sulphonyl chloride. Blowing agents may additionally be employed if products are required of very low apparent sp. gr. D. F. TWISS.

Preservation of natural varieties of rubber and artificial rubber-like masses. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 350,563, 14.3.30).—The OH-derivatives of diphenyl and of its substitution products have a marked preservative influence on rubber and do not cause discoloration even on exposure to light. D. F. TWISS.

Reclaimed rubber. C. H. CAMPBELL, Assr. to PETER COOPER CORPS. (U.S.P. 1,786,149, 23.12.30. Appl., 9.8.29).—Rubber scrap is reclaimed by subjecting it to a hydrolytic devulcanising process after mixing it with tanned leather. The cleavage products from the tanned leather assist the softening of the harder particles of the scrap. D. F. TWISS.

Reclaimed rubber. L. MELLERSH-JACKSON. From AMER. GLUE Co. (B.P. 350,269, 27.6.30).—Reclaimed rubber, produced by a process involving hydrolytic action, is improved in plasticity by the addition of 2—5% of cleavage products of tanned leather or tanned leather itself, before the devulcanising operation. D. F. TWISS.

Manufacture of vehicle tyres comprising artificial rubber. I. G. FARBENIND. A.-G. (B.P. 350,490, 12.2.30. Ger., 12.2.29).—Tyres are manufactured from products obtained by polymerisation of mixtures of βγ-dimethylbutadiene with butadiene and/or isoprene, to which a finely-divided form of soot is added before vulcanisation. D. F. TWISS.

Rubberising of fibrous material. E. HOPKINSON (U.S.P. 1,784,523, 9.12.30. Appl., 21.6.24).—An aq. dispersion of rubber such as latex is rendered more viscous, *e.g.*, by concentrating or by adding thickening agents, and, after being compounded, is used for the manufacture of rubberised fabric by application to a normally penetrable fabric, possibly in a single coating operation, without substantial penetration. The latex can conveniently be of 50% concentration or higher. The finally vulcanised textile material retains a high proportion of its original flexibility. D. F. TWISS.

Rubberised sheet material. I. H. ROBINSON (B.P. 350,589, 18.3.30).—Waterproof sheet material suitable for shoe insoles or for rainproof coverings is made by mixing a granular substance such as cork, asbestos, wood powder, or leather buffings with rubber latex, preferably with the temp. raised gradually up to 80° and then drying. The material is then rolled into sheet

and sandwiched between two layers of fabric, such as linen, one at least of which has been previously rubberised.
D. F. TWISS.

Production of rubber substitute. M. BANDLI (B.P. 349,901, 20.12.29).—A precipitant liquid (H_2O) is added to a solution of cellulose nitrate in a mixture of solvents of which at least one is readily miscible with the precipitant and at least one other is not readily miscible. The solution contains also a plasticiser (which may itself be one of the essential solvents, e.g., tolyl phosphate) in a dissolved or suspended condition, which is precipitated with the cellulose nitrate.
D. F. TWISS.

Reclaiming or improving of gum exudates [e.g., gutta-percha]. C. MARTELL, Assr. to WESTERN ELECTRIC Co., INC. (U.S.P. 1,786,075, 23.12.30. Appl., 6.5.25).—Inferior gum exudate, such as gutta-percha, is masticated with rubber latex; the resulting removal of foreign matter and absorption of rubber from the latex cause the gutta to emerge with all the characteristics of a good grade.
D. F. TWISS.

Manufacture of rubber-like compositions. F. C. ZOBEL (U.S.P. 1,786,281, 23.12.30. Appl., 23.1.26).—Gum copal is heated with hard-wood creosote oil and the solution is poured into petroleum naphtha. The resulting amorphous ppt. is kneaded and washed with H_2O and yields a rubber-like mass, which is sol. in the usual rubber solvents and can be used for erasing pencil marks.
D. F. TWISS.

Vulcanising and treating of rubberised materials or the like and apparatus therefor. PIONEER VENTILATING & DRYING Co., LTD., J. H. WILD, and J. LLOYD (B.P. 350,648, 11.4.30).

Rubber tubing. GAS LIGHT & COKE Co., J. G. CLARK, and C. A. MASTERMAN (B.P. 350,385, 3.3.30).

Impermeable cloth.—See VI. Coating compositions.—See XIII.

XV.—LEATHER; GLUE.

Sex differences of hide powder. II. T. TADOKORO and K. YOSHIMURA (J. Soc. Chem. Ind., Japan, 1931, 34, 175 B; cf. B., 1931, 504).—Hide powder of female animals differs from that of male animals in that (a) it is more easily digested by trypsin, (b) the I absorption of the alkali-sol. portion is smaller, (c) the alkaline solution of both crude and refined varieties has a lower absorptive power for light of wave-length $> 2740 \text{ \AA}$., (d) the gluten has greater rotatory power in alkaline solution, (e) the gluten solution attains a max. viscosity after a shorter time of boiling, (f) the gluten has a higher Ac val. and its NH_2 -acids contain more diamino- and lysine-N, but less histidine-N.
E. H. SHARPLES.

Analyses of salt used for curing hides and skins. R. C. BOWKER and J. BEEK, JUN. (J. Amer. Leather Chem. Assoc., 1931, 26, 312—317).—Complete analyses of various mined and evaporated salts are tabulated.
D. WOODROFFE.

Dermatophytes as the cause of leather damage. M. BERGMANN, W. HAUSAM, and E. LIEBSCHER (Collegium, 1931, 248—254).—A description, with photographs, of the damage caused by dermatophytes, the

spores of which were found in the grain of half-tanned calfskins.
D. WOODROFFE.

Determination of moisture in vegetable-tanned leather. D. BURTON (J. Soc. Leather Trades' Chem., 1931, 15, 273—281).—The difficulties of obtaining concordant moisture figures for leather are discussed. Loss of wt. was observed after heating some leathers for 200 hr. An increase in wt. of 0.3% was observed after heating several samples of leathers for 12—16 hr., followed by a decrease on prolonged heating. This increase was smallest in leathers low in H_2O -sol. matter. The continuous loss in wt. on heating leather was accentuated by the presence of mineral oil in the leather. About 0.3% more moisture was shown by use of a vacuum oven than when an air oven was used for drying purposes. Immediately the oven is opened the lid or stopper should be placed in the weighing bottle, which should be immediately transferred to the desiccator and weighed after 20 min. H_2SO_4 should be used in the desiccator. A vac. should be maintained in the oven throughout the heating period.
D. WOODROFFE.

Analysis of vegetable-tanned leather. [Report of a Committee of the French Section of the Society of Leather Trades' Chemists.] G. PARSY (J. Soc. Leather Trades' Chem., 1931, 15, 251—256).—In determining moisture, the leather should be heated for 11 hr. at 103° , or for 8 hr. at 108° , or for 5—8 hr. at 113° . Some volatile matter is lost by greasy leathers at 103° . The fat should be determined by extraction with CCl_4 or C_6H_6 and the fat extract should be heated for 7—8 hr. at 108° before weighing. Greasy leathers should be degreased before the moisture determination.
D. WOODROFFE.

Determination of moisture in vegetable-tanned leather. P. CHAMBARD (J. Soc. Leather Trades' Chem., 1931, 15, 258—261).—Satisfactory results have been obtained on vegetable-tanned sole leather if the sample was planed, heated for 5 hr. in an oven at 110° , cooled, weighed, heated for a further 2 hr. at 110° , and reweighed, and the result calc. therefrom, provided the difference between the weighings did not exceed 15 mg.
D. WOODROFFE.

Average moisture content of vegetable-tanned heavy leathers. F. STATHER (Collegium, 1931, 254—256).—The moisture in vegetable-tanned heavy leathers is not affected by the amount of H_2O -sol. matter, but is influenced by the fat content. The average fat and moisture contents of various leathers were, respectively, (%): < 10.0 , 12.6; 10—20, 12.4; > 20 , 10.9. The moisture content was not a direct function of the fat content, but depended on the method which had been used to incorporate the fat with the leather.
D. WOODROFFE.

Report of a Committee [of the French Section of the Society of Leather Trades' Chemists] on the analysis of bating materials. A. BOIDIN (J. Soc. Leather Trades' Chem., 1931, 15, 257—258).—Bating materials should be evaluated by the amount of a standard protein, e.g., casein, fibrin, or edestin, hydrolysed by them. The Fuld-Gros, Kubelka and Wagner, Schneider and Ulcek, "Pouvoir Présure," Film, and Bergmann methods are suggested.
D. WOODROFFE.

Lesser-known tropical tanning materials. F. STATHER (Collegium, 1931, 256—262).—The tannin, non-tans, insol. matter, and H_2O contents of the following materials are given (%): Angico wood (*Viptadenia rigida*, Benth.) 4.5—10.9, 1.7—2.3, 75.3, 14.5; Angico bark 16.0—22.0, 5.9—9.5, 59.0, 14.5; Aroeiro bark (*Schinus areira*, L. [*S. molle*, L.]) 23.0, 8.8, 53.6, 4.6; Acajou bark 21.5, 10.5, 55.0, 13.0; Capororoca oak (*Rapanea guyanensis*, Aubb., and *R. umbellata*, Mez.) 8.75, 2.9, 73.9, 14.5; copaiba bark (*Copaiba Langsdorffii*, Desf.) 14.5, 2.0, 69.0, 14.5; Jatahy bark (*Hymenaea courbaril*, L.) 19.2, 5.75, 60.0, 14.5; inhacaperana bark 19.75, 1.75, 64.0, 14.5; mangué bark (*Laguncularia racemosa*, Gaertneri, or *Conocarpus racemosus*, Linn.) 17.0—29.9, 6.0—13.5, 43.0—62.0, 14.5; murta bark (*Eugenia lucida*, Camb.) 15.9, 8.2, 61.4, 14.5; cassia bark (*Cassia fistula*, Linn.) 18.2, 8.6, 58.7, 14.5. Cassia is found in all tropical regions; the other barks are derived from South America. All are pyrocatechol tans.

D. WOODROFFE.

Sulphiting of quebracho [tannin]. M. BERGMANN and G. POJARLIEFF (Collegium, 1931, 239—243).—When quebracho tannin is sulphited, equal parts of two compounds are formed, from one only of which the sulphurous acid can easily be split off. From the known constitution of quebracho tannin it is evident that there is a fundamental change in its nature during sulphiting. The resorcinol part of its mol. loses its phenolic character and is converted into a hydrogenated aromatic alcohol with properties different from those of the original unsulphited phenol. Sulphiting is mainly a chemical process followed by colloid-chemical changes, thus distinguishing it from mere solubilising which reduces the particle size.

D. WOODROFFE.

Chemico-technical properties of Rumanian spruce bark as a tanning material. C. OTIN and G. HUIDOVICI (J. Soc. Leather Trades' Chem., 1931, 15, 264—273).—Analyses of 40 samples of Rumanian spruce bark (*Abies excelsa*) showed (%): tannin 5.26—17.58 (aver. 11.7); sol. non-tans 3.89—18.38 (aver. 9.3). The tannin content is fairly uniform throughout the whole length of the trunk. A satisfactory bark is obtained from those trees which yield the best timber. Large quantities are available in Rumania, and it compares favourably with that from other parts of Europe.

D. WOODROFFE.

Filtration of tannin solutions for the determination of insoluble [matter]. Report of Committee of the American Leather Chemists' Association. J. S. ROGERS (J. Amer. Leather Chem. Assoc., 1931, 26, 272—297).—Slightly higher amounts of insol. matter were obtained at 18° (International method) than at 20° (Official American). A turbid filtrate was obtained when quebracho extracts were filtered by these two methods, but clear filtrates were given by all extracts filtered by the Riess method. Too rapid filtration was shown by the latter method on valax extract, slow filtration by chestnut and quebracho extracts, and very slow filtration by hemlock and pine bark. Good agreement can, however, be obtained by this method, which is preferable to the International and American methods in principle, since the kaolin mat is of even

thickness. Variations in results are often caused by the use of different papers and by pipetting solutions at different temp. Slightly higher total solids were obtained by evaporating 50 c.c. of solution instead of 100 c.c.

D. WOODROFFE.

Photographic gelatin.—See XXI.

See also A., July, 812, **Measurement of OH and SH in Na_2S solutions.**

PATENTS.

Unhairing of hides or skins. G. D. McLAUGHLIN, G. E. ROCKWELL, F. O'FLAHERTY, and J. H. HIGHBERGER, Assrs. to TANNERS COUNCIL of U.S.A. (U.S.P. 1,785,092, 16.12.30. Appl., 15.3.27).—Hides or skins are treated with a saturated $Ca(OH)_2$ liquor to which has been added about 1% of a primary, secondary, or *tert.* amine, or an amide, or mixtures of these for 2—3 days.

D. WOODROFFE.

Tanning of chamois, buckskins, or other leather. A. ERNST (U.S.P. 1,784,828, 16.12.30. Appl., 27.3.30).—The suitably prepared pelts are drummed with a solution of 1—1.5% CH_2O and 0.5—0.75% MeOH for 45 min., after which 0.5% of soap, 2.25% of moellon degreas, 2.25% of cod oil, 2% of Glauber's salt, and 2.75% of $NaHCO_3$ are added and drumming is continued until tannage is complete. $MgSO_4$ is then added to the mixture and the skins are again drummed, washed, and dried.

D. WOODROFFE.

Treatment of tanning solutions. A. G. WACKENREUTER (U.S.P. 1,786,880, 30.12.30. Appl., 30.4.28).—Tanning liquors in which hides have been suspended for some time are centrifuged to remove moulds, solids, and harmful fungi, and the separated liquor is conc. for further use.

D. WOODROFFE.

Manufacture of a vegetable adhesive. I. F. LAUCKS and G. DAVIDSON, Assrs. to I. F. LAUCKS, INC. (U.S.P. 1,786,209, 23.12.30. Appl., 31.8.28. Cf. U.S.P. 1,689,732; B., 1929, 141).—A vegetable meal containing protein, e.g., soya bean, linseed, or cottonseed flour, is incorporated with an alkaline medium [e.g., $NaOH$, $Ca(OH)_2$] and $ZnSO_4$ (0.1 pt./30 pts. of meal); other substances, e.g., $NaCl$, $CaCl_2$, $Na_2Cr_2O_7$, may also be added.

L. A. COLES.

Impregnated articles.—See V. **Reclaimed rubber.**
Reclaimed leather. Rubberised sheet.—See XIV.

XVI.—AGRICULTURE.

Soils of the Nile and Gash. I. P. VAGELER and F. ALTEN (Z. Pflanz. Düng., 1931, 21A, 47—57).—Discussion of appropriate methods of examining these soils.

A. G. POLLARD.

Soils of the Havelland plains. B. TACKE (Mitt. Ver. z. Förd. Moork. i D.R., 1931, Nos. 1, 2, 3—7, 25—29; Bied. Zentr., 1931, 60A, 151).—The response of alkaline low-moor soils to various types of manurial treatment is recorded. Physiologically neutral or acid fertilisers are preferable. Bone meal is non-effective in these soils. Applications of $MnSO_4$ counteracted, to some extent, the ill effects of soil alkalinity. The conjoint use of milling waste and S produced good results.

A. G. POLLARD.

Comparison of methods for determining the volume-weight of soils. A. S. CURRY (J. Agric. Res.,

1931, 42, 765—772).—A cylinder method is described. Existing methods proved less satisfactory for the soils examined.

A. G. POLLARD.

Catalytic power of soils. I. F. RADU (Landw. Versuchs-Stat., 1931, 112, 45—54).—The catalytic power bears no relationship to the p_H or exchange acidity (cf. B., 1929, 182), but increases with the content and degree of dispersion of colloidal clay and humus. Correlation between catalytic power, nutrient content, and bacterial numbers is examined.

A. G. POLLARD.

Dynamics of the absorbing complex of soils. M. A. VINOKUROV (Pochvoved., 1928, 23, No. 3—4, 46—92).—In a chernozem soil the Ca was higher in the autumn and lower in the spring; the reverse held for the Mg. The total bases were lower in the spring. During the first part of the growing season the total exchange capacity (BaCl₂ method) decreased slightly, whilst the Ca increased. In some cases the total Ca and Mg absorbed was greater than the base-exchange capacity. Increase in the absorption capacity during summer and winter is attributed to change in p_H and possibly to mechanical absorption. The quantity of highly dispersed particles of the absorption complex falls from the beginning of spring until the middle of summer.

CHEMICAL ABSTRACTS.

Determination of adsorption capacity of the mineral and organic portions of the adsorption complex of soil. B. MALÁČ (Věstn. Českoslov. Zem., 1930, 6, 1063—1065; Chem. Zentr., 1931, i, 1964—1965).—The soil was treated with BaCl₂ followed by 0.1N-HNO₃ until no further reaction was obtained, the Ba⁺⁺ and Cl⁻ in the filtrate being determined. By pretreatment of the soil with a cation (NH₄⁺, K⁺, Na⁺) of which the humate is sol. in pyridine, followed by extraction of the complex with pyridine, only the mineral portion remained.

A. A. ELDRIDGE.

Determination of soil organic matter. C. T. SCHOLLENBERGER (Soil Sci., 1931, 31, 483—486).—The author's original method (B., 1927, 662) is modified by the addition of H₃PO₄ or HF to the dil. solution prior to titration with Fe(NH₄)₂(SO₄)₂ in the presence of NHPH₂. The end-point is sharp. A blank determination should be made.

A. G. POLLARD.

Base exchange in soils rich in organic matter. L. SMOLIK (Věstn. Českoslov. Akad. Zem., 1930, 6, 912—915; Chem. Zentr., 1931, i, 1963).—The base-exchange capacity is greater in soils rich in C than in those poor in humus. No connexion with N content was observed.

A. A. ELDRIDGE.

Carbon : nitrogen ratio in relation to the accumulation of organic matter in soil. F. J. SALTER (Soil Sci., 1931, 31, 413—430).—The micro-org. decomposition of plant material in soil depends primarily on the C : N ratio, there being a general tendency for the latter to stabilise at 10 : 1. With wider ratios losses of C occur, and with narrower ratios there is an accumulation. Nitrate formation is rapid where the C : N ratio is narrow, but is depressed for several months where the ratio is wide. The N fixed as a result of energy supplies carried by wide-ratio materials does not become available until losses of C have reduced the C : N ratio to 10 : 1. Fixation of N is favoured by a

C : N ratio of 15 : 1, but is not appreciably increased by applications of phosphates. Addition of N to soils is necessary in order to increase the accumulation of C.

A. G. POLLARD.

Relations between the hydrolytic acidity of soils and the degree of saturation with lime. A. GEHRING and O. WEHRMANN (Z. Pflanz. Düng., 1931, 21A, 1—32).—The CaO requirement of soil as determined by the authors' method (B., 1930, 256) is that requisite to ensure a sufficiency of replaceable Ca to maintain a good physical condition in addition to removing acidity. Methods based on measurements of hydrolytic acidity are not concerned with the nature of the active soil bases. In determining the degree of saturation of soils with Ca, due proportionality between the wt. of sample and vol. of Ca(OH)₂ solution used and vol. of filtrate collected must be maintained. The hydrolytic acidity as determined by the authors' method is in close agreement with the degree of saturation with Ca if the value " y_1 " be multiplied by the factor 4. Relationships between this value and Kappen's measurements of hydrolytic acidity are discussed.

A. G. POLLARD.

Replaceable cations in the soil and the plant. K. K. GEDROIZ (Udobr. Urozhai, 1930, 2, 464—475).—When a chernozem soil was saturated with Mg, Ba, Mn, Co, Ni, Cu, or H ions, no crop (mustard) was obtained with or without a complete fertiliser; when CaCO₃ was added, no crop (oats) was obtained with Ba, Ni, or Co, small crops with Cu, Mg, or Mn, and a normal crop with H. In another series (Mg, Ca, Sr, Cd, Fe⁺⁺, Fe⁺⁺⁺, Al, H), Cd and Fe⁺⁺ gave zero, and Mg, Al, and H a small yield in absence of CaCO₃; Sr gave a normal crop. With CaCO₃ present Cd gave no, Fe⁺⁺ and Fe⁺⁺⁺ small, and Al and Mg 50% normal, crops.

CHEMICAL ABSTRACTS.

Phosphorus assimilation by soil micro-organisms. I. G. THOMPSON, JUN., F. B. SMITH, and P. E. BROWN (Soil Sci., 1931, 31, 431—436).—The H₂O-sol. P of soils is affected to different extents by various species of soil micro-organisms. Some species render sol. more P than they can assimilate; with others the reverse is the case. *Azotobacter chroococcum* and various species of *Aspergillus* are examined in this respect.

A. G. POLLARD.

Transformation of *Azotobacter*-nitrogen in soils. H. ENGEL (Z. Pflanz. Düng., 1931, 21A, 32—46).—The N of *Azotobacter* cultures, whether alive or dead, was rapidly nitrified on admixture with soil. The results are discussed in relation to decomp. of straw and cattle manures in soil (cf. B., 1930, 73).

A. G. POLLARD.

Chemical methods for determining the availability of soil phosphate. P. L. HIBBARD (Soil Sci., 1931, 31, 437—466).—Extraction of soils with dil. acids (1 : 5 equilibrium mixtures) offers the simplest and quickest method for determining the availability of soil P, but several extractions with acids of different concentrations yield more satisfactory results. Strict comparisons of different soils should be made with extracts of similar p_H (e.g., 4.0). Simple extraction methods which indicate conditions at the time of sampling only are inadequate to characterise the supply

of P throughout the plant's growth. The "relative solubility" method (Lemmermann) is more satisfactory from this viewpoint. Methods involving extraction of soils with CO_2 and CaCO_3 (Dirks and Scheffer), citric acid (Dyer), HNO_3 (Fraps), NaCl in H_2SO_4 (Arrhenius) or H_2O are not generally applicable to soils of all types. Percolation methods are superior to equilibrium extracts in that they resemble more closely the action of the growing plant, and give a general but not accurate interpretation of the ability of soils to maintain a supply of P.

A. G. POLLARD.

The phosphate question [in soils]. V. Phosphate and nitrate concentrations and plant growth.

O. ARRHENIUS (Z. Pflanz. Düng., 1931, 10B, 289—292).—In sand-culture experiments with oats and barley in which both the N and P contents of the nutrient were varied, insufficient supplies of either nutrient completely nullified the effect of increasing the concentration of the other. With clover (inoculated) additions of P were effective in all proportions used.

A. G. POLLARD.

Portable field apparatus for the determination of chlorides in soils. R. J. BEST (J. Coun. Sci. Ind. Res., Australia, 1931, 4, 122—123)—Apparatus described previously (B., 1929, 731) is adapted for field work.

A. G. POLLARD.

Effect of humic acid on the *Aspergillus* method [for soil-nutrient determination].

L. E. KIESSLING (Z. Pflanz. Düng., 1931, 21A, 86—104).—The Niklas-Poschenrieder-Trischler method for determining the available K in soils by means of *A. niger* gave unduly high values in low-moor soils. Similar results were obtained on mineral soils to which humic preparations (H_2O -sol. or -insol. or K humate) were added. Humic acid not only stimulates mycelium production, but causes modifications in its structure and in conidia formation.

A. G. POLLARD.

Neubauer method for determining mineral nutrient deficiencies in soils.

S. F. THORNTON (J. Amer. Soc. Agron., 1931, 23, 195—208).—The Neubauer method gives results most closely in accord with the pot and field tests; extraction with 0.2N- HNO_3 and the Illinois phosphate test frequently give high values for P_2O_5 . Nutrient absorption by seedlings is greatly affected by selection of seed and temp. control, and to a smaller extent by light intensity, moisture content, soil reaction, and the presence of other nutrients.

CHEMICAL ABSTRACTS.

Availability of nitrogen in farm manure under field conditions.

A. F. HECK (Soil Sci., 1931, 31, 467—481).—Little, if any, of the H_2O -insol. N of farm-yard manure is recovered in the first crop after application. The recovery of the N of liquid manure is greater if applied with dung than if used alone. If ploughed in immediately after spreading, no difference is apparent in the availability of the N of fermented and fresh manure. Nitrification of manure is more rapid when applied as a top dressing and harrowed in than when ploughed in. Losses of N from manure in the interval between spreading and ploughing in are greatest when the manure has become ammonified but not fermented, less after complete fermentation, and least in fresh

manure. Admixture of straw with manure decreases the amount of N recovered in the first crop.

A. G. POLLARD.

Changes in stall manures during storage and their action in soil. H. C. VON SEYDEWITZ (Landw. Versuchs-Stat., 1931, 112, 55—102).—Inadequate heating in manure stacks ($< 60^\circ$) results in incompletely rotted straw, greater losses of N and dry matter during fermentation, and a final product of lower dry-matter content. Losses of N from hot-fermented manure stacks did not increase after the 4th month. Drainage from hot-fermenting stacks decreased with the age of the stack and contained much less NH_3 -N than did ordinary liquid manure. Hot-fermented manure was nitrified more rapidly and more completely than yard manure and produced greater crop increases.

A. G. POLLARD.

Comparison of various methods of storing manure.

J. P. MAMCHENKOV (Udobr. Urozhai, 1930, 2, 284—291).—Loose piling, compacting, and Krantz' method (compacting at 55°) were compared, combined, NH_3 -, and total N being determined. Packing down is preferable, since mineral-N is preserved.

CHEMICAL ABSTRACTS.

Effect of drying manure on the nitrogen losses and crop yields.

J. P. MAMCHENKOV and J. F. ROMASHKEVICH (Udobr. Urozhai, 1930, 2, 394—397).—Piled manure lost more N than scattered manure; the latter lost N chiefly as NH_3 in the first 2 days and was slightly inferior to fresh manure with oats.

CHEMICAL ABSTRACTS.

Availability of nitrogen of green manure for rice and the supplementary value of various fertilisers.

H. MISU and H. SHIMOHIRA (Ann. Agric. Exp. Sta. Gov.-Gen. Chosen, 1929, 4, 65—94).—The availability of N was lower in dried than in fresh green manure. The yield was better with fresh than with fermented green manure.

CHEMICAL ABSTRACTS.

Effect of phosphate manuring on the yield and quality of malting barley.

C. DREYSPRING, H. KURTH, and F. HEINRICH (Z. Pflanz. Düng., 1931, 10B, 265—289).—In pot cultures with many varieties of barley, applications of easily-sol. P definitely accelerated growth and caused increased tillering and earlier flowering and maturing, the latter being particularly apparent in the "green-ripe" and "yellow-ripe" stages. Phosphate manuring produced greater yield increases in grain than in straw, there being an increase both in the wt. and number of ears. The length of straw was not definitely affected. The protein content of the grain decreased with increasing applications of superphosphate. This effect was greatest in varieties having a high protein content when grown in untreated soil. In no case was the protein content $< 8.9\%$. There was a direct relationship between the proportion of high-mol. protein and the P content and stage of maturity of the grain. Phosphate fertilisers did not increase the starch content of the grain. The P content of the grain was directly proportional to the grain yield, the number of tillers and ears, to the wt. per ear, the acceleration of growth, and the increase in grain : straw ratio, but was inversely proportional to the total protein content.

A. G. POLLARD.

Comparative value of nitrogenous fertilisers on the growth of autumn and spring barley. I. OMAI (Ann. Agric. Exp. Sta. Gov.-Gen. Chosen, 1930, 3, 347—354).—Of the materials tested, NaNO_3 and $(\text{NH}_4)_2\text{SO}_4$ gave the highest recovery of N (60—66%) and the best yield. The efficiency of the N in pig and cow manure is small. CHEMICAL ABSTRACTS.

Fertiliser experiments with citrus seedlings. I. TAKAHASHI (J. Okitsu Hort. Soc., 1930, 25, 38—50).—The P_2O_5 and K requirements are, respectively, 50 and 66% of the N requirement. CHEMICAL ABSTRACTS.

Efficiencies of phosphoric acid of various fertilisers for spring- and autumn-sown barley. I. OMAI (Ann. Agric. Exp. Sta. Gov.-Gen. Chosen, 1930, 3, 394—402).—Application of Na_2HPO_4 , bone meal, and superphosphate gave about 190% greater yield and 130—140% more absorbed P_2O_5 ; rice polishings and AlPO_4 gave 150% (yield), 60—70% (P_2O_5). Autumn-sown barley showed higher absorption and higher yield than spring-sown barley. CHEMICAL ABSTRACTS.

Organic fertilisers for oats and flax. Z. V. LOGVINOVA and A. P. SHCHERBAKOV (Udobr. Urozhai, 1930, 2, 476—482).—Various org. sources of N were compared with NaNO_3 and $(\text{NH}_4)_2\text{SO}_4$. With oats intestinal slime gave good results; meat scrap, horn meal or shavings, burned horn, blood meal, feathers and down, and oil meal gave good results when larger quantities were compared. The residual effects on the succeeding crop were better for org. than for inorg. N. With flax, org. N was superior to inorg. N. CHEMICAL ABSTRACTS.

Ammonification of nitrogenous substances by pure cultures of micro-organisms. H. C. PULLEY (J. Agric. Res., 1931, 42, 791—800).—Ammonification of the following N compounds in soil by pure cultures of various organisms occurred in the order: asparagine (most rapid), peptone, gluten, urea, casein, gelatin, dried blood, uric acid, egg albumin, hippuric acid. Acetanilide and caffeine depressed ammonification, which was entirely inhibited by NHPh_2 . CaCN_2 was not ammonified in the soil examined, nor was any urea formed. In general, amino-N is readily ammonified, but the N groups of purine bases are more resistant. A. G. POLLARD.

Effect of salt on the microbial heating of alfalfa [lucerne] hay. L. S. STUART and L. H. JAMES (J. Agric. Res., 1931, 42, 657—664).—Lucerne hay heated most rapidly when its moisture content was 30%. Retardation of heating following the addition of NaCl varied inversely with the moisture present. Small amounts (1—2%) of NaCl tend to increase the growth of moulds and reduce that of bacteria. With larger proportions microbial activity may be delayed sufficiently to permit the curing of the hay. A. G. POLLARD.

Cotton plant, with special reference to its nitrogen content. G. M. ARMSTRONG and W. B. ALBERT (J. Agric. Res., 1931, 42, 689—703).—A generous supply of soil-N is associated with a succulent growth and high N contents of leaves, stalk, and fruit. The N supply did not affect the N content of seed and lint from

7 to 21 days old. The N content of all tissues, with the possible exception of seed and fruit, decreased with maturity. Close spacing of plants tended to accelerate N absorption, to produce bolls of higher N content, and to increase the proportion of stem to dry wt. The general intake and distribution of N during growth is recorded. A. G. POLLARD.

Fertilising citrus trees. J. J. THERON (Farming in S. Afr., 1931, Reprint No. 29, 5 pp.).—In the area examined, citrus trees responded to applications of NaNO_3 and phosphates, but K had little effect. Appropriate manurial treatments are specified. A. G. POLLARD.

Percentage dry matter and field weight of ear maize from unlimed and limed plots. A. W. BLAIR (J. Agric. Res., 1931, 42, 773—774).—Maize grown on acid soil does not mature and dry out so quickly as when the same soil is adequately limed. Small but not very definite increases in grain yield after liming are recorded. A. G. POLLARD.

Sugar and catalase determinations of seeds of varying viability. A. NIETHAMMER (Z. Pflanz. Düng., 1931, 21A, 69—86).—A general parallelism exists between the catalase activity and germinative capacity of many seeds, the effect being more definite among seeds of cultivated crops than of wild plants. Differences are apparent among certain seeds of the same species and strain. Seeds of sufficient age to lose all germinative power usually had no catalase activity. A. G. POLLARD.

Analysis of seeds. L. BUSSARD (Ann. Falsif., 1931, 24, 211—220).—Tests are made for identification, degree of purity ($P = \% \text{ genuine seeds}$), presence and nature of foreign material, dryness, and germinating faculty ($G = \% \text{ genuine seeds germinating in given time}$). Cultural value = $PG/100$. Methods of sampling are given, together with data for 58 kinds of seeds of good quality. E. B. HUGHES.

Progressive changes in the wax-like coating on the surface of the apple during growth and storage. K. S. MARKLEY and C. E. SANDO (J. Agric. Res., 1931, 42, 705—722).—With advancing growth, the waxy covering of apples shows a general increase in Et_2O -sol., light petroleum-sol. ("oily fraction"), and ursolic acid contents. The oily fraction increases more rapidly than the ursolic acid. Changes in the proportions of these constituents are associated with differences in the physical properties of the coating, and its permeability to gases, in the effectiveness of spray applications and the ease of removal of spray residues. The amounts of ursolic acid and Et_2O extract are greater in the shaded than in the lighted side of the apple, but the oily fraction is equally distributed. The proportions of the 3 named constituents vary with season and variety. A. G. POLLARD.

Effect of arsenic on the composition of citrus fruits. I. TAKAHASHI (J. Okitsu Hort. Soc., 1930, 25, 153—163).—Spraying citrus trees with arsenates caused a decrease in acidity and an increase in sugar content of fruit juice, with diminished keeping quality. Excessive use of arsenate affects the yield and taste. CHEMICAL ABSTRACTS.

Chemical eradication of *Ribes*. H. R. OFFORD (U.S. Dept. Agric. Tech. Bull., 1931, No. 240, 24 pp.).—Of numerous chemicals examined, NaClO_3 proved most successful. One application of 10–50% solution sufficed for *R. petiolase*, but with *R. lacustre* and *R. inerme* 3 applications of 25% solution were necessary. Additions of fish-oil soap and flaked glue (0.01–0.05% of the dry chemical used) improved the spreading and adhesive properties of the solutions. The fire risk in handling solutions of >10% of NaClO_3 in the field is considerable.

A. G. POLLARD.

$\text{Ca}_3(\text{PO}_4)_2$ and phosphate rock.—See VII.

See also A., July, 877, **Influence of the soil on microbiological phenomena. C cycle in sphagnum, an alder-bush soil, and a garden soil.** 882, **Transpiration etc. of the cotton plant. Ripening of oranges.**

PATENTS.

Production of non-caking fertilisers. A. M. CLARK, W. K. HALL, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 349,566, 29.1.30).— NH_4NO_3 is mixed with 1–5% of finely-ground phosphate rock to prevent caking in bulk. $(\text{NH}_4)_2\text{HPO}_4$ solution, prepared from phosphate rock, H_2SO_4 , and $(\text{NH}_4)_2\text{SO}_4$, is separated from the CaSO_4 and treated with aq. NH_3 to ppt. AlPO_4 and FePO_4 . The ppt. is collected, washed, dried, ground, and mixed with NH_4NO_3 or with the $(\text{NH}_4)_2\text{HPO}_4$ obtained by crystallising the mother-liquor.

A. R. POWELL.

Production of ammonium nitrate-ammonium sulphate mixed fertilisers. RUHRCHEMIE A.-G. (B.P. 349,998, 24.2.30. Ger., 23.2.29).—The combustion gases from the NH_3 oxidation process are treated with liquid or gaseous SO_2 , or SO_2 may be mixed with the NH_3 during oxidation, the mixture of HNO_3 and H_2SO_4 produced being then neutralised with NH_3 and the product mixed with other fertiliser salts.

W. J. WRIGHT.

Thermal process for production of a fertiliser consisting of lime [calcium] phosphate. A. BUCHLEITNER (B.P. 350,167, 30.4.30. Austr., 30.4.29).—Phosphorites are continuously reduced in an Fe bath containing P by means of C, so as to enrich the P content of the bath, the P being then partly removed by oxidation and the P_2O_5 combined with CaO.

W. J. WRIGHT.

Production of organic iron compounds [fertilisers]. H. BLUMENBERG, JUN., and J. H. BLUMENBERG (U.S.P. 1,783,694, 2.12.30. Appl., 31.8.26).—Cellulosic material, e.g., sawdust, is steeped in 20% FeSO_4 or $\text{Fe}_2(\text{SO}_4)_3$ solution, removed, dried, and heated at 120° until dark brown or black.

L. A. COLES.

Manufacture of disinfectant [dusting] compositions [containing mercury]. M. ENGELMANN, ASST. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,783,377, 2.12.30. Appl., 27.2.28).—A Hg salt, an alkyl or aryl derivative of a metal higher than Hg in the electromotive series (e.g., PbMe_4 , SnEt_4 , PbMe_3Cl , PbPh_4), and an inert diluent (e.g., tolanite, kieselguhr) are ground together.

L. A. COLES.

Fungicide and insecticide. W. C. O'KANE (U.S.P. 1,786,125, 23.12.30. Appl., 18.5.27).—"White" hydro-

carbon oil which has been used for extracting the active constituents of pyrethrum, derris, etc., or which has been mixed with extracts from these, is emulsified with H_2O , and the emulsion is mixed with a colloidal Cu prep. obtained, e.g., by heating CuO or CuSO_4 with waste molasses or sulphite liquor and NaOH. L. A. COLES.

Manufacture of [fungicidal] sulphur compositions. H. BLUMENBERG, JUN. (U.S.P. 1,783,695, 2.12.30. Appl., 14.2.27).—A 9 : 1 mixture of S and H_3BO_3 is sublimed at 130–300°.

L. A. COLES.

Seed fungicide and disinfectant. H. ADLER and G. A. McDONALD, ASSTS. to VICTOR CHEM. WORKS (U.S.P. 1,785,472, 16.12.30. Appl., 10.12.27).— CuSO_4 solution is added slowly to a hot aq. suspension of Ca oxalate, and the ppt. is removed and dried.

L. A. COLES.

Insecticide [for spraying fruit trees etc.]. J. H. LAMBERT, ASST. to STANDARD OIL Co. (U.S.P. 1,785,451, 16.12.30. Appl., 6.12.24).—An emulsion, which is diluted with H_2O for use, comprises straw oil, Na salts of sulphonated mineral oils, soap, and alcohol. L. A. COLES.

XVII.—SUGARS; STARCHES; GUMS.

Influence of temperature of storage of raw [beet] sugars on their affining quality. O. SPENGLER and A. TRAEGL (Z. Ver. deut. Zucker-Ind., 1931, 81, 289–299).—Two raw beet sugars, light and medium dark in colour and containing 0.9% and 1.5% H_2O , were stored at const. temp. of 20–60° for periods of 8 hr. to 3 weeks, in bottles of 200 c.c. capacity hermetically closed, laid on their sides, and turned at intervals to prevent draining. Their colour was measured before and after the "Zucker-Institut" affining test. At 30° no detectable darkening occurred in 3 weeks, but at 40° darkening was perceptible after 1–2 weeks, and at higher temp. it was more rapid and pronounced, being detectable after 8 hr. at 60° both before and after the affining test. The light sample deteriorated to a relatively greater extent than the darker one. None of the stored samples contained more than a trace of invert sugar. Raw beet sugars should be cooled at least to 30° before storage, especially if stored in bulk, for in sacks there is greater opportunity for subsequent cooling. J. H. LANE.

***Termobacterium mobile*, a Mexican bacterium as new acidifying bacterium for beet slices.** P. LINDNER (Z. Ver. deut. Zucker-Ind., 1931, 81, 25–36).—Isolated from the juice of the agave, collected for the production of Mexican *pulque*, this organism is an effective agent for the conservation of exhausted beet slices etc. by lactic acidification, no AcOH nor butyric acid being formed. It ferments sucrose, dextrose, and levulose, but not maltose or lactose; in presence of air the EtOH formed is completely assimilated.

J. H. LANE.

Alkalisiation of the diffusion in working dried beet slices. O. SPENGLER and N. LOGINOV (Z. Ver. deut. Zucker-Ind., 1931, 81, 107–118).—Extracting dried beet slices containing 64.8% of sucrose and 7.6% of moisture with tap-water of p_H 7.6, at 69–76°, in a 5-unit laboratory diffusion battery, with 50 g. of slices per unit of 250-c.c. capacity, the authors obtained juice of 42.1° Brix, purity 89.72%, p_H 5.2, and an invert

sugar : sucrose ratio of 2.1% compared with 1.4% in the dried slices. This increase in invert sugar ratio was almost entirely prevented by addition of 0.4% CaO or 0.8% Na₂CO₃, calc. on dried slices, the juices obtained having p_H 6.9. The purities were substantially the same as without alkali, but the viscosities were 14% and 8% higher with CaO and Na₂CO₃, respectively. Excessive addition of alkali may render the exhausted slices unfit for fodder.

J. H. LANE.

Continuous indication of alkalinity in the saturation of beet sugar juices by conductivity recording. O. SPENGLER and F. TÖDT (Z. Ver. deut. Zucker-Ind., 1931, 81, 1—12).—In a trial of a Lindner continuous conductometric alkalinity indicator, for the first carbonatation, throughout one campaign in the Genthin sugar factory, with frequent checks of alkalinity by titration and true conductivity, the automatic indications were consistent within the degree of precision usual in the determination of the alkalinity by titration. Subject to confirmation with other juices in other factories, the automatic indicator is considered practicable for the first carbonatation, but not for the second, the irregularities being too large in relation to the very small alkalinity in the second carbonatation. J. H. LANE.

Improved utilisation of carbon dioxide in carbonatation [of beet juice]. I. O. SPENGLER, G. BARTSCH, and J. WIGAND (Z. Ver. deut. Zucker-Ind., 1931, 81, 173—182).—An experimental form of carbonatation apparatus, with a packed scrubbing column, enabled the proportion of the total CO₂ utilised to be increased from 50% to 85%, with a saving of 20% of time, but the juice was not purified to the normal extent, the scum-cake contained excessive amounts of free CaO and "bound" sugar, and the packing in the scrubbing column became badly encrusted with CaCO₃.

J. H. LANE.

New magnesia process [for beet-juice purification]. F. W. MEYER (Z. Ver. deut. Zucker-Ind., 1931, 81, 378—390).—After the usual double carbonatation beet juice is sulphited to about p_H 7.2 and passed through filter presses containing MgO mixed with 10% of powdered wood charcoal, by which it is decolorised and brought to an alkalinity of 0.01—0.02% CaO, according to its rate of flow. The working of the process in the Wismar factory, where it has been employed for 3 campaigns in white sugar manufacture, is described. Technical MgO powder, as used for (Steinholz) flooring, is employed, but dried above 110° before being mixed with H₂O and 10% of wood charcoal and charged into the presses. With a layer 10 mm. thick, a juice pressure of 1 atm. produces a suitable rate of flow. The decolorising effect is about equal to that of vegetable carbons at one seventh of the cost. When exhausted the material may be partly revived twice by passing H₂O through the presses for ½ hr. The filters are repacked every 24 hr., but during the last 12 hr. are used only for their alkalisising effect. With sound beets the final thin juice is colourless and the thick juice has a pale lemon colour. The thick juice is sulphited, limed, and carbonated. High-grade white sugar requiring no blue is obtained. In a short note SPENGLER confirms the claims made for the process.

J. H. LANE.

Diatomaceous earths produced in Japan as the filtration medium of sugar solutions. I, II. T. TANNO and M. ODAGIRI (J. Soc. Chem. Ind., Japan, 1931, 34, 157—158 B).—Japanese-coast diatomaceous earths are similar in properties to the American Supercells used for sugar solutions and if suitably refined are superior to the American refined earths, which they may replace for sugar filtration.

E. H. SHARPLES.

Solubility of lime in sucrose solutions according to van Aken. E. LANDT and E. SAALMANN (Z. Ver. deut. Zucker-Ind., 1931, 81, 361—377).—An account of recent work by van Aken (Diss., Delft, 1930) who confirms the irregular solubility of CaO in sucrose solutions noted by Claassen and, after further investigation by fractional filtration, interprets the results in terms of adsorption, peptisation, and coagulation, denying that CaO forms definite compounds with sucrose.

J. H. LANE.

Comparative experiments on the purification of raw [beet] juices unfiltered and filtered through the Seitz deposited-fibre filter in the Genthin refinery. O. SPENGLER and S. BÖTTGER (Z. Ver. deut. Zucker-Ind., 1931, 81, 300—311).—The Seitz filter, consisting of a closed tank containing vertical gauze cells on which a mixture of fine asbestos and vegetable fibres is deposited from suspension (cf. B., 1926, 807), has proved effective in removing very fine pulp particles from raw juice which has to be made alkaline with CaO for transport from one factory to another. Studying the possibility of its application to juice purification in general, the authors found that filtration of diffusion juice, before the usual liming and carbonatation, removed about 50% of the coagulable matters (AcOH test), but did not markedly affect the purity and ash content of the final thin juice. A saving of 75% of the usual consumption of CaO could be effected by treating raw juice with 0.1% of CaO (calc. on beets) at 80°, then filtering through a Seitz filter, liming further with 0.6% of CaO, and carbonating once to an alkalinity of 0.018%. This method of working yields thin juice of normal quality, but it would probably not be economical owing to the low output of the Seitz filters, which was found to be only 100 litres per hr. per sq. m. of surface for the limed juice.

J. H. LANE.

Movement of nitrogenous substances in sugar manufacture, Usinskii, 1929—1930. B. A. LYASKO (Nauk. Zapiski Tzuk. Prom., 1930, 10, 23—38).—The melassigenic N represents about 33% of the total N of the beet. At the diffusion battery about 50% of the total, 80% of the protein, and 10% of the melassigenic N are eliminated, whilst NH₃- and NH₂-N pass entirely into the juice. 96.5% of the N in syrup is melassigenic.

CHEMICAL ABSTRACTS.

Experiments on raw sugar with Russian activated carbon. M. P. KOTLYARENKO and N. K. KONIBOLTZKI (Nauk. Zapiski Tzuk. Prom., 1930, 10, 102—111).—A comparison with Norit. Max. regeneration was obtained by heat and HCl treatment.

CHEMICAL ABSTRACTS.

Quality of the sweet (wash) water from bone-black filters. M. I. NAKHMANOVICH and I. F. ZELIKMAN (Nauk. Zapiski Tzuk. Prom., 1930, 10, 51—74).—With

decrease in sp. gr. the proportion of non-sugars increases; washing should cease at 2.5 Brix (1.5—1.6% of sugar).

CHEMICAL ABSTRACTS.

Saccharification of flaked rice with acids. T. KOMURO (J. Soc. Chem. Ind., Japan, 1931, 34, 166—167 B).—Hydrolysis of flaked rice is slower than that of potato starch, due to the different properties of the starch granule and to the presence of an amphoteric protein, oryzenin. This substance is deposited when the hot filtrate from the hydrolysed rice is kept (optimum p_H 4.1). The colour intensity of the hydrolysed solution increases, and the efficiency of decolorisation decreases, with increase of p_H , the former changing rapidly at p_H 3—6.

E. H. SHARPLES.

Surface tension of solutions of different sugars. E. LANDT (Z. Ver. deut. Zucker-Ind., 1931, 81, 119—124).—A collection of data published by various workers, relating to sucrose, maltose, dextrose, lævulose, and galactose. None of these sugars is surface-active, i.e., each increases the surface tension of its aq. solution.

J. H. LANE.

Polarimetric determination of potato starch and the relation between dry matter and starch contents in potatoes. C. VON SCHEELE and G. SVENSSON (Landw. Versuchs-Stat., 1931, 112, 1—43).—The rasped sample is washed on a filter with H_2O and then with $N/285$ HCl, heated on a water-bath with more acid to form a paste, autoclaved for 15 min., and subsequently the polarimetric value is taken. The starch-free dry-matter content of potatoes is not a const., but increases with the total dry matter. The Maercker table for calculating the dry matter and starch content from the sp. gr. of potatoes needs rectification. A. G. POLLARD.

Size of the cells and of the starch granules in potatoes. G. BREDEMANN and W. SCHULZE (Z. Spiritusind., 1931, 54, 157).—The mean diam. of the plant cells in different varieties of potatoes cultivated in the same area varies markedly. The size of the cells is related neither to the size of the starch granules nor to the starch content of the potatoes.

C. RANKEN.

Spectral colorimeter.—See I.

See also A., July, 794, H_2O adsorption [from sucrose solutions] by SiO_2 gel. 802, Hydrolysis of sucrose by strong acids.

PATENT.

Insecticides.—See XVI.

XVIII.—FERMENTATION INDUSTRIES.

Alsatian wines. LOBSTEIN and SCHMIDT (Ann. Falsif., 1931, 24, 220—229).—From the analyses of 19 samples it is concluded that the accepted œnological ratios do not apply, owing to differences of climate and method of manufacture, which are described. The presence of lactic acid and methods of determination of tartaric acid are discussed.

E. B. HUGHES.

Determination of sorbitol [in wine]. G. FIESELMANN (Chem.-Ztg., 1931, 55, 490—491).—Adulteration of wine by fruit wine is indicated by the presence of sorbitol. To determine the content of sorbitol, the wine is decolorised with charcoal and conc. under

decreasing pressure at 4—5°. After condensation of PhCHO for 12 hr. with the sorbitol in the syrup, the benzylidenesorbitol is precipitated by adding H_2O , filtered, dried in vac. over H_2SO_4 , and weighed. The ppt. should give an Ac derivative having m.p. 98°.

C. RANKEN.

Production of absolute alcohol in converted distillery plant. FRITZWEILER and K. R. DIETRICH (Z. Spiritusind., 1931, 54, 155—157).—By the introduction of additional valves and conductors the Barbet and the Guillaume plants, which are used for the rectification of EtOH in ordinary distillery practice, can be economically converted for the production of abs. EtOH by the azeotropic method.

C. RANKEN.

Gasification of water hyacinth.—See II. **Thermobacterium mobile.**—See XVII. **Sterilisation of enzymes.**—See XIX.

See also A., July, 794, Adsorption of H_2O from aq. EtOH. 811, Colorimeter for determining $[H^+]$ of solutions. 873, Activity of peroxidase. Action of ultra-short electromagnetic waves on amylase. 875, Influence of catalytic elements on alcoholic fermentation. Action of poisons on yeast. Components of activator-Z. 877, CO_2 -BuOH fermentation.

PATENTS.

Manufacture of yeast of high enzymic activity. M. MOSKOVITS, and KRAUSZ-MOSKOVITS EGYESÜLT IPARTELEPEK RÉSZVÉNYTÁRSASÁG (B.P. 349,201, 20.3.30. Hung., 22.3.29).—After completion of the reproduction of yeast in a dil. mash with strong aeration, assimilable and acidified nitrogenous substances are added so that the mash contains 0.05—0.25% N and 0.3% of acid (calc. as lactic acid), whilst the content of carbohydrates is restricted to 1%. After some hr. the content of carbohydrates in the mash is increased to 6% and the enzymes of the cells are caused to develop by vigorous fermentation.

C. RANKEN.

Yeast manufacture. J. H. BARRINGTON, ASS. to STANDARD BRANDS, INC. (U.S.P. 1,784,618, 9.12.30. Appl., 16.11.23. Renewed 29.4.30).—Yeast is propagated in a nutrient solution the acidity of which is controlled by the addition during the first stages of fermentation of an alkaline substance innocuous to yeast and containing yeast-assimilable N, and by the addition of an inorg. NH_4 salt during the latter stages of fermentation.

C. RANKEN.

Purification of yeast. G. T. REICH (U.S.P. 1,783,521, 2.12.30. Appl., 8.3.29).—The yeast, which is removed from the fermenters by mechanical means, is diluted with H_2O at 40° and purified by fractional gravity separation.

C. RANKEN.

Preservation of hops. G. SCHLICK (B.P. 350,780, 18.7.30. Ger., 29.7.29).—The air entering the preserving chambers is loaded with moisture by means of an atomiser so that drying of the stored hops is prevented.

C. RANKEN.

[Production of] aldehyde-free alcoholic liquids. H. HEUSER (U.S.P. 1,785,447, 16.12.30. Appl., 28.6.26).—Fusel oil and CH_2O are removed by evaporating the EtOH-containing liquid until the content of EtOH is

reduced by 25—40%. The boiling residue is transferred to a container, in which it is cooled either in contact with gas free from O_2 or in the completely filled and sealed container.
C. RANKEN.

Peptonised food.—See XIX.

XIX.—FOODS.

Sterilisation of flours and enzymes in the powdered state [with carbon disulphide]. III, IV. A. J. J. VANDE VELDE (Bull. Soc. chim. Belg., 1931, 40, 237—242, 247—253).—III. Treatment of amylase and pepsinase with cold CS_2 for some days, and subsequent removal of the solvent with a current of air, sterilises without loss of activity.

IV. The method is effective with taka-diastrase, trypsinase, pancreatin, and rennin.
A. A. LEVI.

Detection of persulphate, bromate, and benzoyl peroxide in flour. ANON. (Ann. Falsif., 1931, 24, 232—233).—Flour is treated on a glass plate with drops of reagents as follows: for persulphate the test is made with 1% KI solution; for bromate, with 0.25N- H_2SO_4 containing $NaHSO_3$, after addition of iodide reagent, or, if persulphate is present, with rosaniline decolorised with $NaHSO_3$; for benzoyl peroxide, with 1% benzidine.
E. B. HUGHES.

Adulteration of milk by the addition of sugar solution. A. SABATIÉ (Ann. Falsif., 1931, 24, 208—211).—Discrepancies between the solids-not-fat and the sum of the lactose, protein, and ash were found to be due to the presence of added sucrose.
E. B. HUGHES.

How the cream layer forms on milk. A. C. DAHLBERG and J. C. MARQUARDT (N.Y. State Agric. Exp. Sta. Bull., 1931, No. 591, 11 pp.).—A theory, found to fit the observed facts, is advanced that the positive charges on the Ca ions neutralise the negative charges on the fat globules. This permits the formation of fat clusters, which rise in the milk much more rapidly than would the individual fat globules.
E. B. HUGHES.

Utilisation of dry skim milk in the manufacture of ice cream and cream cheese. J. C. MARQUARDT (N.Y. State Agric. Exp. Sta. Bull., 1931, No. 174, 24 pp.).—Dried skim milk stored in unsealed packages for more than 60 days made unsatisfactory ice cream and cheese. The insol. portion of poor-quality dried skim milk is generally composed of casein, but may be a combination of casein and lactose.
E. B. HUGHES.

Effect of pasteurising and homogenising temperatures on certain properties of ice-cream mixes. C. D. DAHLE and G. S. BARNHART (J. Agric. Res., 1931, 42, 675—688).—The processing of ice-cream mixtures at 77—82° decreases the degree of "fat clumping," reduces viscosity and freezing time, and increases protein stability. These advantages are most apparent when pasteurisation and homogenisation are carried out at the high temp. Reduction of the temp. from 170—180° to 150° for homogenising gives less satisfactory results. High pasteurising temp. affects principally the viscosity, overrun, and protein stability, whereas a high homogenising temp. has the greater effect on fat clumping.
A. G. POLLARD.

Chemical changes in the fat of frozen and chilled meat. I. Frozen mutton and lamb. II. Chilled beef. C. H. LEA (J.S.C.I., 1931, 50, 207—213 T, 215—220 T).—I. Changes in chemical composition, appearance, and flavour of the fat of carcasses of lamb were followed during precooling, cold storage at -5° , -10° , and -20° for periods up to 7 months and during hanging at room temp. subsequent to storage. Free acidity changes were comparatively slight, the max. values recorded being of the order of 1.2% (as oleic acid) for external fat, and somewhat less for kidney fat. In no case were any signs of superficial oxidation of the fat observed during 24 hr. precooling at room temp., and no definite increase in susceptibility to oxidation during subsequent storage could be detected as a result of the precooling treatment. Oxidation of the fat of carcasses held at -5° or below for periods up to 7 months was very slight, and in no case did oxidation sufficient to affect the flavour of the fat occur when such carcasses were held for 3 days at room temp. in not too powerful light. "Sweating" in the presence of light exerted a deleterious effect on the keeping properties of the fat when held subsequently at room temp. The effect is largely one of light action, so that sweating for short periods in the absence of light might be expected to produce considerably less change. "Sweating," however, even for short periods, produced a marked deterioration in appearance of the carcasses. In these experiments a temp. of -5° failed to prevent the growth of moulds and yeasts on the carcasses. No visible growth occurred at -10° or -20° , and the fat of the meat stored at all three temps. did not appear to be attacked by micro-organisms when held for three days at a mean temp. of 12° subsequent to storage.

II. With regard to the chilling of beef, the implications of the experiments carried out are as follows. In none of these experiments involving either (a) storage at 0° or -1.6° for 42 days, followed by hanging for 4 days at 8.6° or 10° , or (b) storage at 0° for 60 days, was atm. oxidation of the fat sufficient to render it unpalatable, provided that undue exposure to strong light (sunlight or direct skylight) was avoided. Portions of the fat, particularly the front edge of the breast (or brisket), were, however, found to acquire on prolonged storage a "tainted" flavour which was apparently due to the action of micro-organisms, and was always accompanied by a high free acidity in the fat. The free fatty acids, though not themselves responsible for the flavour, may be used as an index to the activity of the taint-producing organisms. Measures, such as the use of air circulation, or of a storage temp. of -1.6° in place of 0° , which produced conditions less favourable to the growth of micro-organisms were found to extend the storage life of the fat and hence of the meat.

Growth of micro-organisms on chilled and frozen meat. R. B. HAINES (J.S.C.I., 1931, 50, 223—227 T).—Plate counts of the nos. of micro-organisms on frozen lamb stored at -5° for 238 days showed that on freezing there was a decrease in the nos., followed by an increase on certain portions of the carcass due mainly to the growth of yeasts and moulds. Similar counts on quarters of chilled beef stored at 0° indicated that

bacterial growth may occur in certain cases, and an instance of spoilage by organisms of the *Pseudomonas* group is considered. Definite changes in the "sol. N" were obtained at 0°.

Distinction between natural and artificial honey.

S. A. SCHOU and J. ABILDGAARD (Dansk Tidsskr. Farm., 1931, 5, 89—105).—The presence of artificial honey in bee honey and *vice versa* may be detected by examination of the ultra-violet absorption spectrum of a 5% solution of the material. The absorption curve for natural honey ascends regularly, but that for artificial honey shows a strong absorption band at 2825 Å., due to the presence of hydroxymethylfurfuraldehyde. The quantity of this latter substance present in artificial honey can be determined accurately by this means, the average content of a number of samples examined being 1%, but the method, although it will reveal with certainty the presence of an admixture of artificial honey in natural honey, does not permit an accurate determination of the amount present. H. F. HARWOOD.

Determining N in NH₄ salts. Ca phosphate.—See VII. Citrus fruits.—See XVI. Dried beet slices. Saccharification of flaked rice. Starch in potatoes.—See XVII.

See also A., July, 811, Colorimeter for determining [H] of solutions. 858, Metallised food. 867, Nutritive values of hardened oils. 868, Nutritive value of caseinogen and autoclaved albumin, and of potato protein and gelatin. 880—1, Vitamins (various). 884, Org. acids of spinach, broccoli, and lettuce. 885, Carotenoids of fruits and vegetables. Micro- and histo-chemistry of fruits and leaves. 886, Trigonelline in Gautemala coffee.

PATENTS.

Leavening preparation. A. H. FISKE, Assr. to RUMFORD CHEM. WORKS (U.S.P. 1,787,193, 30.12.30. Appl., 2.7.29).—The keeping quality of phosphate baking powders is improved by addition of 2—3% Fe (calc. as Fe₂O₃) during manufacture. The added ferruginous material should be dissolved in the H₃PO₄ from which the phosphate is manufactured prior to its incorporation in the leavening preparation.

E. B. HUGHES.

Production of dietetic foods. E. DAHO (B.P. 350,777, 16.7.30).—Aq. extracts of tubers, rhizomes, etc. of edible plants, especially of the *Compositæ* and *Synantheræ* families, containing inulin, inositol, etc., replace part or all of the H₂O used in the prep. of bread, biscuits, etc. for diabetics.

E. B. HUGHES.

Manufacture of peptonised food. W. R. B. ST. J. GATES and J. TAVROGES (B.P. 350,831, 3.9.30).—Milk predigested at 49° with pancreatic extract, and starch (wheat flour) similarly predigested, are cooled to 7°, mixed in stated proportions, and then condensed or desiccated.

E. B. HUGHES.

Butter colouring. K. J. MONRAD, Assr. to C. HANSEN'S LABORATORY, INC. (U.S.P. 1,786,256, 23.12.30. Appl., 13.4.27).—The red component of an orange-coloured butter is neutralised by mixing with the butter an oil-sol. green colouring matter. H. ROYAL-DAWSON.

Preservation of eggs. D. E. SEAWARD (U.S.P. 1,785,461, 16.12.30. Appl., 31.5.28).—The eggs are wrapped in paper pretreated with 1—2% aq. AgNO₃, so that air, light, and bacteria are excluded. Containers may be treated similarly.

E. B. HUGHES.

Preservation of meat, carcasses, or the like. H. WATKINS-PITCHFORD (B.P. 350,758, 7.7.30).—Meat brushed or sprayed with a protective covering of blood-serum will retain its fresh appearance for a considerable time; mould and bacterial growth upon its surface is restrained and loss of wt. due to drying is retarded.

E. B. HUGHES.

Vitaminised food seasonings. E. MAYBURY (B.P. 350,684, 14.5.30).—Vitamin concentrates from vegetable sources are coated with powdered rice, yeast, or egg to give a free-running powder, which is blended with dried spices.

E. B. HUGHES.

Rapid pickling of meat [in airtight containers]. M. NEGELE-FISCHER (B.P. 351,355, 2.10.30).

[Case for] preservation by cooling of foodstuffs and the like exposed for sale. A. E. SIMCOCK (B.P. 350,620, 29.3.30).

Treatment of tea etc.—See XX.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Ipecacuanha preparations and their stability. H. ESCHENBRENNER (Pharm. Ztg., 1931, 76, 694—696).—Notes on the stability of infusions and fluid extracts of ipecacuanha root prepared under various conditions are given. Double infusions, 1 : 400, with the addition of small quantities of HCl gave extracts of most const. composition and highest alkaloid activity. A fluid extract, 1 : 20, prepared with dil. alcoholic HCl suffered no loss in alkaloid activity over a period of nearly 2 years.

E. H. SHARPLES.

Testing of ferrum reduction D.A.B. VI and distinction between this and ferrum pulveratum D.A.B. VI. M. SIEGERT (Pharm. Ztg., 1931, 76, 624—625).—The methods of testing ferrum reductum described in D.A.B. VI do not distinguish between reduced Fe and powdered Fe. These two products may be distinguished from one another by shaking with 20 times the wt. of cold H₂O; in 1 hr. all the powdered Fe has settled, whereas the reduced Fe forms a colloidal suspension; in 48 hr. the walls of the vessel are covered with a brown layer if the prep. is powdered Fe, whereas reduced Fe has settled completely and the deposit is full of gas bubbles, but no brown flakes remain floating. If the prep. is heated in the air to dull redness, reduced Fe becomes rapidly covered with a red layer of Fe₂O₃, whereas powdered Fe is converted into black Fe₃O₄. The preps. can also be distinguished from one another under the microscope, reduced Fe appearing matt and lustreless, whereas powdered Fe shows sharp edges and irregularly sized particles which are more or less burnished.

A. R. POWELL.

Preparation of bismuth oxyiodide tannates. A. MIHALOVICI and G. SPECH (Pharm. Zentr., 1931, 72, 401—402).—The method given is a modification of that described in G.P. 101,776.

E. H. SHARPLES.

“**Enflourage**” of **jasmin**. TRABAUD (Parfum. Mod., 1930, No. 2, 84—85).—Me anthranilate and indole, which improve the odour, are obtained in extraction by fat. The method affords a higher yield than ordinary extraction. CHEMICAL ABSTRACTS.

Bactericidal efficiency of essential oils. R. E. MILLER (Amer. J. Pharm., 1931, 103, 324—328).—The bactericidal efficiency of numerous essential oils and synthetics has been tested by their action on *B. typhosus* and *S. albus* and by a determination of their PhOH coeffs. When two or more of the oils or active principles are mixed in a solution of 31 pts. each of EtOH, glycerin, and H₂O, and 6.6 pts. of soap, the resulting mixture has a greater bactericidal efficiency than when each substance is used separately and in larger units. E. H. SHARPLES.

Bergamot industry. F. LA FACE (Boll. Uff. Staz. Sperim. Ind. Ess. Agrumi Calabria, 1931, 6, 46—67).—A review of the Calabrian bergamot industry, with suggestions for its technical improvement. The content of essential oil does not vary regularly as the gathering season (Dec.—Feb.) advances, although generally higher yields are given in the early, and lower ones in the later, periods. Improved extraction of the essential oil is realisable by the use of the machine now employed in Sicily for the treatment of lemons, the fruit being subjected to centrifugation and sprayed with H₂O, which is returned to process after the oil has been separated. Addition of salts to the H₂O, in accordance with Cusmano and Bennett's patent, enhances the separation of the oil, which is of excellent odour and paler than that obtained with the ordinary presses, and contains less stearoptene and more esters. T. H. POPE.

Some abnormal aniseed oils and B.P. requirements. W. M. SEABER and S. MARSHALL (Perf. Ess. Oil Rec., 1931, 22, 163—165).—The abnormally low *n* vals. (< 1.5520 at 25°) of some otherwise quite satisfactory star-anise oils, these values bearing no relationship to the f.p. or m.p., are not due to deficiency of anethole. There is present in such an oil a fraction of low b.p. and *n* val., but otherwise the oil is quite genuine. It is suggested that the B.P. limit should be lowered to *n*₂₅²⁵ 1.5510. Distillation ranges of several oils are given, and it is considered that the B.P. requirements are too strict. E. H. SHARPLES.

Essential oil of *Eucalyptus rariflora* (Bailey). A. R. PENFOLD, C. B. RADCLIFFE, and W. F. SHORT (J. Proc. Roy. Soc. New South Wales, 1930, 64, 101—114).—*E. rariflora*, on steam-distillation, gave 2.05—2.94% (2 samples) of oil having, respectively: *d*₁₅¹⁵ 0.9072, 0.9154; α _D²⁰ —8.5°, —10°; *n*_D²⁰ 1.4872, 1.4909; ester val. 10.0, 15.4; ester val. after acetylation 58.0, 75.4; solubility in 80% EtOH 0.8 vol., partly in 10 vols. The oil contained Δ^4 -carene, β -phellandrene, *l*- α -pinene, β -pinene, cymene, cineole (10—15%), sesquiterpenes (principally aromadendrene), sesquiterpene alcohols, with small quantities of cuminal, phellandral, and cryptal, unidentified phenols, and dehydroangustione (β -diketone). E. H. SHARPLES.

Essential oils from some cultivated Eucalypts. II. A. R. PENFOLD and F. R. MORRISON (J. Proc. Roy. Soc. New South Wales, 1931, 64, 210—223; cf. B.,

1927, 28).—Particulars of oils from the following trees grown from seed in New South Wales are given: *E. Australiana* (1.8% yield, *d*₁₅¹⁵ 0.9191, α _D²⁰ +4.6°, *n*_D²⁰ 1.4651; contained 50—56% of cineole, no phellandrene), *E. Macarthuri* (0.2—0.55%, *d*₁₅¹⁵ 0.9248—0.9326, α _D²⁰ +2° to +4.75°, *n*_D²⁰ 1.4705—1.4753; geranyl acetate 62.5—71.5%), *E. Macarthuri* from Kenya Colony (0.22%, *d*₁₅¹⁵ 0.9247, α _D²⁰ +2.2°, *n*_D²⁰ 1.4702; geranyl acetate 69.5%), *E. Smithii* (0.63%, *d*₁₅¹⁵ 0.9235, *n*_D²⁰ 1.4657, cineole 65%), *E. citriodora* (0.6—1.4%, 5 samples grown at different times of the year described), *E. Dives* (3.4—3.8%, *d*₁₅¹⁵ 0.8891—0.9037, α _D²⁰ —64.8° to —72.5°, *n*_D²⁰ 1.4794—1.4812, piperitone 52%), *E. Dives*, var. *B.* (3.1%, *d*₁₅¹⁵ 0.9149, α _D²⁰ —7.2°, *n*_D²⁰ 1.4660 cineole 45—48%, piperitone 8%, much phellandrene), *E. Dives*, var. *A.* (3%, *d*₁₅¹⁵ 0.8803, α _D²⁰ —55.25°, *n*_D²⁰ 1.4793, piperitone 3%). *E. bicostata* (Maiden, Blakely, and Simmonds). Oils from different types (5) of leaves of this form of *E. globulus* were obtained in 1.23—2.4% yield and had *d*₁₅¹⁵ 0.9194—0.9336, α _D²⁰ +8° to +20°, *n*_D²⁰ 1.4646—1.4804, ester val. 6.0—24.6, ester val. after acetylation 36.3—103.7, solubility in 70% EtOH 1 in 1.1 to 1 in 1.5. The principal constituents were cineole 38—65% (*o*-cresol method), *d*- α -pinene, eudesmol, and isovaleraldehyde. E. H. SHARPLES.

Essential oils of three species of *Geijera* and the occurrence of a new hydrocarbon. I. A. R. PENFOLD (J. Proc. Roy. Soc. New South Wales, 1931, 64, 264—297).—Leaves and terminal branchlets were steam-distilled in each case. *G. parviflora*, var. *A.* (N.S.W.), gave 0.17—0.53% of essential oil having *d*₁₅¹⁵ 0.8676—0.8942, α _D²⁰ +22.8° to +50.85°, *n*_D²⁰ 1.4721—1.4886, ester val. 1.8—15.2, ester val. after acetylation 14.5—48.9, solubility in 80% EtOH, insol. in 10 vols. (11 samples) and sol. in 10 vols. (1 sample), and containing *d*- α -pinene, camphene, limonene, dipentene, cineole, sesquiterpenes, and phloracetophenone dimethyl ether. *G. parviflora* from Queensland: five samples grown at Eidsvold gave 0.6—1.18% of oil having *d*₁₅¹⁵ 0.9070—0.9199, α _D²⁰ —6° and —7° (2 samples), *n*_D²⁰ 1.4987—1.5042, ester val. 4.5—15.1, ester val. after acetylation 71.2—103.0, and containing linalool, a hydrocarbon, C₁₁H₁₈ (b.p. 198—199°/774 mm., *d*₁₅¹⁵ 0.8788, α _D²⁰ 0°, *n*_D²⁰ 1.4914), constituting about 50% of the oil, and unidentified terpenes, together with small amounts of azulene and octoic acid. Oil from material grown at Rockhampton was similar to the Eidsvold oil with the exception that a considerable quantity of phloracetophenone dimethyl ether was present. Plants from Dalby gave an oil resembling those from New South Wales and containing pinene and camphene in quantity. *G. Muellieri* (Bentham) yielded only 0.09% of oil having *d*₁₅¹⁵ 0.9132, α _D²⁰ +14.8°, *n*_D²⁰ 1.4920, ester val. 12.9, ester val. after acetylation 57.0, solubility in 80% EtOH, insol. in 10 vols., and containing *d*- α -pinene, *d*-camphene, cadinene, sesquiterpene alcohol, and an unidentified alkali-sol. substance (0.3%). *G. salicifolia* (Schott) from Eidsvold gave 0.02—0.1% of essential oil and 0.2—1.27% of solid oil, the latter being phloracetophenone dimethyl ether (m.p. 82°). The constituents of the oil (*d*₁₅¹⁵ 0.9139—0.9344, α _D²⁰ —4.8° to +6.4°, *n*_D²⁰ 1.4839—1.5006, ester val. 8.7—32.0, ester val. after acetylation 105.6—134.3) could not be identified. E. H. SHARPLES.

Essential oils of *Zieria Smithii* (Andrews) and its various forms. I. A. R. PENFOLD (J. Proc. Roy. Soc. New South Wales, 1930, 64, 83—89).—Fresh and air-dried leaves of *Z. Smithii* gave 0.4% and 0.9% of oil, respectively, and the respective constants were: d_{15}^{20} 1.0588, 1.0449; α_D^{20} +5.2°, +4.95°; n_D^{20} 1.5264, 1.5232; ester val. 18.8, 4.6; ester val. after acetylation 28.7, 26.1; solubility in 80% EtOH 1 in 4 vols., 1 in 1.4 vols. The main constituents of the oils were phenol ethers (70—80%), mainly safrole and a little methyleugenol, with small quantities of *d*- α -pinene, sesquiterpenes, eugenol, stearic acid, etc.

E. H. SHARPLES.

MgO₂.—See VII. Examinations with ultra-violet light.—See XI.

See also A., July, 808, Millon's reagent. 813, Determination of Hg₂Cl₂. 847, Rotenone from *Derris* root. Perfumes in fungi. 850, Cinchona alkaloids. 854, Sparteine from *Chelidonium majas*. *Corydalis* alkaloids. 855, *Strychnos* alkaloids. Org. derivatives of Si. Org.—Sb compounds. 856, Reagent for free phenolic OH groups in org. compounds. Determination of cocaine and its salts. 857, Microchemical identification of alkaloids. 870, Toxic principle from Nao-Yang-Hua. 871, Alkaloids of gelsemium. 872, Pantocaine, a new local anæsthetic. 876, Decomp. of nicotine in tobacco. 877, Diphtheria antitoxin. Germicidal efficiency of *o*-phenylphenol. 878, Posterior pituitary prep. Separation of sexual hormones. 879, Prep. of Theelol. 880—1, Pure carotene and vitamin-A. Vitamins (various). 881, Cryst. antineuritic substance. Vitamins of fish oils. 886, Oil and alkaloids in seeds of *Papaver somniferum*. Benzylmethylamine in Ma Huang extract.

PATENTS.

Mercury derivatives of tetraiodofluorescein. L. M. ROEG, Assr. to BREWER & Co., Inc. (U.S.P. 1,786,172, 23.12.30. Appl., 11.11.27).—An aq. suspension of erythrosin is treated with Hg(OAc)₂ and AcOH, the mixture diluted with water, boiled, filtered, and the ppt., after washing, dissolved in *N*-NaOH to give a neutral, non-poisonous, stable alkali salt of the mono-Hg derivative of tetraiodofluorescein.

E. H. SHARPLES.

Manufacture of benzimidazolonestibinic acid. I. G. FARBENIND, A.-G. (B.P. 343,744, 19.2.30. Ger., 30.3.29. Addn. to B.P. 343,072; B., 1931, 612).—An *o*-arylenediaminestibinic acid is treated with 1 mol. of a chloroformic ester; e.g., 4-nitro-*o*-phenylenediamine is diacetylated, reduced, diazotised, and converted into the diacetylstibinic acid, which is hydrolysed and condensed with ethyl chloroformate. C. HOLLINS.

Extraction of pyrethrum. W. J. TREVILLIAN, Assr. to W. T. RAWLEIGH Co. (U.S.P. 1,786,967, 30.12.30. Appl., 14.4.29).—Pyrethrum flowers are extracted with a petroleum fraction and the marc is expressed with a twisting motion, i.e., in a screw conveyor having a diminishing pitch. The residue is re-extracted and re-expressed.

E. H. SHARPLES.

Manufacture of a thyroid gland preparation. I. G. FARBENIND, A.-G. (B.P. 349,966, 28.2.30. Ger.,

28.2.29).—An aq. extract of thyroid glands is treated with a limited quantity (40—45 pts. by vol.) of saturated aq. (NH₄)₂SO₄ or other very sol. salt. The ppt. is rejected and the aq. extract completely or fractionally precipitated by further addition of the saturated solution, the total of which added does not exceed 80% of the original aq. extract. The ppts., which have the character of I-albumoses (0.6—0.8% I), are purified by dialysis and reprecipitation. E. H. SHARPLES.

Manufacture of lens extract. E. H. STUART, Assr. to E. LILLY & Co. (U.S.P. 1,787,179, 30.12.30. Appl., 11.10.26).—Lenses of the eyes of animals, e.g., hogs or cattle, are extracted, preferably several times and both hot and cold, with EtOH. The combined extracts are filtered, evaporated with the addition of H₂O until all the EtOH is removed, and the residue is defatted, conc., filtered, and preserved.

E. H. SHARPLES.

Treatment of tobacco, tea, petals of flowers, and the like aromatic vegetable products. MONTIS A.-G., and S. ROSENHOCH (B.P. 349,992, 27.1.30).—The products, preferably at 30—70°, are treated electrically in the presence of metals having a bactericidal action. The Cu, Ag, etc. ions may be dispersed throughout the material or form the electrodes (in the form of rollers, bands, etc.) or the substances may be treated between two metallised travelling bands which form the electrodes. The material may be ozonised either before, during, or after treatment.

E. H. SHARPLES.

Manufacture of vaccine for hog cholera. M. DORSET (U.S.P. 1,784,928, 16.12.30. Appl., 1.9.28).—Hog cholera virus is treated at below 41° (37.5° for about 48 hr.) with CH₂O in an amount sufficient to destroy its disease-producing property without affecting its immunising power.

E. H. SHARPLES.

Perfumery. [Adsorption of perfumes.] E. E. REID (U.S.P. 1,786,630, 30.12.30. Appl., 31.10.22).—Flowers are treated with powdered adsorbent mineral gel or other adsorbent, either directly or in counter-current direction in a specified apparatus and, if desired, in a tenuous atm. The impregnated adsorbent may be used as such or the odorous material recovered by a counterflow solvent-extraction process.

E. H. SHARPLES.

Insecticides.—See XVI. **Dietetic foods.**—See XIX.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Measurement of the sensitivity of [photographic] emulsions. Comparative results by different methods. L. LOBEL and M. DUBOIS (Bull. Soc. franç. Phot., 1931, 18, 52—61).—From comparisons with practical exposure tests, the Hurter and Driffeld (inertia) method is more accurate than are the methods of Jones and Russel, Labussière, or Scheiner. Practical results are on the average 25% higher than those given by the first method.

J. LEWKOWITSCH.

Effect of environment on photographic sensitivity III. Effect of sodium sulphite. S. E. SHEPPARD and E. P. WIGHTMAN (Phot. J., 1931, 71, 281—287; cf. B., 1929, 303).—KBr, except at strong concentrations,

lowers the speed of an emulsion only when present during exposure; Na_2SO_3 is effective when plates are treated either before, during, or, to a lesser degree, after exposure. Gamma is decreased only by Na_2SO_3 .

J. LEWKOWITSCH.

Additive and subtractive effect in two successive photographs. R. LANDAU (Sci. Ind. phot., 1931, [ii], 2, 1—4; Chem. Zentr., 1931, i, 1868).—The desensitising action on a photographic film of short exposure to light of high intensity is discussed. The effect was not observed with positive film, and hence appears to be connected with the sensitisation of the emulsion.

A. A. ELDRIDGE.

Photographic gelatin. R. SPYCHALSKI and J. TOMASZEWSKI (Przemysl Chem., 1931, 15, 202—213).—The higher the initial viscosity of gelatin solutions, and the smaller the temp. change of this value, the more suitable is the given gelatin for photographic purposes. The presence of salts used in photography, such as bromides etc., considerably affects the viscosity of gelatin solutions. The m.p. and setting point of gelatin jellies are also useful criteria of their technical suitability. All salts examined lower the m.p. and f.p., the action of anions being in the order $\text{Cl} > \text{Br} > \text{NO}_3$.

R. TRUSZKOWSKI.

Composition of developer in mechanical development of kinematographic positive film. J. I. CRABTREE and C. E. IVES (Sci. Ind. phot., 1931, [ii], 2, 26—31; Chem. Zentr., 1931, i, 1868).—Changes during development, and additions necessary to counter-balance them, are discussed.

A. A. ELDRIDGE.

Photographic reducers. G. ROBIN (Sci. Ind. phot., 1931, [ii], 2, 24—26; Chem. Zentr., 1931, i, 1868).—A study of the action of KMnO_4 , $\text{Ce}(\text{SO}_4)_2$, $(\text{NH}_4)_2\text{S}_2\text{O}_8$, and Farmer's reducer in relation to contrast.

A. A. ELDRIDGE.

Photochemistry on paper and glass. A. REYCHLER (Bull. Soc. chim. Belg., 1931, 40, 254—258).—The latent image produced on filter paper soaked in an aq. fine suspension of AgBr , or AgNO_3 solution, or a Ag sol, then partly dried, exposed, and washed, can be developed physically. An emulsion on glass, exposed while still fluid, through the back of the plate, and washed off, leaves a developable latent image adhering lightly to the glass.

J. LEWKOWITSCH.

See also A., July, 805, **Cathodic projection of elements. Light sources for photochemical reactions.** 806, **Separate processes in ripening. Theory of the latent image. Fastness to light of azo dyes. Photographic effects of vitamins-A and -B.**

PATENTS

Manufacture of photographic pictures on chromated gel layers. N. LEBEDENKO (U.S.P. 1,785,635, 16.12.30. Appl., 28.4.28. Ger., 4.5.27. Cf. G.P. 455,046; B., 1930, 121).—The briefly exposed, sensitised layer is treated before staining with an atm. supersaturated with steam, below 40° ; some AcOH or CO_2 may be added to the vapour. A uniform light exposure may be imposed after short treatment in the dark, and, when on both the back and front of the gel layer, prevents wrinkling.

J. LEWKOWITSCH.

[Production of kinematographic pictures of long narrow type in] colour photography. TECHNICOLOR MOTION PICTURE CORP., Assees. of J. A. BALL (B.P. 351,306, 14.8.30. U.S., 21.8.29).

XXII.—EXPLOSIVES; MATCHES.

Determination of the maximum detonation velocity of nitroglycerin and nitroglycol. P. NAOUM and A. BERTHMANN (Z. ges. Schiess- u. Sprengstoffw., 1931, 26, 188—190).—The tests were carried out by Dautriche's method in seamless steel tubes of various thicknesses and diameters, the explosive being initiated by a No. 8 detonator, with or without a picric acid primer. The average value for nitroglycerin was 8500, and for nitroglycol 8250 m./sec. Dserschkovitsch and Andreev's contention (B., 1930, 1170) that the alleged low sensitiveness of nitroglycerin is due to the labile isomeride cannot be maintained on either practical or theoretical grounds. Loss in sensitiveness of stored gelatinous explosives is caused by increase in sp. gr. due to diminution in the air content (cf. B., 1931, 464).

W. J. WRIGHT.

Determination of velocity of detonation by Dautriche's method with niperyt (pentaerythritol tetranitrate) detonating fuse. W. FRIEDERICH (Z. ges. Schiess- u. Sprengstoffw., 1931, 26, 184—187).—The detonation velocity of various portions of a length of fuse varied over the ranges 0.16—3.76, 0.16—1.30, and 0—0.37% with fuse filled with trotyl, fulminate, and niperyt, respectively. If trotyl fuse is bent the density of the filling is considerably decreased and a reduced velocity is obtained. With fulminate and niperyt fuse this does not occur. The velocities of trotyl, fulminate, and niperyt fuse are 4500—5000, 5000—5300, and 6300—7300 m./sec., respectively. The results of velocity determinations on liquid and solid stable nitroglycerin, blasting "gelatine," dynamites, and trinitrotoluene, initiated by a compressed charge of niperyt and paraffin wax, are tabulated. The highest value obtained for liquid nitroglycerin was 8242 m./sec., and for the solid stable material 8287 m./sec.

W. J. WRIGHT.

PATENTS.

Propellant powder and method of colloidizing same. C. H. KECK (U.S.P. 1,784,189, 9.12.30. Appl., 28.6.27).—Nitrocellulose is rendered colloidal by incorporating it with one or more nitro-aromatic compounds and only sufficient solvent to dissolve the latter, the product being subjected to pressure and heat. A suitable composition consists of nitrocellulose 74.5, trinitrotoluene 15, dinitroxyline 10, and NHPh_2 0.5%.

W. J. WRIGHT.

Explosive. C. H. WATERS, Assr. to DUMOV NAT. CHEM. Co. (U.S.P. 1,786,046, 23.12.30. Appl., 26.3.27).—A chlorate blasting explosive contains liquid mononitrotoluene and liquid dinitrotoluene together with other constituents. A suitable composition is: NaClO_3 29.84, NaNO_3 45.86, CaCO_3 3.31, crude mononitrotoluene 2.62, crude dinitrotoluene 10.91, and sawdust 7.46%.

(Cf. U.S.P. 1,073,279; B., 1913, 992.) W. J. WRIGHT.

Manufacture of explosives and blasting charges. DYNAMIT A.-G. (B.P. 350,293, 14.7.30. Ger., 22.11.29).—Explosives capable of being cast are produced by forming

eutectic mixtures of monoethanolamine dinitrate and diethanolamine trinitrate or of either of these with methylamine nitrate, other ingredients being added, if desired.

W. J. WRIGHT.

Manufacture of detonators. C. A. WOODBURY, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,783,372, 2.12.30. Appl., 3.5.28).—The base charge consists of a compound, melting below 100° and having high sensitiveness, *e.g.*, erythritol tetranitrate, which may be mixed with another solid explosive. The charge is melted and allowed to solidify, an initiating composition being then pressed on the top of it.

W. J. WRIGHT.

Electric blasting cap and ignition material for the same. E. I. DU PONT DE NEMOURS & Co. (B.P. 350,036, 11.3.30. U.S., 18.3.29).—In electric detonators, the loose igniting composition above the main charge comprises a thiocyanate, an oxidising compound, and a material containing not more than one nitric ester and having a low ignition temp. A suitable composition consists of $\text{Pb}(\text{CNS})_2$ 30–50%, KClO_3 10–30%, and ground smokeless powder ("Pyro-powder") 30–50%.

W. J. WRIGHT.

XXIII.—SANITATION; WATER PURIFICATION.

Effect of iron on the anaërobic decomposition of sewage sludge. L. R. SETTER (Sewage Works' J., 1930, 2, 504–520).—Gasification is not affected by FeCl_3 up to 5 p.p.m.; at 5–20 p.p.m. the digestion period is doubled or trebled. Retardation is partly eliminated by neutralisation of the hydrolytic acidity; 10 p.p.m. is not toxic to the organisms, but 20 p.p.m. reduced the microbial population. Fe, or Fe oxide or hydroxide, has no effect; FeCl_2 , FeSO_4 , or Fe acetate or citrate cause slight retardation.

CHEMICAL ABSTRACTS.

Correlation between biochemical oxygen demand and suspended solids of activated sludge effluent. H. G. SWOPE (Sewage Works' J., 1930, 2, 500–503).—The demand increases with increase in the solids. The relative increase in the demand is the greater as the period of incubation is prolonged.

CHEMICAL ABSTRACTS.

Water purification processes at Cleveland, Ohio. W. C. LAWRENCE (J. Amer. Water Works' Assoc., 1931, 23, 896–902).—Plant studies show that Great Lake H_2O requires a detention period of 2–8 hr. and not more than 1.1 grains of coagulant per gal.; that sand filters remain clean if a 50% expansion with wash-water is available; and that $\text{NH}_3\text{-Cl}_2$ is preferable to activated C for odour and taste removal. Laboratory tests suggest that FeCl_3 with a slow rate of mixing will give the most rapidly settling floc.

C. JEPSON.

Formation of artificial and natural protective layers in water conduits. L. W. HAASE (Gas- u. Wasserfach, 1931, 74, 572–576. Cf. B., 1929, 266).—The theory of the formation of natural protective layers of oxide or Ca salts on Fe water conduits is outlined. Waters rich in alkaline-earth carbonates and containing dissolved O_2 are able to form protective layers; waters poor in such carbonates may form such layers, if other conditions are favourable. Acid waters of low carbonate

content form a layer of rust which does not protect from further attack. Some protection is afforded by coating the Fe with Zn or bitumen, but neither method is entirely satisfactory. The protective action of the Zn coating fails after the deposition thereon of a layer of Ca salts. Pb pipes should be used only with waters rich in alkaline-earth carbonates and O_2 , which rapidly form a protective layer. Strongly corrosive waters may be submitted to deacidification, or should be distributed through conduits of more resistant metal. In hot-water systems two types of deposit are possible, *viz.*, a hard adherent layer and a sludge. The latter is not dangerous, whilst the former is beneficial if not allowed to become too thick. This danger may be avoided by controlling the O_2 content of the water.

A. B. MANNING.

Tests for control of water-softening plant. L. O. NEWTON (Fuel Econ. Rev., 1931, 10, 59–61).—A review of known processes.

D. K. MOORE.

Fumigation with formaldehyde: an attempt to improve Storm's method. D. W. HORN and L. E. HUNTER (Amer. J. Pharm., 1931, 103, 332–335).—The action of formalin on a mixture of KMnO_4 and KClO_3 is directly proportional to the amount of KMnO_4 present, *i.e.*, as measured by the % of total CH_2O evolved as gas by the heat generated during oxidation. The need for external heating to initiate the oxidation is not obviated by the use of KMnO_4 (cf. B., 1930, 122).

E. H. SHARPLES.

Water for steam plant.—See I. Corrosion of water-pipes.—See X. Poisonous action of lead pigments.—See XIII. Essential oils as bactericides.—See XX.

See also A., July, 801, Preparation of "equilibrium" and conductivity waters. 877, *o*-Phenylphenol as germicide.

PATENTS.

Water softening and purification. A. R. MOBERG, Assr. to F. O. PAIGE, JUN. (U.S.P. 1,786,501, 30.12.30. Appl., 15.4.29).—A conc. solution of FeCl_3 containing peptised $\text{Al}(\text{OH})_3$ is used to clarify H_2O , and this reagent may be combined with CaO and soda-ash for softening purposes and to coagulate the ppt. W. G. CAREY.

Purification of swimming-bath water. R. ADLER (B.P. 350,540, 12.3.30. Czechoslov., 13.3.29).— H_2O , continuously withdrawn from the bath, is treated with excess of Cl_2 and is then passed through carbonaceous material, NH_3 or an NH_4 salt being added at any desired point in the cycle of operation. The H_2O may be filtered through a sand, or Mn-removing, filter.

W. G. CAREY.

Warning means for poison gases. [Fumigant.] H. LEHRECKE, Assr. to ROESSLER & HASSLACHER CHEM. Co. (U.S.P. 1,786,623, 30.12.30. Appl., 24.6.26. Austr., 18.7.25).—90–95% of HCN and 10–5% of chloropicrin are absorbed in, *e.g.*, active charcoal or kieseluhr.

L. A. COLES.

Structures for protection against poisonous gases. E. KRAEMER and K. HÖRRMANN (B.P. 350,832, 4.9.30).

Preventing boiler scale.—See I.