

BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

SEPT. 11 and 18, 1931.*

I.—GENERAL; PLANT; MACHINERY.

Sight feed for centralising control of distillation equipment. D. F. OTHMER (Chem. Met. Eng., 1931, 38, 415—416).—The liquor passes to the column through an orifice in the bottom of a sight feed box. One end of an inverted U-pipe is below the liquor level in the feed box and the other is carried to the central control level and connected with a manometer. By pumping air through a connexion to the pipe the liquor level is indicated on the manometer. A pipe on the feed box acts as a vent for the air.
D. K. MOORE.

Measurement of small particles. W. L. GADD (Cement, 1931, 4, 763—767).—A direct method is actually to measure the diameter of a number of particles in one direction only on a microscope slide without reference to the orientation of the particles; the average diameter being obtained measured in several directions, the law of averages equalises the orientation. For fine particles which may be held in suspension in a suitable viscous liquid, e.g., medicinal paraffin or a sugar solution, a definite vol. of the powder suspended in the solution is allowed to flow into a vertical calibrated glass tube, which is illuminated from beneath until opacity is attained, at which point the height of the suspension is noted. The standard normal suspension for comparison consists of 0.5 g. of pulverised quartz sand suspended in 100 c.c. of sugar solution (150 g. of sugar in 100 c.c. H₂O). This method is not suitable for cement particles >200 mesh/linear inch.
C. A. KING.

Influence of the proximity of a solid wall on the consistency of viscous and plastic materials. III. R. K. SCHOFIELD and G. W. S. BLAIR (J. Physical Chem., 1931, 35, 1212—1215; cf. B., 1930, 844).—Theoretical. A solid wall may modify the consistency of the material at an appreciable distance from it.
L. S. THEOBALD.

Problems in the conduction of heat. G. GREEN (Phil. Mag., 1931, [vii], 12, 233—255).—Mathematical.

Polariscopes.—See VIII. **Electrical gas purification.**—See XI.

See also A., Aug., 928. **Ebullioscope for testing purity of liquids.**

PATENTS.

Regenerative reverberatory furnace. O. SCHWITZER, and EISEN- U. STAHLWERK HOESCH A.-G. (B.P. 351,297, 6.8.30).—A form of inlet-outlet passage and removable angle piece between the furnace and regenerators (which are provided for air only) is described.
B. M. VENABLES.

Furnaces for supplying heating and drying gases. J. CHATWIN. From SCHMITZ & Co., G.M.B.H. (B.P. 351,625, 14.4.30).—A supply of moderately hot gases is produced by causing cold compressed air to induce a draught through the bottom of the furnace; the induced air enters at the top of the furnace but at once passes into an annular space surrounding the fuel and is admitted into and passes through the fuel at a considerable distance below the top.
B. M. VENABLES.

Rotatable drying drums of the class divided into compartments. F. HAAS (B.P. 351,130, 8.4.30).—An arrangement of lifting and distributing blades is described. [Stat. ref.]
B. M. VENABLES.

Rotary dryer. W. A. HARTY and F. W. MOORE, Assrs. to HARMOR & Co., Inc. (U.S.P. 1,787,197, 30.12.30. Appl., 5.5.28).—A rotary dryer in which the material travels in an annular space between a hollow core and the outer shell has the former extended at the feed end and a burner placed therein. A worm conveyor is either attached to the core or separately driven below it. The worm runs in a casing having an open top to receive the feed.
B. M. VENABLES.

Drying or concentrating of raw sludge substances. L. MELLERSH-JACKSON. From F. KRUPP GRUSONWERK A.-G. (B.P. 351,328, 3.9.30).—Sludge, e.g., cement slurry, is lifted into the path of hot gases, e.g., kiln exhaust gases, on the faces of a number of rotating discs in one or more stages, from the earlier of which it falls back into the feed trough and from the last of which it is scraped. Filtration may be effected before, intermediately, or after thickening by heat, and the filter cake may be formed into blocks and calcined in a shaft furnace.
B. M. VENABLES.

Heat-exchange apparatus. C. F. HAMMOND and W. SHACKLETON (B.P. 351,020, 19.3.30).—Apparatus of the type comprising a pile of plates provided with spiral or other channels on both sides is operated with heat exchange through the thickness of the plates only by the provision of separating plates of insulating material which reduce the conductivity of the pile as a whole and improve the countercurrent effect. The ribs touching both sides of an insulating plate are arranged to be opposite each other.
B. M. VENABLES.

Heat interchanger. A. E. PEW, JUN., Assr. to SUN OIL Co. (U.S.P. 1,787,086, 30.12.30. Appl., 10.6.26).—A heat exchanger of the bundle-of-tubes type having return flow has one tube plate fixed in the casing and the other free to slide. The casing is constructed of a number of pairs of semi-cylindrical sections.
B. M. VENABLES.

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

Heat-exchanging apparatus for liquids. R. A. LISTER & Co., LTD., and P. H. WATTS (B.P. 351,587, 2.4.30).—A method of connecting the edges of corrugated sheets to end-pieces without leaving sharp corners is described.
B. M. VENABLES.

Ball crushing mills. S. A. WARD (B.P. 350,964, 18.3.30).—The material is dried by hot air in an annular passage between the fixed outer wall and rotating inner wall of the mill, slides down fixed funnel-shaped members, and is alternately caught and flung out by rotating dished members, falling at the bottom into the path of the rotating balls, and after crushing is drawn up the central passage by the same air current.
B. M. VENABLES.

Apparatus for separating or sorting crushed material. S. A. WARD (B.P. 351,129, 8.4.30).—A grinding mill, which may be of the ball-race type, is covered by a plate provided with a central aperture for an updraught conveying all the crushed material, and, nearer the periphery, sets of apertures for supply of hot air, supply of new material, and return of oversize. In a separator above, the updraught is deflected downwards with deposition of coarse material into shoots leading to the apertures, which are preferably closed by doors automatically opening when material has accumulated. The draught is diverted upwards again through an annular space of much larger area than the central uptake and passes to a fan at the top which induces all the draught and is driven from the mill by a shaft running up through the hollow main shaft.
B. M. VENABLES.

Extracting and sampling dust from dust-laden air or gas flowing in a conduit. DAVIDSON & Co., LTD., and J. WHITMORE (B.P. 351,584, 2.4.30).—The sampling tube faces the main current of gas and serves also as a Pitot tube to measure the pressure and velocity conditions in both the main and sample stream. A pair of smaller tubes are run along the wall of the sample tube, one inside, the other outside; both have closed ends and small side apertures and are used to measure the static pressure. In use the rate of flow of the sample aspirated through a filter is adjusted so that the two static pressures are equal; the velocity of the sample is then equal to that of the main stream, and the cross-section of the sample tube is a definite fraction of that of the main stream, so that calculation is simple.
B. M. VENABLES.

Reducing and classifying materials. H. G. LYKKEN (B.P. 351,069, 22.3.30. U.S., 29.3.29).—The material is fed into the bottom of a vertical casing by a mechanical device which also keeps it gently agitated. It is crushed by impact against the corrugated walls, a vortical motion being produced by a lower rotor with an air supply just above. The air-borne material rises to an upper chamber, where a second impellor produces a vortical motion for purposes of classification, the oversize falling back to the grinding compartment through controlled ports near the wall of the casing.
B. M. VENABLES.

Pneumatic separators. E. BARTHELMESS (B.P. 350,932, 7.3.30. Ger., 7.3.29).—An apparatus is described in which coarse material is separated by simple

deflexion with subsequent separation of finer products in whirling streams of air.
B. M. VENABLES.

Freezing of colloidal liquids. B. P. TSITOVITSCH (B.P. 351,132, 8.4.30. Esth., 8.4.29).—Liquids comprising or containing biocolloids are rapidly frozen by applying them to surfaces, which are much colder than the lowest f.p. of any constituent, in the form of a thin layer, in drops or in an atomised condition. The frozen layer is removed by scraping or other means and the material kept at a low temp. until thawing is required; when this is effected the original qualities of the material will be recovered unchanged.
B. M. VENABLES.

Centrifugal-bowl separator. C. SCHMITZ (U.S.P. 1,786,921, 30.12.30. Appl., 22.4.29. Ger., 27.4.28).—A detachable cover embodying collecting vessels and supply and delivery pipes is described.
B. M. VENABLES.

Washing slimy-pulpy, finely-divided, or liquid products. L. ALTPETER, and GUTEHOFFUNGSHÜTTE OBERHAUSEN A.-G. (B.P. 351,192, 17.5.30).—The material and the wash liquor are supplied in turn to a centrifuge, the lighter liquid, usually the wash water, first, so that they change places in the bowl. After the lighter liquid has collected inwardly it is removed by an overflow device that does not cause agitation.
B. M. VENABLES.

Filter-leaf construction. W. H. BACHELDOR, Assr. to STANDARD OIL Co. (U.S.P. 1,787,100, 30.12.30. Appl., 5.8.29).—The leaf is constructed of coarse wire mesh or other spacing material supported in a frame, which is considerably thicker. Finer wire gauze and filter cloth are clamped outside the frame and metallic strips are placed round the interior of the frame to preserve a clear passage for filtrate all round the circumference.
B. M. VENABLES.

Prevention of incrustation in boilers. H. MENZ (B.P. 351,331, 8.9.30).—A device containing rolled strips of fabric coated with a tannin extract and a water-softening salt is inserted in the boiler.
B. M. VENABLES.

Saturation of superheated steam. I. G. FARRENIND. A.-G. (B.P. 351,296, 1.8.30. Ger., 1.8.29).—Superheated steam is bubbled into water through a perforated pipe or other device and the bubbles are further broken up by beds of balls, rings, etc. in one or more stages.
B. M. VENABLES.

De-scaling of tubes. F. ABLARD, J. JOHNSTON, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 350,922, 17.1. and 15.2.30).—Scale is removed from the exterior of tubes by internal high-speed hammering effected by collars loosely mounted on the cranks of a crankshaft rotating at at least 10,000 r.p.m. The cranks have small throw, and either may be rigid for straight tubes or may consist of flexible shafts eccentrically mounted in bearings which are rounded off so as easily to enter the tubes.
B. M. VENABLES.

[Acoustic] means for indicating changes in gases. A. MEISSNER, Assr. to GES. F. DRAHTLOSE TELEGRAPHIE M.B.H. (U.S.P. 1,789,369, 20.1.31. Appl., 30.6.27. Ger., 10.8.26).—A piezo-electric crystal is arranged in the input circuit of a thermionic oscillator

and is provided with two electrodes, one of which is spaced from a face of the crystal a distance equal to an odd number of half wave-lengths of sound corresponding to the natural period of the crystal in a surrounding standard gas. Any change in the gas is indicated by deflexion of the pointer of an ammeter inserted in the output circuit of the oscillator. J. S. G. THOMAS.

Colloid [for cleaning etc.]. E. L. LEASMAN (U.S.P. 1,790,272, 27.1.31. Appl., 20.6.27).—Finely-divided clay or bentonite is mixed, in quantity sufficient to form a paste, with a hot solution of Na_3PO_4 .

H. ROYAL-DAWSON.

Constructing and applying lagging and other heat-insulating means. E. KREWS and H. W. FRANKLIN (B.P. 352,640, 19.5.30).

Fin tubing for heat-exchange apparatus. GRISCOM-RUSSELL Co., Assees. of R. C. JONES and R. COLSTON (B.P. 353,251, 23.7.30. U.S., 1.8.29).

Cleaning apparatus for the discs of centrifugal bowls. AKTIEBOLAGET SEPARATOR (B.P. 352,886, 12.12.30. Swed., 20.12.29).

Apparatus for the production of foam [for fire extinguishing etc.]. PYRENE CO., LTD. (B.P. 352,849, 20.10.30. Ger., 18.10.29).

Thermostats [of diaphragm type] for refrigerating and like apparatus. METERS, LTD., and C. C. APPLETON (B.P. 353, 225, 5.7.30).

Lubricant.—See II. **Separating gaseous mixtures.**—See VII. **Kilns.**—See IX. **Feed-water.**—See XXIII.

II.—FUEL; GAS; TAR; MINERAL OILS.

Ash, ultimate composition, and calorific value of coal. F. SCHUSTER (Gas- u. Wasserfach, 1931, 74, 629—635).—The methods that have been proposed for determining the true content of mineral constituents of a coal, as distinguished from the ash, fall into three classes: (a) those taking into account the reactions occurring in the ash during combustion of the coal, e.g., oxidation of pyrites, loss of H_2O of hydration of the silicates, etc., (b) Brinsmaid's method in which the calorific val. is determined as a function of the ash content after separating the coal into fractions of different ash content (J. Ind. Eng. Chem., 1909, 1, 65), and (c) methods depending on the extraction of all or part of the mineral constituents with acid (cf. Mayer, B., 1929, 966). The literature of the subject is critically summarised. It is shown that if the ash is regarded as identical with the mineral constituents the results of the ultimate analysis when referred to pure coal may be in error by amounts greater than the limits of error of the analysis. Brinsmaid's method is considered to be the best for determining the calorific val. of the pure coal.

A. B. MANNING.

Analysis of coals. BRUÈRE (Ann. Falsif., 1931, 24, 268—273).—Detailed methods are given for the determination of moisture, ash, and coke yield, and calculation of the results, from which calorific power can be obtained by the aid of formulæ and tables given. The character of the coke is also noted and typical figures are given for various coals. E. B. HUGHES.

Caking power and swelling of coal. II—V. H. A. J. PIETERS (Rec. trav. chim., 1931, 50, 851—855, 856—859, 860—864, 865—873; cf. B., 1930, 308).—II. The crushing strength of a coke is diminished if the coal is plastic during gas evolution, which thus forms bubbles. The plasticity is affected by the rate of heating of the coal, an optimum rate existing for each kind of coal, and can, if large, be diminished by admixture with a non-caking coal. The crushing strength of the coke may thus be varied from 0 to 30—80 kg./sq. cm.

III. An apparatus for measuring accurately the swelling of coal at accurately known temp. is described. The swelling is shown to be influenced by the rate of heating, to be greater and to occur at a lower temp. if the coal is finely powdered, to occur at a lower temp. but to be less under an applied external pressure, and to be suppressed by addition of sand.

IV. An apparatus for measuring the permeability of coal to gases during heating is described. Passage of a gas through coal prevents the formation of a coherent coke, carrying away tarry matter, which acts as a "primary binder." Experiments with an intermittent gas stream show that the period of suppressed permeability is short. Addition of high-temp. coal tar, or oxidised coal tar, as a binder or source of binder, to a non-caking coal (19.6% volatile matter) caused formation of a coherent coke, the best results (judged by a shatter test) being obtained with 10% of ordinary tar, though 2.5% was sufficient. Oxidised tar was more effective than high-temp. tar. The function of the binder is to coat the coal particles when fluid, and by rapid decomp. to cement them together.

V. An apparatus for determination of the rate of evolution of gas from coal heated at a const. rate is described, and the following conclusions are reached. (1) Water is evolved between 80° and 120°. (2) Evolution of gas commences at 320°, and with good caking coals reaches a large max. at 480°. (3) With non-caking coals evolution of gas is more gradual, and the max. less pronounced and at a slightly higher temp. (4) With both kinds of coal a small secondary max. occurs at about 700°, at which temp. shrinkage of the semi-coke occurs. With banded coal, separated by crushing and sieving into (A) vitrain, (B) durain, and (C) fusain fractions, it was found that A and C showed the gas evolution characteristic of caking and non-caking coals, respectively, B being intermediate. Permeability experiments showed that A and B form a plastic mass at 420—460°, which soon becomes porous, while C is unchanged. A and B begin to soften at 360°; A swells at 420°, and becomes very soft; B swells (somewhat less) at 420°, but remains viscous. C neither swells nor softens.

R. S. CAHN.

Influence of the constituents of coal on its coking properties. J. M. PERTIERRA (Anal. Fís. Quím., 1931, 29, 374—385).—The pressures exerted during the coking of the vitrain and durain constituents of a coal were 590 and 325 g./sq. cm. Analyses are given of the isolated constituents and of the coke and other products. The durain had m.p. 380° and the vitrain 403°. The plasticity curves rise rapidly at 410° and 415° respectively, and thereafter fall at different rates which indicate that semi-coke is formed more rapidly from durain than

from vitrain; the former yields a denser and less porous coke. Primary solidification is complete at 450° and 480° respectively. The separation of coal into constituents suitable for coking is discussed.

H. F. GILLBE.

Apparatus for fuel chemistry. O. LAUE (Brennstoff-Chem., 1931, 12, 253—255).—Apparatus shown at an exhibition at Essen is briefly described.

A. B. MANNING.

High-low-temperature carbonisation. H. T. WRIGHT (Gas J., 1931, 195, 32—34).—The Bussey retort (heated by a portion of the charge, of oval section; the coal rests on a grate and air for combustion is supplied around the periphery some distance above) when tested showed great flexibility. The coke, a good smokeless fuel, passing down the retort is cooled by a water-jacket, quenching being eliminated. The tar is separated into two fractions: (a) a light paraffinic spirit containing 52% of aromatic compounds, (b) a fuel oil; the liquor is disposed of. The coke is made at 1000°, and the outlet gas temp. is 50°, hence it is neither a high- nor low-temp. process.

A. H. EDWARDS.

Evolution of gases from coal and coke. G. E. FOXWELL (Gas J., 1931, 195, 91—93).—Measurement of the gas evolution from a S. Yorks coal heated rapidly to above 700° and maintained at a given temp. indicates that the decomp. above 700° is a unimol. reaction and, by analogy with other gas-solid reactions, is probably largely influenced by surface conditions. Examination of the gas evolved from coal at various temps. and at various times after charging into horizontal retorts shows that the thermal yield decreases progressively as the carbonisation time increases, the final amounts of gas requiring disproportionately large amounts of heat. It is suggested that reduction of carbonising time will increase the capacity of the plant, reduce capital and fuel costs by utilising fewer retorts, and will increase the combustibility of the coke when 3—4% of volatile matter is left in the charge.

H. E. BLAYDEN.

Dilution of straight coal gas. W. M. CARR (Gas J., 1931, 195, 103—105).—At Stretford gas works coal gas is diluted by producer gas which is drawn from the producers feeding the setting and cleaned. The dilution system and the automatic method of control are described. The quantity of producer gas utilised does not exceed 15 vol.-% of the straight coal gas and the mixed town gas has an average inert content of less than 12%. The installation requires only a small expenditure and no additional labour, and maintenance costs are negligible.

H. E. BLAYDEN.

Dilution [of gas] by steaming in vertical retorts. J. E. BLUNDELL (Gas J., 1931, 195, 157—159).—The effect of steaming is to increase the CO₂ and decrease the calorific val. of the gas. Given the yield of gas per ton at one calorific val., the yield at any other can be calc. The efficiency of steamed vertical retorts is compared with that of retorts in which the gas is mixed with water-gas to obtain the same calorific val. Results of tests show increased yields of products, and the ash of the coke is not increased.

A. H. EDWARDS.

Dilution of horizontal-retort gas. J. H. CLEGG (Gas J., 1931, 195, 159—161).—A gas of 565 B.Th.U.

was reduced to 499 B.Th.U. by diluting with flue gas from the settings, the admission being regulated by a butterfly valve. At the inlet to the exhauster it is further reduced to 475 B.Th.U. by admission of blue water-gas. The resulting gas contains CH₄ 21.6, H₂ 39.8, N₂ 19.9, CO₂ 3.9, O₂ 0.6, CO 9.9, C_nH_m 4.3%.

A. H. EDWARDS.

The wet sulphur purifier of the Hamburg gas-works. H. MÜLLER (Gas- u. Wasserfach, 1931, 74, 653—657).—The gas is washed by aq. K₃Fe(CN)₆ and K₂CO₃ or KHCO₃. The S resulting from oxidation of the H₂S is separated by filtration and the washing liquid is continuously regenerated by electrolytic oxidation and recirculated through the washer. S of 99% purity and H₂ are obtained as by-products. Details of the plants are given and the efficiency of the process is discussed.

H. E. BLAYDEN.

[Aromatic and hydroaromatic compounds of lignite tar.] J. HERZENBERG and E. VON WINTERFELD (Ber., 1931, 64, [B], 1911).—The authors' experiments (B., 1931, 706) were performed with a benzine obtained by a particular process and the results are not necessarily applicable to all lignite-tar benzenes.

H. WREN.

Coal-tar oils for internal-combustion engines. J. D. SMITH (Gas J., 1931, 95, 41—42).—A blend of 90% of light creosote oil (washed) and 10% of 90—190° water-white solvent naphtha gave satisfactory results when tested on an omnibus provided with two carburetors. The engine was warmed by running with petrol, and thereafter run on tar oil. The blended oil has a closed flash point of 54°; distillation commences at 148°, and 90% distils at 273°. The exhaust gas contained 0.3% CO, compared with 4.2% on petrol.

A. H. EDWARDS.

Classes of hydrocarbons and some properties of representative Japanese gasoline fractions. M. MIZUTA (Proc. World Eng. Congr., 1929, 31, 31—48).—The physical consts. and chemical composition of a number of Japanese gasolines have been determined. The relation between aniline point and aromatic content where the latter substances are present in large quantities has been redetermined and is found not to be strictly linear. It was found advisable to cut fractions at 97°, 120°, and 150° for fractions containing C₆H₆, PhMe, and xylene. Unsaturated substances are found in small quantity (<12%), whilst gasolines from the southern portion of the Japanese Archipelago are rich in aromatics, those of Formosa containing up to 50% and little naphthenes. The oils from the more northerly districts are richer in naphthenes and poorer in aromatics. The oils from Formosa show levorotation whilst those from the north are generally dextrorotatory.

T. A. SMITH.

Pyrogenic decomposition in tube furnaces. H. I. WATERMAN and T. W. TE NUYL (Petroleum, 1931, 29, 539—542).—The temp. rise in a refined vaseline oil, *d* 0.8681, circulating slowly through an experimental furnace was found to be quite irregular. No decomp. occurred up to 425° and only a small alteration in viscosity was observed; decomp. was vigorous at 600°. Results of 10 tests at different temps. are recorded.

E. DOCTOR.

Refining process for making high-grade gasoline.

F. W. HEATH (Petroleum, 1931, 29, 542—544).—To prevent coloration by exposure to air and light, gasoline is treated with aq. alkaline $K_3Fe(CN)_6$ and subsequently with H_2SO_4 . Unsaturated hydrocarbons are scarcely affected by this method. E. DOCTOR.

Solvent extraction of lubricating oils.

S. W. FERRIS, E. R. BIRKHIMER, and L. M. HENDERSON (Ind. Eng. Chem., 1931, 23, 753—761).—A number of solvents have been used to separate the naphthenic and paraffinic constituents of lubricating oils. The solvents have been compared by plotting the relation vols. undissolved oil/vol. solvent against the viscosity-gravity const. α of the undissolved oil (cf. Hill and Coats, B., 1928, 592). A high value of α indicates high naphthene content. The selectivity of a solvent may be expressed as the difference between the α values of the dissolved and undissolved oils. For these relationships to hold extractions should be carried out at least 25° below the crit. solution temp. Many of the solvents were superior to SO_2 ; the best were PhCN, $PhNO_2$, and PhCHO. Generally, cyclic compounds were superior to open-chain compounds, and addition of aliphatic chains to the ring reduced the efficiency. Efforts were also made to correlate the extractive value of the solvents with other physical properties such as dielectric const. and internal pressure. A high internal pressure was found to be associated with a high miscibility temp.

T. A. SMITH.

Alinement chart for estimation of viscosity index of oils. L. NEWELL (Ind. Eng. Chem., 1931, 23, 843).—The viscosity index as defined by Dean and Davis (B., 1929, 1039) may be determined by the aid of the given alinement chart. Viscosities at three temps. and the viscosity index are given. The value of the index for an oil is determined by alining the viscosities as obtained for two temps. and observing where this line cuts the viscosity index scale; this index also indicates the relative paraffinic-naphthenic character of a lubricant as described by Davis and McAlister (B., 1931, 376).

T. A. SMITH.

Regeneration of used mineral oils.

E. AZZARELLO (Proc. World Eng. Congr., 1929, 31, 1—14).—A scheme is outlined and costs are discussed for the purification of used railway axle oils. It is estimated that 20% of the oil used for this purpose can be recovered, together with the material used as wicks in lubricators and some bearing metal which may be separated by mechanical means from the wicks. A lay-out for the recovery of 10,000 kg. per month is described. After pressing from the fibrous material, the oil is passed through screens, then allowed to settle for 10 days at 85—90°, and treated with limed kieselguhr at the same temp. for a further 20 days and again decanted. The clear liquid is filtered through more kieselguhr and cotton shreds, then through fine coal. After centrifuging, the oil is again filtered through cotton under pressure. The recovered oil is suitable for reuse. T. A. SMITH.

Acetyl value of oxidised mineral oils. T. YAMADA (J. Soc. Chem. Ind. Japan, 1931, 34, 188—189 B).—"Technical white oil" and a switch oil were oxidised in air at 130°; the acid val., sap. val.,

and sap. val. of the acetylated product increase almost linearly with the time, but the acetyl val. of the unsaponifiable fraction shows a definite max. Alcohol and acid formation is small in the case of the less refined switch oil. E. LEWKOWITSCH.

Determination of soluble bitumen and total organic matter in bituminous rocks. I. UBALDINI (Annali Chim. Appl., 1931, 21, 222—228).—After the rock has been moistened with EtOH and treated with dil. HCl, the whole is shaken with about 50 c.c. of C_6H_6 and centrifuged. The aq. layer, separated from the clear C_6H_6 solution, is washed with several quantities of C_6H_6 until this is no longer coloured. The total C_6H_6 solution is evaporated and the residue of almost pure bitumen dried and weighed. Org. matter other than bitumen is determined by filtering the aq. layer through calcined, washed asbestos on a Gooch crucible, evaporating the filtrate to dryness, and either subjecting the dried residue to elementary org. analysis or determining its loss of wt. on ignition. T. H. POPE.

Heating asphalt by diphenyl vapour. G. H. MONTILLON, K. L. ROHRBACH, and W. L. BADGER (Ind. Eng. Chem., 1931, 23, 763—769).—The heat transfer coeffs. for the heating of asphalt by means of diphenyl vapour have been determined by means of a circulatory apparatus. The liquid-film coeff. increased with the velocity through the heating tube, whilst viscosity had no effect. The average heat-transfer coeffs. were: overall 30—45, asphalt liquid film 39—55, and diphenyl vapour 225—400 B.Th.U. per hr. per sq. ft. per °F. A table of the physical characteristics of diphenyl vapour is given. The only changes in the asphalt due to continued heating under the conditions were such as could be attributed to loss of volatile constituents. T. A. SMITH.

Petrol-alcohol-benzol mixtures. C. BARON, C. BOULANGER, and R. LEGRAIN (Compt. rend., 1931, 192, 1383—1385, and Bull. Assoc. Chim. Sucr., 1931, 48, 295—296).—Using aviation petrol, d 0.698, a petrol-benzol mixture containing not more than 15% benzol is stable at -40°, but one containing 25% or more deposits solid at -5°. EtOH (99%) and petrol deposit at -16° with 10% EtOH, at -30° with 40%. Mixtures of petrol and benzol in the ratios 8:1, 7:2, and 6:3 with 1 pt. of EtOH deposit at -27°, -30°, and -43° respectively. C. A. SILBERRAD.

Spectroscopic studies of engine combustion.

L. WITHROW and G. W. RASSWEILER (Ind. Eng. Chem., 1931, 23, 769—776).—The normal flame front, the rapid combustion during detonation, and the afterglow or re-illumination of the gases in an engine cylinder have been examined spectroscopically by means of an engine cylinder fitted with an observation window and stroboscopic disc. The flame-front spectrum shows that light is emitted from CH and C_2 mols., whilst the afterglow is due to the combustion of CO. In the detonating flame front the lines due to CH and C_2 are missing, but are re-established when knocking is suppressed by $PbEt_4$. Spectroscopic analysis indicates that the difference between knocking and non-knocking explosions is confined to the nature of the combustion of the last portion of the charge. At Pb and PbO are shown to exist in the flame front at the time when

knocking would occur if PbEt_4 had not been added. The spectra of a number of fuels other than gasoline are given.

T. A. SMITH.

Photographic determination of the detonating tendency of petrol. M. AUBERT and R. DUCHÈNE (Compt. rend., 1931, 192, 1633—1635).—More detailed study of previous methods (cf. A., 1928, 248) confirms the diminution of knock caused by increased turbulence of the air-gas mixture. Actual detonation is indicated by a brilliant spark succeeding diminished light emission, indicating a diminished initial rate of normal combustion. For any given petrol gas-air mixture detonation begins when the mixture is heated to a definite temp.; the higher this is the less is the tendency of the petrol to knock. Knocking is a max. when the initial (normal) combustion is a min. The effect of PbEt_4 is confirmed (cf. A., 1928, 715; B., 1928, 5). C. A. SILBERRAD.

Decomposition and polymerisation of the olefines. G. EGLOFF, R. E. SCHAAD, and C. D. LOWRY, JUN. (J. Physical Chem., 1931, 35, 1825—1903).—A survey of published work relating to the action of heat, light, high pressure, chemical reagents, electric discharges, and α -particles on the olefines.

H. F. GILLBE.

Description of plant for preparing coal for pulverised-fuel-fired and stoker-fired boilers at Synthetic Ammonia and Nitrates, Ltd. G. H. C. CORNER (Fuel Econ., 1931, 6, 337—343).

Ethyl alcohol. Hexoic acid. Humic acid derivatives.—See III. Dielectric loss in oils.—See XI. Oil acidity.—See XII. Brown coal and crops.—See XVI.

See also A., Aug., 903, Adsorption of PhOH by charcoal. 904, Adsorption of H_2 and CO on $\text{ZnO-Cr}_2\text{O}_3$ catalysts. 913, System $\text{NH}_3\text{-H}_2\text{SO}_4$. 926, Determination of CO . 932, Catalytic oxidation of mineral oils in vapour phase. 972, Colour reactions of phenols.

PATENTS.

Coal-washing apparatus. W. C. MENZIES (U.S.P. 1,790,107, 27.1.31. Appl., 26.2.27).—Special means of controlling the delivery of coal, discharging refuse from the coal, and separating coal from refuse are detailed. To the washing box constructed on the upward flow of water principle is fitted a non-clogging screen.

A. H. EDWARDS.

Production of coke. K. WIRGES, and G. WIPPERMANN MASCHINENFABR., STAHLWERK U. EISENGIESSEREI G.M.B.H. (B.P. 351,854, 8.10.30).—Coking coals of high volatile matter content are mixed with ground coke slack consisting of sharp grains of 0—3 mm. diam. and the mixture is carbonised. The coke slack is preferably crushed between rollers until 80—90% is below 1 mm. and none is above 2 mm. in diam.

A. B. MANNING.

Coking retort oven. J. VAN ACKEREN, ASSR. to KOPPERS Co. (U.S.P. 1,787,963, 6.1.31. Appl., 23.5.25).—In ovens of the Koppers and Becker type a pair of smaller horizontal flues in each heating wall is substituted for the usual single horizontal flue, and each horizontal flue is subdivided into a number of flues which serve (say) five vertical flame flues. This modification permits an upward extension of the flame flues which decreases the

time of coking, strengthens the construction, and prevents decomp. of the gases.

A. H. EDWARDS.

Removal of smoke from coke ovens. J. VAN ACKEREN, ASSR. to KOPPERS Co. (U.S.P. 1,785,748, 23.12.30. Appl., 27.6.25).—A bridge member with a gas passageway on its under side is provided across the bottom of each feed opening in the oven. These permit the gas and smoke to pass to the offtakes across the streams of coal entering through the feed openings during the charging operation.

A. B. MANNING.

Treatment of coal and like substances. W. HECKEL, ASSR. to C. H. ELLSWORTH (U.S.P. 1,789,549, 20.1.31. Appl., 30.1.21).—By heating coal or bituminous substances at about 500° , a tar containing lubricating oils free from C_{10}H_8 , a gas rich in aliphatic hydrocarbons, and a low-temp. fuel are obtained. The products are condensed successively at 130° , 65° , and 35° .

A. H. EDWARDS.

Apparatus for carbonising coal. J. MITCHELL, ASSR. to CHARCOLITE CORP. (U.S.P. 1,784,676, 9.12.30. Appl., 7.8.25. Cf. B.P. 256,038; B., 1926, 812).—The apparatus comprises a number of vertical, cylindrical, double-walled retorts, the annular spaces between the walls forming heating baths of fusible salts. The retorts are supported in a structure having vertical division walls forming separate heating chambers for each retort. Hot combustion gases from suitably placed burners are circulated through the chambers. Closure means are provided at the upper and lower ends of the retorts, and the upper ends are provided also with gas offtakes. The lower ends of the retorts are cooled sufficiently to prevent by solidification any leakage of the fused salts in the jackets.

A. B. MANNING.

Apparatus for carbonising and distilling carbonaceous materials. W. W. ODELL, ASSR. to NORTHERN LIGNITE COAL Co. (U.S.P. 1,785,645, 16.12.30. Appl., 17.10.24. Can., 30.5.24).—The retort consists of a vertical shaft, rectangular in plan, formed of a series of superposed chambers each converging downwardly. Horizontal tuyères are arranged in pairs on opposite walls of the shaft, at the junctions of the superposed chambers. Each tuyère supports a baffle which extends into the shaft and co-operates with centrally arranged baffles in constricting the diameter thereof. A horizontal gas offtake pipe having openings in its under side is provided in the shaft above the level of the tuyères. The fuel is carbonised as it passes through the hot zone produced by combustion of part of the charge with the air blown in at the tuyères. The coke is discharged after traversing a cooling zone, by means of a rotating drum with radial blades.

A. B. MANNING.

Apparatus for distilling solid carbonisable materials. F. T. SNYDER (U.S.P. 1,785,565, 16.12.30. Appl., 8.6.25. Can., 14.5.25).—The material is carbonised in a vertical distillation chamber in which it passes successively through an upper evaporating zone, an intermediate carbonising zone, and a lower cooling zone. The products of distillation pass through a heat exchanger and a water-cooled condenser in succession. Part of the gas leaving the condenser is reheated in the heat exchanger and is then subdivided into three currents, two of which pass through the evaporating

and cooling zones respectively of the distillation chamber, whilst the third passes through a heating stove to the carbonising zone of the chamber. Provision is made also for injecting oil, or tar, and air into the bottom of the carbonising zone.

A. B. MANNING.

Apparatus for gasifying coal etc. C. DAVIES (U.S.P. 1,784,985, 16.12.30. Appl., 31.5.22).—The apparatus comprises a carboniser, a water-gas generator, and a fuel preheater etc. The carboniser is preferably of the rotary type having baffles on the interior wall which continuously lift and drop the fuel through the hot gas stream. The carbonised material is transferred directly to the water-gas generator, and the hot water-gas from the latter is led to the carboniser, its sensible heat being utilised for carrying out the carbonisation. The blow gases, after passing through the regenerators, serve to preheat the fuel.

A. B. MANNING.

Production of pure carbon. C. B. EDWARDS and H. R. HORNER, Assrs. to P. C. REILLY (U.S.P. 1,789,380, 20.1.31. Appl., 2.8.26).—Coke from coal-tar pitch or petroleum coke is fed into an elliptical retort, wherein it is heated by the gases from a combustion zone (temp. 1930°) half way down the retort where the volatile hydrocarbons are removed. The coke passes into a cooler zone and is removed by conveyor screws from the bottom of the retort. The product (0.05—0.07 ohm resistance) is suitable for electrode carbons.

A. H. EDWARDS.

Gas producer. J. F. ROGERS, Assr. to WELLMAN ENG. CO. (U.S.P. 1,784,882, 16.12.30. Appl., 2.11.30. Cf. U.S.P. 1,572,040; B., 1926, 351).—A gas producer has a body and an ash pan which normally rotate together but can be automatically given a relative motion at suitable intervals. Improved means of supporting the two parts of the apparatus and of producing the desired motion are described.

A. B. MANNING.

Carburetted water-gas apparatus. W. J. McCURG (U.S.P. 1,788,400; 13.1.31. Appl., 25.10.24).—The generating chamber is provided with a hollow shaft and both are divided into four symmetrical compartments. Those in the chamber open into a common chamber which communicates with the carburetted shaft; this connects with a column fitted with baffles, the mixed gas and vaporised oil passing to a steam generator and then to storage. The steam and compressed air are conducted through valves to the bottom of each angular compartment and to the common chamber, permitting up- and down-blasting operations.

A. H. EDWARDS.

Oil-gas making. F. J. NOLAN, Assr. to THERMO INDUSTRIES, INC. (U.S.P. 1,790,166, 27.1.31. Appl., 28.4.27).—Gas is produced from heavy petroleum oil without residue by feeding measured quantities of heated oil and water into a short hot tube through a central tube open at its end and fitted with baffling plates to mix the vapours. A generator containing several such tubes is heated by oil, the gas being compressed either as liquid or gas into metal containers.

A. H. EDWARDS.

Gas-generating apparatus. W. DARBY, and CARBIC, LTD. (B.P. 351,179, 8.5.30).—An apparatus, e.g.,

for the generation of C_2H_2 from CaC_2 in cake form, is provided with baffles to prevent the water from rapidly flowing away from the carbide when the apparatus is disturbed.

B. M. VENABLES.

Storage and transport of acetylene, more particularly for use for the autogenous working of metals. A. L. MOND. From I. G. FARBENIND. A.-G. (B.P. 351,634, 22.4.30).—The gas is stored in the form of compacted C_2H_2 snow, produced, e.g., by compressing the snow, formed from the gas by known means, in a wooden cylinder by means of a wooden ram.

A. B. MANNING.

Gas purification. G. E. SEIL, Assr. to KOPPERS CO. (U.S.P. 1,786,509, 30.12.30. Appl., 11.6.26).—A carbonyl hydrate, e.g., starch, is oxidised, preferably with HNO_3 , and the product is mixed with an Fe compound. A wash liquor for removing H_2S from coal gas etc. is prepared by dissolving the mixture in water and adding alkali, the liquor preferably containing 0.06—0.1% Fe_2O_3 , 0.1—2.0% of org. material, and about 1% of alkali.

A. B. MANNING.

Removal of naphthalene and carbon disulphide from gases. G. E. SEIL, Assr. to KOPPERS CO. (U.S.P. 1,785,365, 16.12.30. Appl., 6.5.26).—The gas is washed with a solvent, e.g., kerosene oil, which will absorb both $C_{10}H_8$ and CS_2 , preferably by the Sperr process (U.S.P. 1,578,687; B., 1926, 430), and recirculated solvent is treated, e.g., with an aq. or alcoholic solution, to remove CS_2 .

A. B. MANNING.

Fractional extraction of mineral oils. S. W. FERRIS, Assr. to ATLANTIC REFINING CO. (U.S.P. 1,788,569, 13.1.31. Appl., 16.7.27).— $PhNO_2$ is dissolved by heating in a viscous oil, liquid at room temp. and containing paraffinic and naphthenic hydrocarbons. On cooling the mixture forms two layers, the upper richer in paraffinic and the lower richer in naphthenic hydrocarbons. The layers are separated, the solvent is removed by distillation, and the process repeated if desired until oils entirely paraffinic and entirely naphthenic in nature are obtained.

H. S. GARLICK.

Treating hydrocarbons. J. C. BLACK (U.S.P. 1,789,510, 20.1.31. Appl., 1.8.28).—Hydrocarbon oil is passed in heat-exchange relationship with cold treated oil before passing through pipe coils externally cooled by liquid NH_3 to approx. 8°. The cooled oil is continuously passed through an absorber in countercurrent flow to SO_2 gas liberated from already treated oil. The oil, containing condensed and dissolved SO_2 , is further cooled and then passed through a treater in counterflow to streams of liquid SO_2 , cooled to approx. the same temp., and in sufficient quantity to dissolve from the oil the products to be removed. The treated oil and liquid SO_2 containing extracted material are separated and continuously subjected in separate chambers to pressure distillation at temps. sufficient to vaporise the major portion of SO_2 , which is collected and condensed under the same pressure. The remaining SO_2 is vaporised, condensed, and absorbed in a hydrocarbon oil to be subsequently treated with liquid SO_2 , by a second distillation in separate containers at pressures < 10 lb.

H. S. GARLICK.

Polymerisation of hydrocarbon distillates. R. C. OSTERSTROM, JUN., J. HYMAN, and C. R. WAGNER, ASSTS. to PURE OIL Co. (U.S.P. 1,789,413, 20.1.31. Appl., 25.1.30).—Gum-forming compounds are removed from cracked hydrocarbon distillate by passing the oil under pressure, in a continuous stream of restricted cross-section, through a vaporising heater and simultaneously thoroughly mixing it with a polymerising agent consisting of Na sulphonates in a polymerised hydrocarbon, the latter being obtained in a preceding operation of the process and returned after treatment with acid and alkali. The light oils are separated from the high-boiling polymerised compounds and separately condensed and collected. H. S. GARLICK.

Cracking of hydrocarbons. E. C. HERTHEL and H. L. PELZER, ASSTS. to SINCLAIR REFINING Co. (U.S.P. 1,787,981, 6.1.31. Appl., 11.6.27).—Oil is circulated to and from a supply held in a vaporising zone through heating tubes where it is heated to a cracking temp. A bed of finely-divided solid material, *e.g.*, fuller's earth, is maintained within the main body of oil so that the circulating oil passes through it. Vapours are removed from the vaporising zone under superatm. pressure, subjected to refluxing action, and the reflux condensate together with raw oil is circulated through the heating tubes into the vaporising zone. Heating gases for the cracking operation are passed first over separate heating tubes through which reflux condensate and new oil are circulated, and then over the first mentioned heating tubes. Pitch-laden residual oil is discharged direct from the bottom of the vaporising zone. H. S. GARLICK.

Method for transforming and distilling hydrocarbons. A. A. F. M. SEIGLE (U.S.P. 1,779,828—9, 28.10.30. Appl., 14.1.26 and 9.8.27).—Preheated heavy hydrocarbons are passed through a retort consisting of a spiral passage surrounding a heating flue, and the vapours are cracked at 500—700° in presence of metal turnings or other catalysts. The vapours from the retort are then passed through two expansion and cooling chambers where they are cooled to 250—450° in presence of further catalyst, the heat being used to vaporise water under pressure. T. A. SMITH.

Pressure still for cracking oils. D. A. YOUNG, ASSR. to SINCLAIR REFINING Co. (U.S.P. 1,788,006, 6.1.31. Appl., 15.7.27).—The unvaporised residue-discharge line of a pressure still extends for a substantial distance within the still and below the normal liquid level and is controlled by a valve at its inner end having an operating extension outside the still and passing within the discharge line. H. S. GARLICK.

Oil-refinery condenser. J. PRICE (U.S.P. 1,789,880, 20.1.31. Appl., 15.4.29).—A pair of tube sheets are mounted opposite each other on the periphery of a cylindrical shell, so arranged to provide flexible portions to take up changes in length of a bundle of tubes connecting the tube sheets. Baffles are arranged longitudinally at the sides of the tube bundle, and means are provided for preventing the liquid by-passing around the tube bundle, between the baffles and the shell. H. S. GARLICK.

Treating saturated hydrocarbons and gaseous mixtures rich in saturated hydrocarbons. Soc.

D'ETUDES SCIENTIF. ET D'ENTREPRISES INDUSTRI., ASSEES. of E. VOITURON (B.P. 349,067, 14.1.30. Ger., 14.1.29).—Saturated hydrocarbons (*e.g.*, CH₄) in gaseous or atomised form are passed with steam and O₂ through a reaction chamber maintained at 1300° or above. Sufficient O₂ is employed to destroy substantially the whole of the hydrocarbon, *i.e.*, 1 mol. of C_nH_{2n+2} to 0.5*n* mol. O₂. The vol. rate of flow of the mixture per hour, without taking into account the steam, should be 50,000—100,000 times the vol. of the reaction chamber. Under these conditions the saturated hydrocarbons yield considerable amounts of C₂H₂ in addition to CO and H₂. R. W. L. CLARKE.

Conversion of heavy petroleum oils into lubricating oils by treatment with hydrogen at high pressures and temperatures. STANDARD OIL DEVELOPMENT Co., ASSEES. of E. M. CLARK (B.P. 349,342, 19.6.30. U.S., 18.7.29).—High-grade lubricating oils are obtained in large yield from heavy unrefined petroleum oils which contain small quantities of asphaltic, gummy, or resinous impurities by treatment with H₂ in presence of catalysts containing W or Mo at temps. above 370° and at pressures above 25 atm. The production of oils boiling below 205° is limited to less than 20% of the oil treated. The process may also be carried out at temps. between 370° and 455° and at pressures above 200 atm. and the yield of oil boiling below 205° limited to 5—10%. Considerable reduction in viscosity and a marked improvement in Conradson C value of the oil accompany the destructive hydrogenation of the impurities. R. W. L. CLARKE.

Manufacture of lubricating oils and other hydrocarbon products. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 349,071, 10.2., 18. and 19.8.30).—Solid or semi-solid open-chain hydrocarbons containing at least 13.5 pts. (preferably 15 pts.) of H to 100 of C and having a mean mol. wt. of at least 170 (and preferably 250) and only slight lubricating properties are treated with agents capable of introducing exchangeable substituents, such as Cl, O, and S, in presence of suitable catalysts, preferably AlCl₃, and, if desired, in presence of cyclic hydrocarbons or olefines. The exchangeable substituents may be eliminated from the products before treatment with condensing agents, *e.g.*, by steam-distillation in vac. A 50—60% yield of good-quality viscous lubricating oil can be produced from paraffin wax and the like. R. W. L. CLARKE.

Gear lubricant. S. D. WHITE and C. L. KNOPF, ASSTS. to SINCLAIR REFINING Co. (U.S.P. 1,789,614, 20.1.31. Appl., 18.8.28).—Light (Gulf Coast) lubricating oil (100 sec. Saybolt viscosity at 38°) is blended with a heavy Gulf Coast flux oil (1000—5000 sec. at 99°) in proportions that produce a base blend of Saybolt viscosity of 55—62 sec. at 99°. This mixture is heated to a temp. at which it is freely fluid (120—135°) and approx. 25% of caustic bottoms from the redistillation of Gulf Coast lubricating oil over NaOH, preheated to a corresponding temp., are gradually mixed in. The composite stock is then heated to approx. 150° and blown (4—8 hr.) with dry air until the product has a MacMichael viscosity of 55—100 (preferably 85—90) poises at 38°, Knopf viscosity not exceeding 12 oz.

at 18°, and a Knott adhesiveness not exceeding 75 oz. at 18°. H. S. GARLICK.

Testing bituminous mixtures. H. W. SKIDMORE and G. ABSON, Assrs. to CHICAGO PAVING LABORATORY, INC. (U.S.P. 1,789,846, 20.1.31. Appl., 5.3.28).—The material to be tested is placed in a stationary die and a movable die aligned with and put adjacent to it. The movable die is actuated so as to subject the cylinder of bitumen (1—4 in. diam.) to an increasing shearing force, an indicator showing the amount and rate of force applied. The dies are mounted in a const.-temp. bath.

A. H. EDWARDS.

Removal of oxygen from gases. F. PORTER, Assr. to KAY COUNTY GAS Co. (U.S.P. 1,787,795, 6.1.31. Appl., 19.8.26 and 21.9.27).—Natural gas mixed with air is passed over porous refractory material at 800—2000°. When the product, now containing CO and H₂, is mixed with a further quantity of natural gas and passed over a suitable catalyst, e.g., Cu or Fe, at 300—500° the CO and H₂ combine with the O₂.

D. K. MOORE.

Elimination of combustible constituents from the products of combustion of an internal-combustion engine. J. C. W. FRAZER (U.S.P. 1,789,812, 20.1.31. Appl., 12.8.29).—An Fe chromite catalyst (approx. Fe₂O₃.3Cr₂O₃) is deposited on screens of heat-conducting metal placed in the passage of a mixture of air and exhaust gases in such a manner that it is kept heated at 450°, either electrically, or by the reaction.

A. H. EDWARDS.

Removal of carbon deposits [from internal-combustion engines]. W. G. LOVELL and T. A. BOYD, Assrs. to GEN. MOTORS RES. CORP. (U.S.P. 1,787,789, 6.1.31. Appl., 24.8.28).—A mixture of an amine of b.p. >65° (e.g., isoamylamine, benzylamine) and a varnish solvent is injected into a hot engine, and after 1 hr. the engine is started and the loosened C ejected through the exhaust.

A. H. EDWARDS.

Domestic gas plant for waste vegetable products. J. K. GOLD (B.P. 353,221, 2.7.30. U.S., 9.9.29).

Powdered-fuel burners. A. DOCKING and J. MCCLEARY (B.P. 352,516, 12.2.30).

Oil-fuel burners. BABCOCK & WILCOX, LTD., and A. FRANKISH (B.P. 352,816, 20.9.30).

Burners [for hot-blast stoves]. W. W. TRIGGS, From FREYN ENGINEERING Co. (B.P. 352,812, 19.9.30).

Filters [for liquid fuel]. INVENTIONS DEVELOPMENTS, LTD., and W. J. TURNER (B.P. 352,465, 8.4.30).

Sulphuric acid. Acid sludge.—See VII. **Preserving hydrocarbons.**—See XIV.

III.—ORGANIC INTERMEDIATES.

Ethyl alcohol, a product of high-pressure syntheses. G. T. MORGAN and R. TAYLOR (Proc. Roy. Soc., 1931, A, 131, 533—540; cf. A., 1930, 867).—From a mixture of H₂ and CO (2:1 by vol.) maintained at 200 atm., in presence of 75 c.c. of a catalyst prepared from Co(NO₃)₂ and Zn(MnO₄)₂ and heated to 380—410°, 75 c.c. of liquid product were obtained per hr. This contained approx. 9.8% EtOH. Two acetals, ethylidene dimethyl ether and propylidene dimethyl

ether, were identified in the crude liquid product. Appreciable quantities of EtOH were also obtained by the use of other catalysts. L. L. BIRUMSHAW.

Hydrogenation of cyclic compounds. I. G. ROBERTI (Annali Chim. Appl., 1931, 21, 217—221).—Hydrogenation of PhOH yields cyclohexane, the intermediate product being cyclohexanol, not C₆H₆. Hydrogenation of NH₂Ph gives hydrogenated cyclic hydrocarbons, NH₃, and other products.

T. H. POPE.

Pale cresylic acid and lysol. N. GLASS and A. J. JONES (Pharm. J., 1931, 127, 77).—Impurities in the cresol or the use of an excess of soap causes lysol to gelatinise on dilution. Samples of commercial cresols are examined as to impurities (hydrocarbons, pyridine, etc.), solubility in NaOH, b.-p. curve, percentage of *m*-cresol, and properties of the lysol produced. The presence of fractions boiling above 205°, the proportion of *m*-cresol, ratio of *m*-cresol to high-boiling fractions, and proportion of fatty acids to *m*-cresol are important in standardising cresol and lysol.

E. HOPKINS.

γ-Methyl-αγ-pentadiene. H. L. FISHER and F. D. CHITTENDEN (Ind. Eng. Chem., 1930, 22, 869—871).—γ-Methyl-αγ-pentadiene produced from MeCOEt and MeCHO by condensation to methyl β-hydroxy-α-methylpropyl ketone, followed by successive hydrogenation and dehydration of the resulting glycol, did not polymerise satisfactorily to an elastic resilient product. Polymerisation of αγ-diolefines to rubber-like products is, consequently, not dependent merely on the presence of a vinyl group.

D. F. TWISS.

Syntheses from natural-gas hydrocarbons. I. Hexoic acid from pentane. H. B. HASS and J. R. MARSHALL (Ind. Eng. Chem., 1931, 23, 352—353).—The acids are prepared through the nitriles, which are themselves obtained by treating the alkyl chlorides with NaCN. A 70% yield of nitrile with a recovery of 25—28% of unchanged chloride can be obtained on treating amyl chloride with NaCN, and this yield can be increased to 90% if NaI be used as the catalyst. Secondary alkyl chlorides and bromides give poor yields (about 30%) and *tert*-amyl chloride or bromide affords no nitrile. The reactions are carried out in alcoholic solution, 80% EtOH being best. Equimol. quantities of alkyl chloride and NaI are used together with a 10% excess of NaCN. Hydrolysis to hexoic acid is effected by refluxing the nitrile with an equimol. proportion of H₂SO₄ (*d* 1.80) and is complete in 30 min.

T. A. SMITH.

Methylglycol derivatives of humic acids. W. FUCHS and O. HORN (Brennstoff-Chem., 1931, 12, 251—252. Cf. A., 1929, 1282; 1930, 1408).—Humic and nitrohumic acids prepared from brown coal react with methylglycol in presence of HCl to form derivatives in which 2 or 4 mols. of methylglycol are combined with 1 mol. of humic acid. The derivatives are not carboxylic esters, for, like the original acids, they form salts by interaction with KOAc in alcoholic solution. It is suggested that addition takes place by the opening of a ring containing O.

A. B. MANNING.

Lactic acid. Hydrolysis of acetylsalicylic acid.—See XX.

See also A., Aug., 894, Conductivity of pure liquids. 919, Catalysts for synthesis of MeOH. 949, Mono-sulphonic acids of 1-methylnaphthalene. 950, Prep. of chloronitroanilines. 951, 1-Diazo- β -naphthol-4-sulphonic acid. 955, Intermediates in synthesis of di- and tri-arylmethane dyes. 971, Detection of org. compounds. 972, Colour reactions of phenols.

PATENTS.

Catalytic vapour-phase oxidation of aromatic organic compounds. SELDEN Co., Assees. of A. O. JAEGER (B.P. 348,604, 8.2.30. U.S., 8.2.29).—The oxidation of C_6H_6 , phenols, PhMe, acenaphthene, $C_{10}H_8$, etc. is moderated by mixing the vapours with H_2 or with a suitable oxidisable org. compound (other than a homologue or isomeride) before passing with air or O_2 over the catalyst; e.g., C_6H_6 or PhMe is mixed with MeOH or other aliphatic alcohol, an aldehyde being recovered as by-product. C. HOLLINS.

Concentration of aqueous formic acid. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 348,944, 5.7.30).—A mixture of formamide and aq. (e.g., 32–97%) formic acid is treated with gaseous mineral acid (HCl) or conc. H_2SO_4 at 60–80°, filtered from NH_4 salts, and distilled in vac. Preferably the formamide used should be equiv. to the H_2O present. C. HOLLINS.

Production of primary alcohols [by reduction of esters]. H. T. BÖHME A.-G. (B.P. 346,237, 10.7.30. Ger., 23.9.29).—The reduction of esters with Na and alcohols is effected in H_2 under pressure, e.g., 15–20 atm. C. HOLLINS.

Production of ketones from secondary alcohols. (A, B) RHEINISCHE KAMPFER-FABR. G.M.B.H. and (B) H. SANDKUHL (B.P. 347,931 and Addn. B.P. 347,933, [A, B] 4.6.30. Ger., [A] 14.6.29).—The sec.-alcohol vapour is led with steam over a dehydrogenating catalyst (Ni, Co, Cu, with or without alkali or alkaline-earth oxides or hydroxides) below the b.p. of the alcohol, usually 120–300°. Examples are the prep. of (A) menthone, cyclohexanone, (B) camphor (from isoborneol) and acetophenone. Yields are 97–99%. C. HOLLINS.

Manufacture of condensation products [aryl 2-benzthiazolyl disulphides]. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 348,682, 12.2.30).—A 2-thiolbenzthiazole is condensed with a $\cdot SCl$ or $\cdot SBr$ derivative of C_6H_6 or $C_{10}H_8$ in an inert solvent, e.g., dry C_6H_6 ; halogen, NO_2 , alkyl, or alkoxyl substituents may be present. Examples are the products from *p*-nitrochlorothiolbenzene, $NO_2\cdot C_6H_4\cdot SCl$, and 2-thiol- (m.p. 137–138°), 6-chloro-4-methoxy-2-thiol- (m.p. 172–173°), and 4:6-dichloro-2-thiol- (m.p. 181–182°)-benzthiazoles, and from *o*-nitrobrothiolbenzene and 2-thiolbenzthiazole, m.p. 110°. C. HOLLINS.

Production of [4-chloro-]derivatives of phthalic acid. E. G. BECKETT, P. F. BAUGHAM, J. THOMAS, and SCOTTISH DYES, LTD. (B.P. 348,632, 15.11.29).—Phthalic acid or anhydride is chlorinated in presence of aq. Na_2CO_3 , K_2CO_3 , alkali bicarbonates or acetates. C. HOLLINS.

Manufacture of double compounds of the acridine series. A. CARPMAEL. From I. G. FARBENIND.

A.-G. (B.P. 348,047, 27.12.29. Addn. to B.P. 328,212; B., 1930, 741).—3:7-Diacetamidoacridine or other hydrolysable diaminoacridine derivative is alkylated in a solvent (nitro- or dichloro-benzene) to the extent of 50%, e.g., with 1 mol. of Me or Et toluene-*p*-sulphonate at 140°, Ac groups (etc.) being subsequently removed.

C. HOLLINS.

Recovery of sulphites.—See VII.

IV.—DYESTUFFS.

See A., Aug., 908, Colloid chemistry of dyes. 950 and 952, Use of polychlorobenzenes in synthesis of dyes. 951, Hydrogen sulphite compounds of azo dyes. 955, Synthesis of greater di- and tri-arylmethane dyes. 957, Basic properties of hydrazones (dye derivatives).

PATENTS.

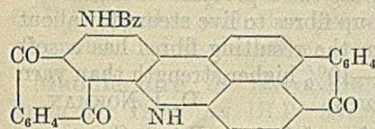
Production and use of anthraquinone derivatives [guanidinoanthraquinones as dyes for acetate silk and wool]. E. G. BECKETT, P. F. BAUGHAM, J. THOMAS, and SCOTTISH DYES, LTD. (B.P. 348,661, 12.11.29).—A di- or poly-aminoanthraquinone hydrohalide is heated with dicyanodiamide, or the mixed bases are treated with hydrogen halide and heated at 150–200°. Products (which may contain unchanged NH_2 groups) from 1:4-diaminoanthraquinone (yellow on acetate silk), 1-amino-4-hydroxyanthraquinone (red on acetate silk, brown-red on wool), 2:3-dichloro-1:4-diaminoanthraquinone, and 1:3:8-triamino-2-methylanthraquinone are described. C. HOLLINS.

Manufacture of azo dyes insoluble in water [ice colours and pigments]. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 348,811, 3.4.30).—A 2:3-hydroxynaphthoic arylamide is coupled in substance or on the fibre with a diazotised 6-halogeno-3-amino-1:4:5-trimethylbenzene. Bright red shades fast to boiling NaOH (without pressure) and to light are obtained. Examples are 2:3-hydroxynaphthoic 5-chloro-*o*-anisidide, 4-chloro-2:5-dimethoxyanilide, 2:3- and 2:5-dimethoxyanilides, *o*-toluidide, *o*-anisidide, 4-chloro-2:3:5-trimethylanilide, 6-chlorocresidide, α - and β -naphthylamides, 4-methoxy- α - and 3-methoxy- β -naphthylamides, and *o*-phenetidide. C. HOLLINS.

Manufacture of [direct] azo dyes. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 348,680, 11.2.30).—Diazo-compounds containing mordant groupings are coupled with 1-aminophenylpyrazolones and the products are phosgenated or thiophosgenated; a nitrophenylpyrazolone may be used and the NO_2 group reduced after coupling. Examples are: 3- or 5-aminosalicylic acid, 3-*p*-aminobenzamidosalicylic acid, 4:4'-diamino-3:3'-dicarboxydiphenylcarbamide, 4-nitro-*o*-aminophenol, 1:2-aminonaphthol-4-sulphonic acid, or 2:3-aminonaphthol-6-sulphonic acid \rightarrow 1-*p*-aminophenyl-3-methylpyrazolone, phosgenated. The shades (yellow, orange, red) on cotton are made faster to washing and AcOH by after-coppering. C. HOLLINS.

Manufacture of vat dyes [of the benzanthrone series]. I. G. FARBENIND. A.-G. (B.P. 348,706 and 349,115, 13.2.30. Ger., 13.2.29. [A] Addn. to B.P. 305,679; B., 1930, 755).—(A) 1-Amino-4-(3'-benzanthranyl amino)anthraquinone is aroylated (e.g.,

benzoylated), halogenated (*e.g.*, dibrominated), and finally oxidised by heating in PhNO_2 to give a yellow-green vat dye (as annexed formula).



(B) A green vat dye of similar structure free from the aroyl-amino-group is obtained by chlorinating or brominating in the 2-position a 1-(3'-benzanthronylamino)anthraquinone (which may already contain halogen in other positions) and condensing the product in H_2SO_4 or oleum. [(B) Stat. ref.]

C. HOLLINS.

Manufacture of vat dyes [of the benzanthrone series]. J. Y. JOHNSON. FROM I. G. FARBENIND. A.-G. (B.P. 348,671, 18.12.29).—The product described in Example 1 of B.P. 24,604/08 (see B., 1909, 596) is chlorinated or brominated and condensed with a suitable amine, *e.g.*, with 1-aminoanthraquinone for a brown-olive vat dye, becoming olive-green on further condensation in H_2SO_4 , or with 1-amino-5-benzamidoanthraquinone (olive-green to olive-brown), aminodibenzanthrone (grey to black), dichloroaminoanthraquinoneacridone (green), or the carbazole from 5:5'-diamino-1:1'-dianthraquinonylamine (brown). The product of alkaline fusion of 1-(9-chloro-3-benzanthronylamino)anthraquinone is chlorinated and condensed with 1-amino-5-benzamidoanthraquinone for an olive-green. C. HOLLINS.

Dehalogenation of [cyclic] organic halogen compounds [vat dyes of the anthraquinoneacridone series]. J. Y. JOHNSON. FROM I. G. FARBENIND. A.-G. (B.P. 346,676, 24.9.29 and 19.6.30).—Halogenated anthraquinoneacridones and other cyclic compounds are partly or completely dehalogenated by treatment with a reducing agent free from metal (*e.g.*, hydrazine or formic acid) in a diluent (*e.g.*, pyridine or quinoline) and in presence of preferably 1 equiv. of Cu or other metal forming reducible oxides or of a reducible salt or oxide of such metal. 2:4:8-Trichloro-6:7-phthaloylacridone is reduced with hydrazine and Cu in boiling pyridine to the 2:4-dichloro-compound (clear red vat dye); the same product results when the hydrazine is replaced by phenylhydrazine, hydrazobenzene, dioxindole, or quinol. In the following 6:7-phthaloylacridones halogen is similarly removed first from position 8 and then from position 1 (the 2-chloro-compound may be reduced with hydrazine under pressure): 1- and 2-chloro-, 1:2- and 1:3-dichloro-, 1:2:3- and 1:2:8-trichloro-, 1:2:3:4-, 1:2:3:8-, and 1:2:4:8-tetrachloro-, 1:2:3:4:8-pentachloro-, 2-chloro-4:8-dibromo-, 2:4-dichloro-1-bromo-, 1:3-dichloro-2:4-dibromo-, 1:2:3-trichloro-4-bromo-, 1:2:3-trichloro-4:8-dibromo-, 2:4:8-tribromo-, 4:8-dichloro-2-methyl-, 4:8-dichloro-2-amino-, 1:2:3-trichloro-8-amino-. The nitro-group is reduced in 1:2:3-trichloro-8-nitro-6:7-phthaloylacridone, but not in the 4:8-dichloro-2-nitro-compound. Other dehalogenations described are: tetra- to di-bromopyranthrone, dichlorotetrabromo- to dibromo-dibenzanthrone, di- to mono-bromobenzanthronepyrazolanthrone, 8-bromo-5:6-phthaloylquinoline to phthaloylquinoline, hexa- to tetra-bromodihydroxydinaphthazine, 1:3-dibromo- to 3-bromo-2-aminoanthraquinone, m.p. 305—310°, 9:10-dichloroanthrac-

ene tetrachloride to 9:10-dichloroanthracene, perchloro- to hexachloro-naphthalene, m.p. 202—204°, 1:3:6-trichloro-2:4-dinitrobenzene to a compound deflagrating at 345°, and octabromocyclohexane, m.p. 178—182°, to gaseous olefines. C. HOLLINS.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Thermal insulating properties of fabrics. M. C. MARSH (J. Text. Inst., 1931, 22, τ 245—273).—The chief factor which determines thermal insulating value is the thickness of the fabric, excluding projecting fibres. There is no direct relation between this property and wt. per unit area of the fabric. Comparison of materials of different composition is difficult, and the results indicate that a fabric of a given insulating value could be made from any of the textile materials by choosing the right thickness and closeness of structure. In general, woollen cloths have higher insulating values than worsted, whilst rayon materials with a very shiny surface tend to have high values. B. P. RIDGE.

Hollow artificial [silk] fibres. M. HESSENLAND and F. FROMM (Z. angew. Chem., 1931, 44, 630—631).—Instead of extruding the cellulose solution into a coagulating bath in the ordinary way, a coagulating solution of the usual composition is forced through a nozzle into the spinning liquid, whereby hollow threads which are coagulated from inside outwards are formed. These are stretched and passed through a fixing bath. The method is applicable to any cellulose wet-spinning process and the filaments obtained are hollow throughout. B. P. RIDGE.

Laundry "winter damage." J. B. WILKIE (Bur. Stand. J. Res., 1931, 6, 593—602).—"Winter damage" of fabrics dried out of doors is caused by H_2SO_4 formed by the oxidation of atm. SO_2 absorbed by the damp material. The oxidation is accelerated by traces of Fe, spent bleach liquor, and AcOH. The damage may be minimised by adding $\text{Ca}(\text{HCO}_3)_2$ to the final wash water, by eliminating Fe and spent bleach liquor as far as possible from the laundered fabric, and by making the drying time as short as possible. C. W. GIBBY.

Swelling of cellulose and its affinity relations with aqueous solutions. Preferential absorption of sodium hydroxide from dilute solutions as a characteristic property of cellulose, and an indication of previous mercerisation or other swelling treatment. S. M. NEALE (J. Text. Inst., 1931, 22, τ 320—338).—The manner in which preferential absorption by various types of cellulose from NaOH solutions up to 5N varies with NaOH concentration is shown. In opposition to Rumbold (A., 1930, 749), it is found that cotton that has been mercerised loose gives a smooth curve of the characteristic "adsorption" type, whilst the curve for purified cotton smoothly approaches an asymptote at about 2N concentration, rises rapidly as swelling occurs, and then approaches a higher asymptote at 5N. In aq. NaOH of any chosen concentration below 2N, the absorptions characteristic of various samples of cellulose bear a const. ratio to each other. Investigation of the reactivity of cotton that has been treated with NaOH solutions of varying concentration by determining its capacity for absorbing dil. alkali shows that with

NaOH above 15% the product has a fairly uniform level of activity, but immersion of the cotton for more than 3 min. is required to attain the max. effect when the NaOH concentration exceeds 40%. With NaOH solutions more conc. than 25% a less active mercerised product is obtained if the NaOH is washed off with brine than when water only is used, and it is concluded that the former prevents the transient swelling that occurs when cellulose in equilibrium with conc. NaOH is suddenly immersed in water. Mercerisation does not consist essentially in the development of an imperfectly cryst. arrangement due to rapid coagulation of cellulose from a state of semi-solution. B. P. RIDGE.

Detection of oxycellulose in bleached cotton goods. H. HEINRICH (Textilber., 1931, 12, 113—114).—The presence and relative amount of oxycellulose are ascertained by boiling 1 g. of the bleached fabric in 20 c.c. of 6% NaOH for 1 hr. (the vol. is maintained const. by additions of water), then diluting the product to 50 c.c., and comparing its yellow colour with that similarly obtained from cotton free from oxycellulose. The results agree with those obtained by the Kauffmann method. The yellower is the extract the higher is the amount of oxycellulose present and the more susceptible the fabric to after-yellowing in storage. A. J. HALL.

Test for distinguishing oxy- and hydro-celluloses. R. HALLER (Textilber., 1931, 12, 257).—Cotton fabric freed from impurities is immersed for 1—2 hr. in cold aq. SnCl_2 , washed, and immersed in a solution of 1 or 2 drops of AuCl_3 per litre of water; the presence of oxycellulose is indicated by development of a purple colour, whereas hydrocellulose produces no distinctive coloration. The test is effective even when the cotton has been previously boiled with NaOH. A technically bleached fabric usually gives a pink colour in the above test. A. J. HALL.

Hygroscopic moisture of cellulose. II. S. OGURI and S. TERUI (J. Soc. Chem. Ind. Japan, 1931, 34, 182—186 B; cf. B., 1930, 898).—The absorption of water vapour by cellulose in an enclosed vessel is independent of temp. (12—30°) if R.H. is kept const. A. A. LEVI.

Theory of milling. I. Method for measuring the scaliness of wool fibres. J. B. SPEAKMAN and E. STOTT (J. Text. Inst., 1931, 22, T 339—348).

Macromols. and micelles.—See XIII.

See also A., Aug., 905, **Cellulose acetate solutions**, 928, **X-Ray fibre photography**.

PATENTS.

Disinfection of raw wool. NORDDEUT. WOLLKÄMMEREI & KAMMGARNSPINNEREI (B.P. 352,279, 28.7.30. Ger., 27.8.29).—Wool is degreased with an org. solvent and, after removal of the latter, is treated with known gaseous disinfectants, whereby its sortability is preserved. F. R. ENNOS.

Opening and preparing artificial staple fibre for spinning. M. F. THOMA (U.S.P. 1,785,823, 23.12.30. Appl., 8.2.29).—After treatment with softening, crinkling, and hygroscopic agents (cf. B.P. 282,776; B., 1929, 429), the fibres are pressed into flat cakes and stacked in piles 5 ft. or more in height for about 10 hr. The

cakes are then opened up and dried at 50—93°. Static electricity developed during these processes is eliminated by exposing the opened-up fibres to live steam for about 48 hr. Yarn spun from the resulting fibres has a soft silky feel, and shows 25—40% higher strength than yarn made from untreated fibres. D. J. NORMAN.

Manufacture of crêpe fabric. BRIT. CELANESE, LTD. (B.P. 352,113, 14.4.30. U.S., 12.4.29).—Highly twisted yarns of degummed silk, which may be sized with a H_2O -sol. material, are incorporated in the fabric, which is afterwards treated with hot aq. liquids. F. R. ENNOS.

Manufacture of textile materials. BRIT. CELANESE, LTD. (B.P. 352,058, 31.3.30. U.S., 2.4.29).—Fabrics containing org. derivatives of cellulose, which may be superficially hydrolysed if desired, are treated with an org. substance (other than an animal or vegetable oil), e.g., waxes, fatty acids or their Na salts fixed by a coagulant, which causes scorching at a temp. below that at which the cellulose derivative begins to melt. F. R. ENNOS.

Manufacture of artificial silk. W. HARRISON (B.P. 351,527, 25.3.30).—Filaments, spun from solutions of cellulose derivatives (viscose, cellulose acetate or nitrate) in suitable coagulating baths so as to form a skin of cellulose, are treated with a solvent, e.g., Na_2CO_3 , aq. CO_2 , which causes the core to swell to a greater extent than the outer layers. A diametrical expansion of the threads is thus produced with consequent disposition of the crystallites of the outer layers at right angles to the axes of the threads. F. R. ENNOS.

Production of artificial filaments etc. BRIT. CELANESE, LTD. (B.P. 351,718, 6.6.30. U.S., 17.6.29).—The upward dry-spinning of solutions of org. derivatives of cellulose in volatile solvents is initiated by use of a liquid coagulating bath, containing H_2O , MeOH, EtOH, C_6H_6 , CCl_4 , or kerosene together with soap, which is afterwards withdrawn. F. R. ENNOS.

Manufacture of matt artificial silk. GLANZSTOFF-COURTAULDS G.M.B.H. (B.P. 351,395, 21.2.30. Ger., 22.2.29).—Viscose containing finely-divided insol. substances such as metallic compounds, fatty oils, waxes, hydrocarbons etc. is further treated with a H_2O -sol. sulphonated fatty oil (Turkey-red oil) before spinning. F. R. ENNOS.

Production of artificial [viscose] silk yarn of diminished lustre. NAAML. VENN. HOLLANDSCHE KUNSTLIJDE IND. (B.P. 348,910, 6.6.30. Holl., 25.10.29).—Viscose emulsions containing fats and oils which yield dull-lustre silk when spun and are so stable that they do not "cream" even when stored up to the point of spontaneous coagulation are obtained by employing as emulsifying agent small quantities of the derivatives obtained by the elimination of H_2O from saturated or unsaturated hydroxy-fatty acids, e.g., ricinoleic acid. A. J. HALL.

Manufacture of viscose solutions. VEREIN. GLANZSTOFF-FABR. A.-G. (B.P. 351,401, 17.3.30. Ger., 26.3.29).—Cellulose of a low degree of polymerisation which shows a Cu viscosity (as determined by the described method) of less than 5, after freeing from hemicellulose and moist-grinding, is treated first with part or all of the required

quantity of aq. NaOH of mercerising concentration and then with CS_2 . The resulting xanthate is dissolved in H_2O together with that portion of the NaOH which was not added at the earlier stage. F. R. ENNOS.

Manufacture of nitrocellulose. H. C. HEIDE. From E. TSCHUDIN (B.P. 351,608, 8.4.30).—Prior to nitration, cellulose in a comparatively dense form (cf. B.P. 322,998 and 323,019; B., 1930, 184) is treated with a gas-generating substance, e.g., a bicarbonate, either in solid form or in aq. solution, to facilitate penetration of the nitrating acids. F. R. ENNOS.

Materials made of or containing organic esters of cellulose. BRIT. CELANESE, LTD., and S. M. FULTON (B.P. 351,417, 24.3.30. Addn. to B.P. 316,521 and 318,468; B., 1930, 1023).—Saponification of the travelling filaments is carried out during their passage from the spinning machine to the collecting device or during the warping or sizing operations. F. R. ENNOS.

Esterification of cellulose materials with vapours of lower fatty acids. KODAK, LTD. From EASTMAN KODAK Co. (B.P. 352,054, 28.3.30).—Cellulose material is heated in the vapour of a fatty acid containing 2–8 C atoms at 100–200° in absence of both O_2 and catalyst until the product contains at least 4% of the acyl group. It is then further esterified in the usual way, whereby economy in fatty anhydride is effected. F. R. ENNOS.

Soluble nitrocellulose and coating composition containing it. E. C. PITMAN, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,788,406, 13.1.31. Appl., 26.1.26).—Cellulose nitrate (10–11.5% N) is digested at 110–140° under at least 50 lb. per sq. in., and washed with water to produce a stability of 30 min. (German test). The resulting ester is dissolved in 95% EtOH, in which it is 99% sol. F. R. ENNOS.

Phosphoric acid solution of cellulose. G. W. MILES and C. DREYFUS, Assrs. to CELANESE CORP. OF AMER. (U.S.P. 1,787,542, 6.1.31. Appl., 30.12.25).—Cellulose is kept at 0–10° with 75–100% H_3PO_4 for several hrs. until dissolved, with simultaneous or subsequent addition of 30–50 vol.-% of EtOH or AcOH. F. R. ENNOS.

Preparation of aqueous emulsions of cellulose derivatives. IMPERIAL CHEM. INDUSTRIES, LTD. From E. I. DU PONT DE NEMOURS & Co. (B.P. 351,444, 19.12.29).—A cellulose derivative (pyroxylin) is colloided with oil (linseed) and treated with a solvent, and the base material so formed is mixed with an emulsion of Na oleate, gasoline, and H_2O . The resulting water-in-oil emulsion is inverted to an oil-in-water emulsion by vigorous stirring in presence of a large quantity of H_2O determined by the particle size required. F. R. ENNOS.

Treating cotton and other porous or absorbing vegetable pulps or fibres. C. W. ANDREWS (U.S.P. 1,784,566, 9.12.30. Appl., 5.10.29).—To prepare a filtering medium for tobacco smoke, raw cotton fibre is steamed at 42 lb./sq. in., boiled with dil. aq. NaOH, washed, dried, combed, and sprayed first with aq. H_3BO_3 and then with milk of magnesia. Sweetening agents or EtOH may be introduced. D. J. NORMAN.

[Electrically] drying cellulose articles such as pulp, cotton cloth, etc. G. E. COBLENS and A. W. MORRIS (B.P. 351,170, 6.5.30).—The material is interposed between two perforated or wire-mesh electrodes made from, e.g., nichrome or other high-resistance alloy, and the whole is submitted to high pressure to embed the electrodes in the surface of the material. These electrodes are then heated electrically. Drying may be accelerated by passing a.c. or d.c. at, e.g., 100 volts through the material to promote electro-osmosis. D. J. NORMAN.

Pulpmaking and apparatus therefor. G. A. RICHTER, Assr. to BROWN Co. (U.S.P. 1,784,849, 16.12.30. Appl., 18.9.28).—The digestion liquor is heated to a temp. and pressure slightly above that required for cooking in a separate vessel which can be connected to give a closed system with any digester in the battery. The hot liquor is then introduced at the bottom of the digester and displaces the air therefrom into the heating vessel. The process is particularly suitable for kraft cooking and reduces the time required to reach the cooking temp. from about 2 hr. to 15–20 min. D. J. NORMAN.

Refining cellulose pulp. G. A. RICHTER and M. O. SCHUR, Assrs. to BROWN Co. (U.S.P. 1,784,161, 9.12.30. Appl., 27.5.24).—Unbleached pulp, particularly sulphite pulp, is agitated for about 20 min. with a small quantity of an oxidising agent [1–2% $\text{Ca}(\text{OCl})_2$ on the wt. of pulp], washed, and digested at atm. pressure for 2–6 hr. with, e.g., 0.1–0.5% NaOH solution. After further washing the pulp is bleached, preferably with a mixture of $\text{Ca}(\text{OCl})_2$ and NaOH or Na_2CO_3 to prevent local overbleaching. The resulting product contains 99.6% of cellulose, 93–94% of α -cellulose, and has Cu no. 1.7. D. J. NORMAN.

Digester for sulphite wood pulp. E. MORTERUD (U.S.P. 1,785,591, 16.12.30. Appl., 26.2.29. Nor., 25.1.29).—Intake and outlet pipes from the external heating and circulating system enter the digester adjacently at the middle and communicate with sieve boxes at the top and bottom of the digester. These pipes, which may be made from non-corrosive steel alloy, consist of at least 2 loosely fitting sections, and each section is fixed to the digester wall at one point only to permit free expansion and contraction in any direction. D. J. NORMAN.

Chemical pulp papermaking process. F. A. JOHNSON, Assr. to J. H. O'CONNELL, J. D. HASKELL, and DILTS MACHINE WORKS, INC. (U.S.P. 1,786,538, 30.12.30. Appl., 15.10.27).—Highly hydrated stock suitable for the manufacture of grease-proof or glassine paper is obtained by grinding chemical pulp in a pulp grinder under a pressure of 20–80 lb./sq. in. The freeness of the stock is controlled by adjusting the grinding pressure, the H_2O sprays, and the sharpness of the stone. When run on the machine the sheet should be formed quickly, and hence the number of suction boxes should be increased to 9. D. J. NORMAN.

Filtering and decolorising paper of acid character [for oils etc.]. W. S. BAYLIS, Assr. to FILTROL Co. (U.S.P. 1,784,509, 9.12.30. Appl., 5.8.29).—The paper contains 10–25% of an acid activated clay of the

bentonite or smectite type containing 0.15—0.50% of free H_2SO_4 , e.g., "Filtrol" prepared by a process similar to that of U.S.P. 1,397,113 (B., 1922, 5 A).

D. J. NORMAN.

Manufacture of fibrous articles. N. E. BROOKES. From BEMIS INDUSTRIES, INC. (B.P. 352,275, 23.7.30).—Pulp is introduced through a moving perforated distributing duct into a form of the desired shape having a foraminous outer wall, which is subjected to a differential pressure to cause deposition of the fibres thereon and removal of the liquid. The article is afterwards partly dried by a current of air introduced through the duct.

F. R. ENNOS.

Apparatus and process for removing the grease from and cleaning garments and textiles. R. FABRE (B.P. 352,503, 10.4.30. Fr., 11.4.29).

Dry-cleaning [plant]. BRIT.-AMER. LAUNDRY MACHINERY CO., LTD. From AMER. LAUNDRY MACHINERY Co. (B.P. 352,666, 29.5.30).

[Feeding means for] spinning apparatus for artificial silk. MARTIN HÖLKEN G.M.B.H. (B.P. 352,761, 30.7.30. Ger., 30.7.29).

Apparatus for washing artificial silk spinning bobbins. BARMER MASCHINENFABR. A.-G., O. BOCHMANN, and W. ZINSELMAYER (B.P. 353,197, 20.6.30)

[Flow boxes for] manufacture of paper, pulp-board, etc. W., H., and H. VOITH [J. M. VOITH] (B.P. 353,133, 13.5.30).

Cotton fibres etc. Cellulose derivative fibres. Yarns or filaments.—See VI. Mouldable materials.—See XIII.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Swelling of cellulose. Oxycellulose. Oxy- and hydro-cellulose.—See V.

PATENTS.

Bleaching textile goods and fibrous substances of all kinds with hydrogen peroxide. H. E. POTTS. From G. ADOLPH (B.P. 351,217, 5.6.30).—Bleaching is effected by impregnating the textile material with a solution of H_2O_2 of suitable concentration and alkalinity (e.g., H_2O_2 0.05—0.5, NaOH 0.5—5, H_2O 100), and then maintaining the impregnated material at a suitable temp. and avoiding evaporation until bleaching is complete.

A. J. HALL.

Dyeing of loaded silk. SOC. CHEM. IND. IN BASLE (B.P. 351,400, 15.3.30. Switz., 16.3.29).—Loaded silk is dyed in a neutral or fatty soap bath with a metal (Cu or Cr or both) compound derived from an azo dye made from an *o*-hydroxy- or *o*-carboxy-diazo component and an aminonaphtholsulphonic acid (e.g., 2:5:7, 1:8:4, 2:8:6) or an *N*-derivative of such a sulphonic acid, or with a further conversion product of a reduced dye containing Cr obtainable from diazotised 5-nitro-2-aminophenol and a 6-arylamino- α -naphthol-3-sulphonic acid.

A. J. HALL.

Coloration [with aniline-black] of [cellulose acetate] textile materials. BRIT. CELANESE, LTD., A. MELLOR, and D. T. McLELLAN (B.P. 351,577, 2.4.30).

—Mixed material containing a cellulose ester or ether, particularly cellulose acetate, and a vegetable fibre such as cotton is dyed black by first treating it with an aq. suspension of *p*-aminodiphenylamine or 2:4-diaminodiphenylamine which is absorbed by the cellulose acetate but not the cotton, then padding with an aniline-black liquor containing NH_3Ph , HCl, $KClO_3$, and $CuSO_4$, drying, ageing at 40—50° for development of a black on both fibres, and finally after-chroming at room temp. for 1 hr. with aq. $Na_2Cr_2O_7$ (*d* 1.005—1.015).

A. J. HALL.

Coloration [by discharge printing] of materials made of or containing cellulose esters or ethers. BRIT. CELANESE LTD., and G. H. ELLIS (B.P. 351,457, 20.3.30).—Coloured discharges on cellulose acetate etc. materials dyed with azo dyes are obtained by using a discharge paste containing $SnCl_2$ or $Sn(CNS)_2$, an anthraquinone dye, and a swelling agent for the silk such as phenol, quinol, or an alcohol. Anthraquinone dyes sensitive to hyposulphites are usually unaffected by Sn^{II} salts.

A. J. HALL.

Treating cotton fibres. W. PICKARD and J. WEST (B.P. 351,248, 26.6.30).—Cotton of shorter staple than hitherto is spun into very strong yarn of fine counts after a treatment in which it is sprayed with a solution of rubber in naphtha, allowed to dry, and rendered fire-proof by spraying with a solution containing 4 oz. of $NaHCO_3$ and 1 oz. of H_2SO_4 per gal.

A. J. HALL.

[Linen-like] yarn produced from cotton or other vegetable fibres or derivatives thereof. D. HUNTER, and LINIUM PRODUCTS SYNDICATE, LTD. (B.P. 348,305, 25.3.30).—A permanent stiffness is conferred on cotton yarn by impregnation with a solution of cellulose (e.g., cotton dissolved in cuprammonium solution), which may or may not be capable of attacking the yarn, followed by treatment with a coagulating agent such as NaOH of mercerising concentration.

A. J. HALL.

Manufacture or treatment of textile or other material [delustred cellulose derivative fibres]. BRIT. CELANESE, LTD., G. H. ELLIS, and H. C. OLPIN (B.P. 349,980, 5.3.30. Addn. to B.P. 332,231; B., 1930, 944).—The relustring process previously described is effected with steam having a degree of superheat of at least 20°, and at ordinary or (preferably) higher pressure.

A. J. HALL.

Process and apparatus for treating [tinting and lubricating] yarns or filaments. BRIT. CELANESE, LTD. (B.P. 350,056, 14.3.30. U.S., 14.3.29).—Yarns of cellulose acetate or other cellulose derivative are tinted and made more suitable for knitting and weaving by impregnation either successively or simultaneously with a fugitive dye, e.g., Acid Green G, and a lubricant, e.g., a mineral oil or olive and castor oils, together with one or more polyhydric alcohols, e.g., ethylene glycol, glycerin, and diethylene glycol.

A. J. HALL.

Production of coated fabric material resistant to the growth of fungus. IMPERIAL CHEM. INDUSTRIES, LTD. From E. I. Du PONT DE NEMOURS & Co. (B.P. 350,833, 5.9.30).—See U.S.P. 1,779,258; B., 1931, 585.

Vat for wet-treatment of lengths of fabric. B. SCHROERS (B.P. 353,355, 14.11.30).

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

Titration [of sodium hydroxide and carbonate] by Winkler's and by Warder's method. A. SUCHIER (*Z. angew. Chem.*, 1931, 44, 534—536).—The applicability of the two methods for the determination of carbonate in fairly pure (93—97%) NaOH has been studied. The average deviation from the true val. for Na_2CO_3 by the Winkler method is +0.2%, and by the Warder method +0.7%; for the NaOH determination the deviations are +0.1% and -0.2%, respectively. Curves for obtaining the correct from the experimental val. are reproduced.
H. F. GILLBE.

Factors influencing the stability of hypochlorite solutions and a proposed formula for a modified Dakin's solution. H. DAVIS (*Pharm. J.*, 1931, 127, 81—82).—The rate of decomp. of Eusol B.P.C. and Dakin's solution at room temp. is measurably affected by light, but exposure to the air has little effect. At 55° Dakin's solution is much the more stable. Solutions from Daufresne's, Dakin's, and the U.S.P. X formulæ are in descending order of stability, and the first two have p_H 10.23 and 9.71, respectively. A modified formula in which the amounts of $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ and H_3BO_3 used depend on the % of available Cl in the Ca hypochlorite gives a uniform product, relatively stable and less alkaline (p_H 9.53) than the earlier solutions.
E. HOPKINS.

Deterioration of sodium hypochlorite solution. A. KLING and R. SCHMUTZ (*Compt. rend.*, 1931, 192, 1655—1657).—Decomp. according to (a) $\text{NaOCl} = \text{NaCl} + \text{O}$ is of practical consequence only in samples of chlorometric degree above 20; in ordinary samples of degree below 12 only (b) $3\text{NaOCl} = \text{NaClO}_3 + \text{NaCl}$ is of importance. To distinguish deterioration due to (b) from fraudulent addition of H_2O the amount of Cl_2 evolved on addition of HCl is determined. The quantity evolved in cases of genuine deterioration is unchanged: $\text{NaOCl} + 2\text{HCl} = \text{NaCl} + \text{H}_2\text{O} + \text{Cl}_2$ and $\text{NaClO}_3 + 6\text{HCl} = \text{NaCl} + 3\text{H}_2\text{O} + 3\text{Cl}_2$.
C. A. SILBERRAD.

Conversion of calcium cyanamide into cyanide. P. PASCAL and (MLLE.) BERNHEIM (*Compt. rend.*, 1931, 192, 1425—1427).—The best yield is obtained by heating 1 pt. of Ca cyanamide (pure) with 0.2 C and 4 NaCl at 1000°.
C. A. SILBERRAD.

Method of bringing tricalcium phosphate into solution. P. JOLIBOIS and G. CHAUDRON (*Compt. rend.*, 1931, 192, 1650—1652).— $\text{Ca}_3(\text{PO}_4)_2$ (e.g., 3 kg. of Morocco phosphate) is suspended in H_2O (50 kg.) slightly acidified with HCl (0.5 kg.), and PbCl_2 (6 kg.) is added. The $\text{Ca}_3(\text{PO}_4)_2$ is converted into insol. $\text{PbCl}_2 \cdot 3\text{Pb}_3(\text{PO}_4)_2$, which is separated, the Pb remaining in solution being precipitated by $\text{Ca}(\text{OH})_2$. The chlorophosphate is then treated with HNO_3 of d 1.32 (6 kg.), when most of the Pb separates as $\text{Pb}(\text{NO}_3)_2$, which is converted by KCl into PbCl_2 and KNO_3 . The solution is neutralised with NH_3 when the rest of the Pb separates as $\text{Pb}_3(\text{PO}_4)_2$, and the mixed $(\text{NH}_4)_3\text{PO}_4$ (1.6 kg.) and NH_4NO_3 (0.1 kg.) are obtained on evaporation.
C. A. SILBERRAD.

Dangers in refining radioactive substances. H. SCHLUNDT, W. MCGAVOCK, JUN., and (MISS) M. BROWN (*J. Ind. Hygiene*, 1931, 13, 117—134).—Satisfactory methods of reducing the intensity of radiations from radioactive materials are described; potential danger exists from γ -rays transmitted by the screens used and from α -particles produced from emanation in the air.
H. F. GILLBE.

Recovery and utilisation of sulphur dioxide in the extraction of sulphur. P. LEONE (*Annali Chim. Appl.*, 1931, 21, 238—244).—To utilise the SO_2 of the gases issuing from the earth in the Sicilian S regions, it is suggested that the gases be passed over NaCl at 450—500° and thus converted into HCl and Cl_2 . This mixture is washed with H_2O and the resulting aq. HCl used to dissolve the S-containing calcareous gangue and so enrich it in S. The Cl_2 may be used for making bleaching powder.
T. H. POPE.

Moisture content of liquid sulphur dioxide. A. K. SCRIBNER (*Ind. Eng. Chem. [Anal.]*, 1931, 3, 255—257).—When the H_2O content of liquid SO_2 is less than 65 p.p.m. absorption by P_2O_5 is recommended for its determination. Corrections are given for changes in temp. and pressure.
E. S. HEDGES.

Removal of atmospheric carbon dioxide by means of active charcoal. S. YAGI (*J. Soc. Chem. Ind. Japan*, 1931, 34, 203—205 B).—Experiments designed to investigate the possibility of removing CO_2 from air by means of active charcoal instead of caustic alkali solution in the prep. of N_2 by the liquefaction process show that below -90° the CO_2 is almost completely adsorbed by active charcoal, but that below -100° to -120° the O_2 adsorption, which is small or negligible at higher temp., suddenly increases to high values. This may be connected with the fact that the crit. temp. of O_2 is -118°, below which capillary liquefaction is possible. The adsorption capacity of the charcoal at -90° for CO_2 in air is much less than that for pure CO_2 , and this is thought to be due to the adsorption of O_2 and N_2 in the former case. The effects of pressure, heat of adsorption, and velocity of gas flow are considered.
N. H. HARTSHORNE.

S purifier.—See II. Na silicate. Boric acid and Al_2O_3 .—See VIII. Metals and alloys with H_3PO_4 .
Rubber for pickling baths. H_2S .—See X. ZnSO_4 .—See XI. S in black powder.—See XXII.

See also A., Aug., 893, Phosphorescent substances.
902, Cyclic separation of two salts. 904, Adsorption of H_2 and CO on $\text{ZnO}-\text{Cr}_2\text{O}_3$ catalysis. 907, Hydrous Al_2O_3 sols. 911, Recrystallisation of CaHPO_4 . 916, CO_2 absorption. 919, Ni catalysts for hydrogenation. 921, Pure KNO_3 and NaNO_2 . Refractory carbides, nitrides, and borides. 923, Standard U_3O_8 . 926, Determination of CO, and of small quantities of alkalis in H_2O -insol. acids (H_2WO_4). 927, Microanalysis of Be silicate rocks. 929, New cell for electroanalysis. 986, N fixation and NH_3 production by *Azotobacter*. Nitrite formation by soil bacteria.

PATENTS.

Sulphuric acid chambers. FISON, PACKARD, and PRENTICE, LTD., CHANCE & HUNT, LTD., and R. T. MAUDSLEY (B.P. 352,016, 28.3.30).—Two chambers with

vertical or almost vertical walls and of semicircular or semi-elliptical cross-section are built up with the flat surfaces separated only by the necessary supporting framework etc.; the chambers are provided with means for H_2O -cooling over the whole of the exterior surface, with connecting pipes near the top, and with an inlet and outlet at the lower ends of the first and second chambers, respectively. L. A. COLES.

Process for utilising waste gases from contact plants for sulphuric acid manufacture. METALLGES. A.-G. (B.P. 351,825, 5.9.30. Ger., 3.10.29).—The gases are used as combustion air for roasting pyrites, Zn blende, etc. in blast-roasting apparatus.

H. ROYAL-DAWSON.

Apparatus for concentrating sulphuric acid. W. C. MAST, ASSR. to CHEM. CONSTRUCTION CORP. (U.S.P. 1,790,507, 27.1.31. Appl., 22.9.27).—The dil. acid, especially that from the acid treatment of oils, flows through a series of compartments in which it is treated with a countercurrent of hot gases led successively into each compartment below the acid level.

L. A. COLES.

Recovery and purification of dilute sulphuric acid from acid sludge. F. E. KIMBALL (U.S.P. 1,790,049, 27.1.31. Appl., 30.9.29).—Water is added to the sludge obtained by the action of H_2SO_4 on petroleum oils, and the acid layer is separated and treated to 150° under pressure. After keeping, the acid separates from the oil.

D. K. MOORE.

Process and apparatus for converting sulphur dioxide into trioxide. C. B. CLARK, ASSR. to GEN. CHEM. CO. (U.S.P. 1,789,460, 20.1.31. Appl., 10.11.26).—Temp. control is maintained by withdrawing part of the gas leaving each converter, cooling it, and then re-introducing it with the gas entering a subsequent converter. If the SO_2 is absorbed from the withdrawn gas before its reintroduction, the overall conversion of SO_2 into SO_3 is increased.

D. K. MOORE.

Apparatus for manufacturing nitrogen oxide. F. W. DE JAHN, ASSR. to F. A. BOWER (U.S.P. 1,789,580, 20.1.31. Appl., 15.6.28).—A mixture of air and NH_3 , obtained by passing air, heated by the gases from the converter, up a column down which aq. NH_3 flows, is passed through a heat interchanger and a converter provided with cooling coils.

D. K. MOORE.

Manufacture of boric acid. A. KELLY (B.P. 351,810, 20.8.30).—Borax in any degree of hydration is added to a hot solution of Na_2SO_4 and $NaHSO_4$, and the liquor is boiled and separated from the Na_2SO_4 . H_2SO_4 is added, and the liquor is cooled to 30° .

H. ROYAL-DAWSON.

Manufacture of sodium carbonate. H. B. KIPPER (U.S.P. 1,789,235, 13.1.31. Appl., 22.5.28).— CO_2 , NH_3 , and purified brine are simultaneously introduced into a reaction chamber fitted with stirring and cooling devices, and the ppt. of $NaHCO_3$ is separated from the aq. NH_4Cl , and converted into Na_2CO_3 by heating with the hot gases from a lime kiln.

D. K. MOORE.

Production of potassium sulphate and soda. C. T. THORSSELL (U.S.P. 1,787,497, 6.1.31. Appl., 25.2.30. Ger., 5.3.29).—The mother-liquor from the

Solvay process is mixed with $CaSO_4$ or $SrSO_4$, and after separating the carbonate, the remaining liquor is treated with crude sylvinitic $NaCl$ and NH_3 ; after filtering, the mother-liquor is cooled to remove the NH_4Cl , the remaining liquor being used again in the cycle and the residue treated with H_2O for conversion into K_2SO_4 .

H. ROYAL-DAWSON.

Recovery of alkali sulphites from fusion liquors. C. L. MASTERS, ASSR. to ELKO CHEM. CO. (U.S.P. 1,788,955, 13.1.31. Appl., 4.6.27).—An aromatic sulphinate is fused with alkali hydroxide and the phenolic compound liberated by the addition of SO_2 and separated. Any phenol remaining in the solution of alkali sulphite is removed by distillation. The sulphite solution is cooled and crystallised. The mother-liquor is conc. and the steam produced used for the distillation.

D. K. MOORE.

Separation of potassium aluminates and phosphates. I. G. FARBENIND. A.-G. (B.P. 351,877, 31.10.30. Ger., 23.11.29).—Gaseous NH_3 is passed at 15 – 20° through a solution of K_3PO_4 and K aluminate (such as is obtained by heating Fe Al phosphates with aq. KOH) to saturation point, whereby the liquid separates into two layers, the bulk of the phosphate being in the lower layer, whilst the upper contains the aluminates. The upper layer is drawn off and the lower layer is diluted with H_2O and further separated by treatment with NH_3 .

H. ROYAL-DAWSON.

Manufacture of (A) monophosphates of alkali metals and alkaline earths, (B) ammonium phosphate. I. HECHENBLEIKNER, ASSR. to CHEM. CONSTRUCTION CORP. (U.S.P. 1,790,502–3, 27.1.31. Appl., 1.7.27).—(A) $Ca_3(PO_4)_2$, CaO , or a Na salt or (B) aq. NH_3 is treated with dil. H_3PO_4 , d 1.2–1.26, and the solution obtained is dried by atomisation in a current of hot gas. The residual gases are scrubbed with the dil. H_3PO_4 for use in the process to recover (A) dust, (B) NH_3 .

L. A. COLES.

Concentration of solutions of magnesium chloride. S. B. HEATH, ASSR. to DOW CHEM. CO. (U.S.P. 1,789,385, 20.1.31. Appl., 20.3.29).—The solutions are heated indirectly by steam passing through a Ni coil kept in contact with Al bars which are preferably cleaned and sand-blasted between each operation; the product contains $<0.002\%$ Ni.

L. A. COLES.

Manufacture of phosphorus oxychloride and thionyl chloride. J. G. SCHUDEL, ASSR. to ELKO CHEM. CO. (U.S.P. 1,788,959, 13.1.31. Appl., 13.6.28).—When a mixture of SO_2 and Cl_2 (preferably as liquids) reacts with PCl_3 , $SOCl_2$ and $POCl_3$ are produced. The mixture may be separated by fractional distillation.

D. K. MOORE.

Production of hydrogen from steam and carbon monoxide. J. S. BECKLEY, ASSR. to DU PONT AMMONIA CORP. (U.S.P. 1,789,538, 20.1.31. Appl., 12.11.26).—The activity of Cr oxide gel as a catalyst for the production of H_2 from steam and CO is increased during its prep. and maintained while in use by preventing air from coming into contact with it at temp. above 120° .

D. K. MOORE.

Process for separating mixed liquefied gases. N. V. PHILIPS' GLOELAMPENFABR. (B.P. 351,599,

4.4.30. Holl., 19.4.29).—C, SiO₂ gel, or other selective adsorbent is used to remove impurities from O₂ or other gas while liquid. The mixed impurities, e.g., Kr and X, are afterwards separated by fractional absorption or distillation, or by chemical means. B. M. VENABLES.

Separation of mixtures of rare gases. I. G. FARBENIND. A.-G., Assees. of K. PETERS and K. WEIL (B.P. 351,898, 7.1.31. Ger., 7.1.30).—Gaseous mixtures adsorbed on suitable agents are expelled fractionally under greatly reduced pressure, and at temps. at which the tension of one of the constituents is almost zero, whilst that of the other is sufficient for its removal. E.g., a mixture of A, Kr, and X may be separated by pumping off the A at -129° to -92° , the Kr at -92° to -78° , and the X at higher temp., all at about 0.1 mm. pressure. H. ROYAL-DAWSON.

Oxygen from gases.—See II. **Formic acid.**—See III. **Colloidal Pb.**—See X. **Electrolysis.**—See XI. **Fertilisers.**—See XVI.

VIII.—GLASS; CERAMICS.

Advantages of electric heating applied to glass lehrs. R. M. CHERRY (Chem. Met. Eng., 1931, 38, 400—402).—Electrically heated lehrs for glassware and plate glass are described and their performances given.

D. K. MOORE.

Polariscopes for use in glass factories. C. D. SPENCER and S. JONES (J. Amer. Ceram. Soc., 1931, 14, 512—517).—The advantages of using the reflexion type of instrument together with binocular analysers are discussed and the importance of matching the field (tint plate) colours is emphasised. A tint plate with a retardation of 575 m μ is recommended.

J. A. SUGDEN.

Viscosity of glass between the strain point and the melting temperature. H. R. LILLIE (J. Amer. Ceram. Soc., 1931, 14, 502—511).—An apparatus for measuring the elongation of a glass fibre under load is described. Viscosity measurements were made on three simple Na₂O—CaO—SiO₂ glasses both at low temp. and also in a rotating-cylinder viscosimeter, between the softening point and the m.p. The data from 500° to 1400° lie on a smooth curve. J. A. SUGDEN.

Index of refraction of some soda-lime-silica glasses as a function of composition. C. A. FAICK and A. N. FINN (J. Amer. Ceram. Soc., 1931, 14, 518—528).—Measurements were made on a series of pure Na₂O—SiO₂ and Na₂O—CaO—SiO₂ glasses melted in Pt from pure batch materials. From the results and the analytical figures it is possible accurately to predict n from the composition and also the composition of the various glasses having the same n . Evidence is given that n may be a simple function of certain Na₂O—SiO₂ compounds present. J. A. SUGDEN.

Devitrification of "pyrex" glasses. G. W. MOREY (J. Amer. Ceram. Soc., 1931, 14, 529—531).—Devitrification was studied by the quenching method in the case of three glasses which have a lower liquidus temp. than any other known mixture having so high a SiO₂ content. The glasses with n 1.471, 1.485, and 1.473 had liquidus temps. 1077°, 1042°, and 1036°

respectively. In all cases tridymite is the primary phase and cristobalite was never observed.

J. A. SUGDEN.

Effects of body composition and firing treatment on salt glazes. R. K. HURSH and E. C. CLEMENS (J. Amer. Ceram. Soc., 1931, 14, 482—489).—The firing treatment has a greater influence on the glaze than has the body composition. The addition of various salts has no effect except MgCO₃ and CaCO₃ (above 1%), which give a darker and matt glaze. Increase in Al₂O₃ content gives lighter colour and egg-shell texture and increases the tendency to devitrify. Increase in SiO₂ content improves the gloss and colour and decreases the tendency to devitrify. Addition of Fe₂O₃ only darkens the colour and increase in flux content diminishes the tendency to devitrify. Reducing conditions during firing increase the thickness of the glaze and darken the colour (except in high-Al₂O₃ bodies), and the glazes are more fluid as shown by the greater tendency to crystallise. J. A. SUGDEN.

Separation and determination of boric acid and alumina. Application to glasses, enamels, etc. MALAPRADE and SCHNOUTKA (Compt. rend., 1931, 192, 1653—1655).—To separate Al from a solution in which H₃BO₃ is to be determined the solution is saturated in the cold with SO₂, when the Al is precipitated quantitatively as an indefinite basic sulphite (cf. A., 1931, 452), and all the H₃BO₃ remains in the solution, which is then acidified with HCl and boiled until all SO₂ and CO₂ are driven off. The Al ppt. is dissolved in HCl. Both can then be determined as usual. For glass or enamel the sample is fused with KOH and the filtered solution of the melt treated with SO₂, when the SiO₂ and Al₂O₃ both separate, though the presence of SiO₂ does not interfere with the titration of mannoboric acid with KOH. C. A. SILBERRAD.

Sodium silicate, a new enamel raw material. M. E. MANSON (J. Amer. Ceram. Soc., 1931, 14, 490—494).—The addition of SiO₂ to an enamel as an easily fusible silicate (e.g., Na₂SiO₃) decreases the melting temp. and time required to bring about complete dissolution of the SiO₂. When all the SiO₂ is added as quartz, the enamel, although apparently well smelted, contains much undissolved SiO₂. The presence of undissolved SiO₂ decreases the workability and acid-resistance. The results of laboratory and plant tests are recorded. J. A. SUGDEN.

Control of draining consistencies of enamels by addition of sodium silicate. D. G. BENNETT (J. Amer. Ceram. Soc., 1931, 14, 495—498).—The addition of 0.25—0.5% Na₂SiO₃ greatly improves the draining property of an enamel. The dry wt. per unit area (and not the wet wt.) is the only accurate method for controlling the consistency of wet-coat enamels. J. A. SUGDEN.

Refractories for use at high temperature. W. H. SWANGER and F. R. CALDWELL (Bur. Stand. J. Res., 1931, 6, 1131—1143).—Crucibles of ThO₂ have been made from material which has been pre-fused in the C arc in an atm. of O₂ and may be used at temps. up to 2200°. Commercial MgO volatilises rapidly between 2000° and 2800°, and crucibles may be used only up

he 1800°; pure MgO crucibles may be employed for coating pure metals at 2000° without danger of contamination of the metal. Crucibles of commercial ZrO₂ containing a small quantity of SiO₂ may be used at 2000°, but only at atm. pressure and in an oxidising atm. BeO when in contact with C at 2000° appears to volatilise less than does MgO under the same conditions. Details are given of the production of crucibles, suitable for melting pure metals, from any of the four oxides; the firing temp. should be 1600—1800°, but ThO₂ and ZrO₂ must be kept out of contact with C at temps. above 1200°.

H. F. GILLBE.

Machinery and methods of manufacture of sheet glass. W. E. S. TURNER (Proc. Inst. Mech. Eng., 1930, 1077—1127).

Electric enamelling furnace.—See XI. **Glass for wines.**—See XVIII.

PATENTS.

Glass and method of making. M. METH, Assr. to I. R. STEWART (U.S.P. 1,789,658, 20.1.31. Appl., 4.2.27).—The presence of 1% BeO may reduce the coeff. of expansion of a glass by half (larger amounts produce a negligible coeff.) and also increases the tensile strength. The BeO is added as a mineral containing approx. 66% SiO₂, 20% Al₂O₃, and 14% BeO. J. A. SUGDEN.

Zirconium opacifier. C. J. KINZIE, Assr. to TITANIUM ALLOY MANUFG. CO. (U.S.P. 1,789,311, 20.1.31. Appl., 7.9.28).—Na Zr silicate, prepared by roasting finely milled Zr silicate and soda ash, is claimed as opacifier in enamels smelted below 1100°. Above this temp. the advantages are almost wholly lost. If less than the theoretical quantity of Na₂CO₃ required to form the normal silicate is used, the product is non-caking and can be stored in the finely ground state. A typical prep. contains 55% ZrO₂, 28% SiO₂, 14% Na₂O, traces of Fe₂O₃, TiO₂, Al₂O₃, P₂O₅, CO₂, etc.

J. A. SUGDEN.

Manufacture of articles of silica [astronomical mirrors etc.]. BRIT. THOMSON-HOUSTON CO., LTD., Assees. of E. THOMSON (B.P. 352,375, 28.1.31. U.S., 29.1.30).—The articles comprise a lower layer of quartz sand heated to coalescence in a mould, an intermediate layer built up of a mosaic of, e.g., square or hexagonal pieces of fused quartz and heated to fusion in an electric furnace at a temp. such as to cause a softening of the lower layer, and an upper layer of quartz particles sprayed on by a high-temp. flame to form a smooth, glossy surface.

L. A. COLES.

Continuous preparation [purification] of kaolin and clay products. E. MÜLLER (B.P. 352,036, 4.1.30).—The washing apparatus is supplied continuously with water, with Na and/or K water-glass, *d* 1.33—1.36, and with the raw material, in proportions such that streaks are formed on the surface of the suspension (which usually has to be maintained at *d* 1.08—1.09); the suspension flowing away is neutralised with HCl and filter-pressed.

L. A. COLES.

Refractory. S. M. PHELPS and M. C. BOOZE, Assrs. to AMER. REFRACTORIES INST. (U.S.P. 1,788,123, 6.1.31. Appl., 25.4.28).—The addition of up to 10% of certain substances (e.g., Al salts, alunite, Na₂SiO₃, cryolite,

Mg₂P₂O₇, MgO, apatite, phosphate rock, CaO, CaO, Al₂O₃, etc.) to high-Al₂O₃ materials before they are pre-calcined greatly reduces the shrinkage in subsequent making up and gives a denser and tougher product.

J. A. SUGDEN.

Fireproof tile. C. W. HALL (U.S.P. 1,790,418, 27.1.31. Appl., 14.2.29).—A silicious and carbonaceous mixture (e.g., cinders) is pressed in a mould. A typical analysis is SiO₂ 24.4%, Fe₂O₃ 1.4%, CaO 16.4%, Al₂O₃ 10.6%, small amounts of MgO, Na₂CO₃, S, etc., and carbonaceous matter 33.6%.

J. A. SUGDEN.

IX.—BUILDING MATERIALS.

False setting of cement. F. WHITWORTH (Cement, 1931, 4, 759—762).—It is suggested that false setting may be caused by the dehydration of a portion of the gypsum during grinding. This crystallises in the mass with sufficient interlocking of crystals to produce an initial hardening without affecting the normal setting of the cement. It is unwise to attempt to eradicate the false set by either reducing or increasing the quantity of gypsum, which should be 1.5—2% SO₂ equiv.

C. A. KING.

Acid-proof cement mortars. S. NAGAI (J. Soc. Chem. Ind. Japan, 1931, 34, 191—192 B; cf. B., 1929, 777, 980).—Of the mortars studied, those made with artificial silicious powders (clay extraction residues) have a better binding strength than those made with natural silicious powders. The former also show a smaller decrease in binding strength when acid-cured than the latter. The clay extraction residue should be finely divided, and the alkali silicate solution should have a high SiO₂ content.

N. H. HARTSHORNE.

Absorption of free lime by cement admixtures. T. YOSHIOKA, K. KUMAGAE, and H. IJIMA (J. Soc. Chem. Ind. Japan, 1931, 34, 192—193 B).—To test the view that the effectiveness of diatomaceous earth, volcanic ash, blast-furnace slag, and other substances as cement admixtures is due to the free SiO₂ which they contain combining with free CaO, measurements of their absorptive power for free CaO have been made. Wide variations in the amount and rate of absorption were observed. Water-granulated slag absorbed slowly, its initial rate of absorption being, however, unchanged at the end of 6 days. Diatomaceous earth of moderate purity absorbed rather rapidly for 3 to 4 days. The highest rate was shown by SiO₂ gel.

N. H. HARTSHORNE.

Volume changes in brick masonry materials. L. A. PALMER (Bur. Stand. J. Res., 1931, 6, 1003—1026).—The variations of vol. with changes of H₂O content and of temp. of a variety of cement and lime mortars and of bricks have been determined, and the changes of vol. of the mortars during hardening and during alternate wetting and drying have been measured. The difference between the expansion of brick and of mortar is greater when caused by change of H₂O content than when resulting from change of temp.; plain lime-sand mortars produce the smallest difference, although their initial shrinkage is large. Underburned brick exhibits greater vol. variations than does well-burned brick. The vol. changes in hardened 1:2:9

cement-lime-sand mortar are less than those in a 1:3 cement-sand mortar.

H. F. GILLBE.

Dimensional changes in clay wares during firing. T. YOSHIOKA (J. Soc. Chem. Ind. Japan, 1931, 34, 208 B).—The author's apparatus enables clay ware to be heated at definite rates up to 1500°, and the progressive shrinkage to be measured, so that the effects due to varying the composition of the clay and other conditions may be studied.

N. H. HARTSHORNE.

Aluminous insulating materials at high temperatures. J. B. BARNITT and R. H. HEILMAN (Chem. Met. Eng., 1931, 38, 390—393, and Proc. Eng. Soc. W. Pa., 1931, 47, 349—361).—The thermal conductivity of monohydrated bauxite and monohydrated Al_2O_3 bricks is 0.91 and 2.5 B.Th.U./sq. ft./hr./°F./in. respectively at 870°. The former may be used up to 1040° and the latter to 1370°. The residue from the extraction of aluminous material from bauxite has superior insulating properties, but the shrinkage on drying, when making into bricks, precludes its use.

D. K. MOORE.

Measuring particles.—See I.

See also A., Aug., 921, Di- and tri-Ca silicate and Ca aluminate.

PATENTS.

Rotary kilns for burning cement, ore, and similar materials. VICKERS-ARMSTRONGS, LTD., and L. D. PARKER (B.P. 351,283, 19.7.30).—In a kiln having a number of subsidiary cylinders surrounding the burner end, the inlet passages to the former are not quite radial so that the material falls through without touching the walls, and the inlet ends of the subsidiary cylinders are conical in shape, having those portions which receive the shock of the entering hot material easily renewable.

B. M. VENABLES.

High-temperature cement. A. HUTCHINSON (U.S.P. 1,787,625, 6.1.31. Appl., 8.4.30).—A mixture of finely ground SiO_2 sand (15 pts. by wt.), SiO_2 brick (3 pts.), Portland cement (2 pts.), and soda ash ($1\frac{1}{2}$ pts.) is made plastic with water.

J. A. SUGDEN.

[Clay] emulsion composition. R. CROSS, Assr. to SILICA PRODUCTS CO. (U.S.P. 1,788,706, 13.1.31. Appl., 9.4.28).—The addition of 20% $CaSiO_3$ (especially in the form of Portland cement) greatly enhances the swelling properties of gelatinising clays such as bentonite. Moreover, after the gel has been dried out, the mixture will not hydrate again. This irreversible reaction is utilised in the prep. of paints, waterproofing materials, asphalts, etc.

J. A. SUGDEN.

Manufacture of artificial travertine or the like. J. A. RICE, Assr. to the BUBBLESTONE CO. (U.S.P. 1,788,592, 13.1.31. Appl., 26.10.26).—Artificial voids are produced in imitation stone etc. by the random dispersion of masses of foam throughout the cementitious plastic material. A suitable foam is prepared by saponifying an aq. mixture of casein, rosin, and NH_3 .

J. A. SUGDEN.

Artificially coloured granule [for roofing etc.]. H. L. LEVIN, Assr. to PATENT AND LICENSING CORP. (U.S.P. 1,788,625, 13.1.31. Appl., 20.2.28).—A porous material (e.g., blast-furnace slag) is crushed to 8—35-mesh and impregnated with a colouring solution (con-

taining salts giving coloured oxides, e.g., $FeSO_4$, Na_2CrO_4 , etc.) under reduced (and if necessary increased) pressure. The material is dried and roasted at a temp. (approx. 1000°) sufficient to form the colouring agent and to attach it firmly to the surface by incipient fusion.

J. A. SUGDEN.

Preservative for wood. GRUBENHOLZIMPRÄGNIERUNG G.M.B.H. (B.P. 352,272, 21.7.30. Ger., 10.8.29).—Solutions are used containing a mixture of a sol. F compound (NaF , Na_2SiF_6 , etc.) with more than 20% of a sol. Cr compound (e.g., $K_2Cr_2O_7$); other preservatives, e.g., nitrophenols, may also be added.

L. A. COLES.

Glueing wood with starch or starch-containing substances. E. ABRAMOVITSCH (U.S.P. 1,788,608, 13.1.31. Appl., 6.10.27).—A paste of starch-containing material (e.g., potato- or rice- or corn-flour) and tragacanth with $MgCl_2$ or dextrin and trioxymethylene is applied to the wood plys, which are then pressed at 90°/2—8 atm.

D. WOODROFFE.

[Composite] materials particularly for wearing surfaces of floor and stair treads etc. J. H. BENNETT, JUN. (B.P. 352,555, 10.7.30).

Composite plates, boards, etc. [from wood sheets coated with artificial resin]. H. PIORNIK (B.P. 353,094, 28.4.30).

Drying sludge.—See I.

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

Properties of austenitic grey cast irons. M. BALLAY (Compt. rend., 1931, 193, 47—49).—All samples were from cylindrical castings 25 mm. diam. Addition of from 5 to 12% of Cu to a cast iron containing C 2.71, Si 1.45, Mn 1.30, Ni 14.82, Cr 1.40, Cu 0.30%, diminished by about 65% corrosion by 10% H_2SO_4 or HCl. In such a metal about 10% Cu is sol. Addition of Cr or Al somewhat diminishes corrosion by 5% HNO_3 and also oxidation on heating; 8% Cr renders the metal almost unoxidisable. An austenitic cast iron, C 3.01, Mn 1.48, Si 2.48, Ni 14.09, Cr 3.59, Cu 5.95%, though softer than an ordinary pearlitic sample at low temp., is substantially harder at 800°. Increasing the Si to 4.06% increases resistivity by 27%.

C. A. SILBERRAD.

Cold-working of iron. W. BRONIEWSKI and J. KRÓL (Compt. rend., 1931, 193, 38—40).—Curves show for French Armco iron (less than 0.15% impurities) the relations (a) between degree of cold-working and tensile strength, elastic limit, Brinell hardness, elongation, and striction (cf. B., 1913, 605); (b) for cold-worked samples annealed for 1.5 hr., between temp. of annealing (0—1000°) and hardness and average size of crystals; and (c) between hardness determined by Hanriot's method (cf. B., 1913, 606) of a sample annealed at 650° and the number of times annealed. Series (b) shows that annealing below 520° has little effect (cf. B., 1913, 701); (c) that hardness decreases, reaching a limit after about 20 times annealing.

C. A. SILBERRAD.

Tempering and ageing of extra-soft steels. A. BATES (Compt. rend., 1931, 193, 35—38).—Extra-soft Thomas steel (0.026% C) tempered at 600—1000°

shows, after 30 days' ageing at 12°, marked increases in tensile strength, elastic limit, and hardness, and decrease in ductility. The increase in tensile strength is a max. for tempering at 700° and 950°, a min. at 850°. These effects are due to the varying solubility of cementite in α -ferrite, or (above 900°) of C in γ -ferrite, as shown on a revised equilibrium diagram.

C. A. SILBERRAD.

Influence of chemical composition and heat-treatment of steel forgings on machinability with shallow cuts. T. G. DIGGES (Bur. Stand. J. Res., 1931, 6, 977—992).—The life of cutting tools operating at a const. feed and depth of cut, but variable cutting speed, on Cr-V, Ni-Cr, Cr-Mo, 3.5% Ni, and 0.4% C steels, heat-treated to possess tensile strengths from 75,000 to 220,000 lb./sq. in., has been determined. With the exception of the annealed Ni-Cr steel, the plain C steel is the most difficult to machine, and yields the poorest surface finish. The efficacy of elements added to improve machinability at shallow cuts depends on the tensile strength of the steel; for steels having a strength of about 90,000 lb./sq. in. Cr and Mo are the most effective, but for steels of considerably higher strengths Ni-Cr or Cr-V are more satisfactory. For a given tensile strength the permissible cutting speed is independent of the method of heat-treatment. The performance of the 18% W type of high-speed tool steel is improved by adding 3.5—5% Co and increasing the hardening temp.

H. F. GILLBE.

Graphitisation of steel at low temperature. A. PORTEVIN and P. CHEVENARD (Compt. rend., 1931, 193, 169—171; cf. B., 1927, 110).—Contrary to previous conclusions, graphitisation can be effected in a steel containing 1.6% C, 0.28% Si, and 0.16% Mn on annealing below Al. A sample tempered at 1180° in H₂O, and consequently consisting about equally of martensite and austenite, was heated at the rate of 250° per hr. to 602°, kept there for 7 hr., and cooled slowly. Dilatometric observations showed decarburisation of the martensite and austenite, the transformation $\gamma \rightarrow \alpha$, and return to Fe- α +Fe₃C equilibrium, followed by an expansion indicating the graphitisation of the cementite. The result is probably due to the extreme fineness of the cementite grains (cf. B., 1929, 1045).

C. A. SILBERRAD.

Grain size and fatigue-resistance in soft steel: effects of cold-working, tempering, and overheating. CAZAUD (Compt. rend., 1931, 192, 1558—1560).—An extra soft steel (a) containing C 0.10, Mn 0.45, Si 0.03, S 0.08, P 0.03%, and the same after (b) tempering at 925° and slow cooling, (c) tempering at 925° and rapid cooling, and (d) tempering at 1125° and slow cooling (i.e., overheating) gave (when drawn into bars 20 mm. diam.) the following results (in this order), breaking load, elastic limit, elongation (%), hardness (Messner), fatigue limit (kg./sq. mm.) for rotatory flexion, and number of crystals per sq. mm.: (a) 56.8, 53.5, 15.5, 2, 29.7, —; (b) 39.5, 26.7, 35, 8.6, 25.6, 400; (c) 41.2, 28.1, 31, 30.2, 26, 900; (d) 42, 26.5, 34, 0.60, 20.8, 150.

C. A. SILBERRAD.

Determination of small quantities of hydrogen sulphide. Determination of sulphur in small

samples of steel. S. G. CLARKE (Analyst, 1931, 56, 436—444).—The S in steels containing less than 0.1% of S may be determined by dissolving 0.1 g. in 5 c.c. of H₂SO₄ (1 : 3 by vol.) in an atm. of H₂ and absorbing the H₂S formed in 2 c.c. of 10% NaOH. After acidification with dil. H₂SO₄, treatment with I in CCl₄ gives a quant. yield of HI and S. The diminution of colour of the I solution may be measured colorimetrically, the results being comparable with those of the gravimetric process. Black rubber must be used for all connexions.

T. McLACHLAN.

Magnetic properties of permivar. H. KUHLEWEIN (Wiss. Veröff. Siemens-Konz., 1931, 10, [2], 22—88).—The characteristic magnetic properties of permivar are attributed to the effects of internal stress distribution probably caused by the presence of impurities. An increase in the permivar characteristics of alloys in the Elmen range of composition can be obtained by increasing the Co content or by annealing at higher temps. followed by very slow cooling. The Fe-Co-Ni system has a second field nearer the Fe-Ni side of the ternary diagram in which the alloys also display permivar characteristics.

A. R. POWELL.

Attack of metals by phosphoric acid. A. PORTEVIN and A. SANFOURCHE (Compt. rend., 1931, 192, 1563—1565).—The action of (a) pure H₃PO₄, *d* 1.581, (b) the same, *d* 1.262, and (c) industrial acid, *d* 1.262, prepared from superphosphate, on pure commercial metals is shown by curves. Mg and Zn are attacked with great rapidity, Bi and Ag not at all. The (decreasing) order of attack of the remainder is: for (a) Al, Pb, Cd, Fe, Sn, Sb, Ni, Cu; for (b) Al, Fe, Pb, Cd, Sn, Cu, Sb, Ni; and for (c) Cd, Al, Sn, Fe, Cu, Ni, Sb, Pb. As a rule attack is more violent with the more conc., and still more so with the commercial, acid, save in the case of Pb, which is practically unattacked by this latter, due to formation of PbSO₄. The resistance of Bi is due to formation of phosphate. In presence of 10% HCl Ag alone is unattacked.

C. A. SILBERRAD.

Attack of alloys by phosphoric acid. A. SANFOURCHE and A. PORTEVIN (Compt. rend., 1931, 193, 53—55; cf. preceding abstract).—Attack by the acids previously studied on alpac, duralumin, brass, bronze, cupronickel, German silver, antimonial Pb, and 10 steels was examined. All alloys containing Al or Cu were severely attacked, as also was antimonial Pb. Of the steels examined only that with 21% Cr and 8% Ni withstood all three acids; 13% Cr steel was not attacked by (a) or (b); that with 10% Cr and 23% Ni by (b) and but slightly by (a); those with 12% Cr and 32% Ni and with 11% Cr and 52% Ni slightly by (a). All other steels were severely attacked. In the cupronickels and brasses both metals were equally attacked; in bronze the Sn, and in attacked Cr steels the Cr was most and Ni least. Of Fe alloys containing 65% Cr, 38% Mo, 30% Si, 39% Ti, 71% W, 64% Zr, 58% Ta + 14% Nb, 35% U + 7% V (all in powder), only Fe-Cr and Fe-Si were resistant. HCl (*d* 1.161), H₂SO₄ (*d* 1.831), and HNO₃ (*d* 1.384) attacked all these Fe alloys except ferrosilicon, whilst Fe-Cr rapidly and Fe-Zr slowly attained passivity in HNO₃.

C. A. SILBERRAD.

Determination of phosphorus in steel, alloy steels, and cast iron. N. D. RIDSDALE (Analyst, 1931, 56, 452—454).—The work of Etheridge (B., 1931, 297) is criticised. KMnO_4 is necessary to oxidise P to H_3PO_4 ; HNO_3 is insufficient. 30 c.c. of HNO_3 (d 1.20) are enough to dissolve 2 g. of drillings. Pig iron contains 0.08—0.42% (av. 0.15%) Ti. T. MCLACHLAN.

Ballistic measurements on materials [iron-nickel alloys] of high permeability. H. NEUMANN (Wiss. Veröff. Siemens-Konz., 1931, 10, [2], 55—71).—Two ballistic methods for measuring the magnetic properties of alloys of high permeability are described and the effect of additions of 1—30% Co to a 1:1 Fe-Ni alloy has been determined. The initial and max. permeability reach max. with 1% Co and min. with 10% Co and the remanance and coercivity have min. values with 1% Co. A. R. POWELL.

Influence of arsenic on the dezincification of brass. G. MASING (Wiss. Veröff. Siemens-Konz., 1931, 10, [2], 35—54).—The inhibiting effect of As on the dezincification of brass occurs only with α -brass, increases with the As content from 0.01 to 0.08% As, and decreases slightly with decreasing Cu content. The presence of As in ($\alpha + \beta$)-brass has no effect on its resistance to corrosion. In corrosive media arsenical α -brass becomes coated with a thin film of As which has a smaller cathodic overpotential than has the brass, and the protective effect of As is ascribed to this fact, which results in the more ready reduction of the dissolved O_2 in the electrolyte. Various theories on the electrochemical mechanism of corrosion are discussed. A. R. POWELL.

Aluminium alloys containing beryllium. G. MASING and L. KOCH (Wiss. Veröff. Siemens-Konz., 1931, 10, [2], 15—24).—Addition of up to 8% Be to sand- and chill-cast duralumin, γ alloy, or Cu-Al alloys has no beneficial effect on the tensile properties, but 4—8% Be increases the resistance to wear of 12% Cu-Al alloys. Addition of <1% Be to silumin modified with Na improves the elongation. Be and Si form a ternary eutectic with Al containing 13% Si and 1—1.5% Be. A. R. POWELL.

Electroplating aluminium with copper. R. WEINER (Z. Elektrochem., 1931, 37, 349—356).—The Al is plated in a cyanide bath after the oxide film has been removed and the surface roughened by treatment with 10% NaOH and 2% HCl followed by anodic attack in $N\text{-CH}_2\text{Cl}\cdot\text{CO}_2\text{H}$ and treatment with aq. $\text{Na}_2\text{CO}_3 + \text{NaHCO}_3$. An excellent deposit is obtained in this way. Plating in a CuSO_4 bath is less satisfactory, owing to poor throwing power. R. CUTHILL.

Improvement of the durability of chromium plate. R. J. PIERSOL (Chem. Met. Eng., 1931, 38, 386—389).—Commercial Cr-plate is <0.00001 in. thick. In plating there is a tendency to deposit more Cr on projections than in recesses. The range of current density for the production of a bright deposit is small. Cr-plating on porous surfaces, cast Fe high in free C, and on brass because of zincification of Cr, is not satisfactory. The article should be given an intermediate coat of Ni, or, if porous, Ni followed by Cu the surface of which is flowed on a polishing wheel, and then Ni.

Const. voltage and thermostatic temp. control of the plating bath should be used and the plating solution continuously circulated and filtered. Replating of damaged Cr plate is not satisfactory. D. K. MOORE.

Electrodeposition of lead dioxide on metals and protection against corrosion. N. ISGARISCHEV and A. KUSNEZOVA (Z. Elektrochem., 1931, 37, 359—362).—By electrolysis of a solution of Pb(OH)_2 in NaOH containing certain reducing substances, such as resorcinol, tannin, or glucose, a firm and elastic coating of PbO_2 may be deposited on Cu or brass. Similar deposits may be obtained on Fe, but if resistance to bending is required a coating of Cu should be deposited first. The PbO_2 prevents corrosion by the air, by 3% NaCl solution, and by 5% H_2SO_4 . R. CUTHILL.

Electrodeposition of silver from argentocyanide solutions. II. S. GLASSTONE and E. B. SANIGAR (Trans. Faraday Soc., 1931, 27, 309—312; cf. B., 1929, 1018).—If KCNO at concentrations exceeding 0.1N is added to a KAg(CN)_2 solution 1.5N in respect of Na_2CO_3 the deposit of Ag obtained on electrolysis is microcryst. and exceptionally uniform. Since the KCNO and also CS_2 and similar "brightening agents" cause a decrease in the cathodic polarisation, it seems probable that high cathodic polarisation tends to lead to matt deposits, whereas low polarisation favours bright deposits. Deposition potential is not, however, the only factor which affects the nature of the deposit. R. CUTHILL.

Alloyability of beryllium with calcium and magnesium. W. KROLL and E. JESS (Wiss. Veröff. Siemens-Konz., 1931, 10, [2], 29—32).—Be shows no sign of alloying with Mg in an A atm. at the b.p. of Mg. In boiling Ca the Be lumps become covered with a thin shell of an alloy of 71% Be and 29% Ca. Alloys of Be with Cu and Mn can be dissolved in boiling Mg, but at 20° the resulting ternary alloys all show numerous segregations of Be and their mechanical properties are poor. A. R. POWELL.

Alloys of beryllium with iron. W. KROLL (Wiss. Veröff. Siemens-Konz., 1931, 10, [2], 33—34).—Fe alloys with 12% Cr, 1% Be, and >8% Ni have a Brinell hardness of 150—180 after quenching from 1200°; this hardness increases with ageing temperature to a max. of 400 at 700—750°. The aged alloys are suitable for the manufacture of non-rusting springs which retain their strength up to a red heat. A. R. POWELL.

Analytical chemistry of beryllium. II. Gravimetric determination of beryllium in minerals, rocks, and steel. H. FISCHER and G. LEOPOLDI (Wiss. Veröff. Siemens-Konz., 1931, 10, [2], 1—14).—The rock is fused with Na_2CO_3 and the SiO_2 separated by evaporation with H_2SO_4 . The filtrate is treated with a slight excess of aq. NH_3 and the ppt. of Fe(OH)_3 , Al(OH)_3 , and Be(OH)_2 collected, washed with dil. aq. NH_4NO_3 , redissolved in HCl, and reprecipitated as before to remove Mg. If much Al is present it is then separated by the $\text{Et}_2\text{O-HCl}$ method, the filtrate evaporated to dryness, and the residue dissolved in very dil. HCl. The solution or the main solution, if little Al is present, is neutralised with aq. NH_3 , made just acid with AcOH, and treated with a 5% solution of 8-hydroxyquinoline in 2N-AcOH to remove Al and Fe.

The filtrate is treated with a slight excess of aq. NH_3 and the $\text{Be}(\text{OH})_2$ collected, ignited, and weighed; it should be tested for SiO_2 by evaporation with HF and H_2SO_4 , followed by ignition at 1200° . For the determination of Be in special Ni-Cr steels the alloy is dissolved in HCl , the Fe oxidised with HNO_3 and removed by the Et_2O method, the Cr oxidised with $(\text{NH}_4)_2\text{S}_2\text{O}_8$ and AgNO_3 , and the Be precipitated with aq. NH_3 . The ppt. is purified by repeating the last two operations, igniting, evaporating with HF and H_2SO_4 , and igniting at 1200° to BeO . A. R. POWELL.

Production of metallic antimony from its ores by electrolysis. N. A. ISGARISCHEV and S. A. PLETENEV (*Z. Elektrochem.*, 1931, 37, 363—365).—Massive deposits of Sb may be obtained by electrolysis of a solution of Sb_2S_3 in 10% NaOH using an Fe cathode, and if the cathode deposit is protected from polysulphides formed at the anode by enclosing the latter in a porous membrane and adding KCN the current yield may average 75%. Small amounts of As in the electrolyte do not separate with the Sb. Sb may therefore be manufactured from its ores by extracting with NaOH and electrolysing. R. CUTHILL.

Hard and soft rubber for pickling tanks. H. E. FRITZ (*Chem. Met. Eng.*, 1931, 38, 396—397).—A suitable lining for pickling tanks consists of a combination of hard and soft rubber plies arranged so that the hard plies overlap each other and form expansion joints, with a dovetailed wood sheathing. This construction may be used for dil. H_2SO_4 up to temps. of 65° . With a sheath of 4-in. acid-proof brick and free circulation of air round the outside of the tank, acid up to temps. of 100° may be used. D. K. MOORE.

Dilatation in electrolytically deposited metals. C. MARIE and N. THON (*Compt. rend.*, 1931, 192, 31—32; cf. A., 1922, ii, 648).—Using as cathode a thin sheet of Pt, Au, Ag, or Cu, covered on one side with insulating material, dilatation or contraction of the deposit is determined by its change of shape. With a current of 1.1 amp./sq. dm. and 200 g. $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ per litre dilatation occurred with matt-surface Pt only; with the same solution with addition of 1% H_2SO_4 it sometimes occurred with Ag and Au, the dilatation occasionally changing to contraction (attributed to formation of Cu salt). With more acid contraction always occurred, but dilatation invariably with a solution M in CuCl and 4.5 M in NaCl containing HCl , and also with solutions of ZnCl_2 , ZnSO_4 , or $\text{Zn}(\text{CN})_2$. The effects are not due to H. C. A. SILBERRAD.

Measurement of tension in electrolytic metallic deposits. C. MARIE and N. THON (*Compt. rend.*, 1931, 193, 233—236; cf. preceding abstract).—The pressure, p , in dynes per sq. cm. of the electrolytic deposit is approx. $f/3$, where f is the force, in dynes, which, applied at the edge of the plate on which the deposit is made at a distance l from the supported end, produces the same deflexion, λ , as that caused by the contraction of the deposit. Values of λ , p , and f for deposits of Ni on plates of Pt, Ag, Cu, Ni, Fe, Al, and Ta are given. The surface tension of the deposit is $pl^2/2\lambda$. C. A. SILBERRAD.

Influence of electromagnetic waves on resistivity and hardness of metals and alloys. G. MAHOX

(*Compt. rend.*, 1931, 193, 27—29; cf. B., 1931, 206).—The resistivity of cast iron, special steel, a Ni-Cr-Mn steel, and an Al alloy subjected to electromagnetic waves diminished. The bars after exposure showed alternate rings, light and dark, differing in hardness. The hardness of all but the cast Fe was increased.

C. A. SILBERRAD.

Use of special non-ferrous metals and alloys in marine engineering and shipbuilding. J. W. DONALDSON (*Metallurgia*, 1931, 4, 77—80).

Electric enamelling furnace. Zinc sulphate electrolysis.—See XI. Tanning substances and metals.—See XV. Corrosive soil areas.—See XVI.

See also A., Aug., 888, Semi-silvering of interferometer plates. 900, Cu-Sn, Ca-Na, and Pb alloys. 906, Au sols. Colloidal Au. 914, Electrochemical behaviour of Pt in HCl solution. Electrolytic reduction of H_2PtCl_6 in HCl solution. 917, Influence of stress on corrosion. 919, Ni catalysts for hydrogenation. 924, Action of H_2SO_4 on Ni-Cu matte.

PATENTS.

Smelting furnace. J. T. McCOURT (U.S.P. 1,789,531, 20.1.31. Appl., 10.6.26).—Preheated ore from a rotary kiln is fed into an inclined shaft which terminates at the lower end in a hearth. The hearth and shaft are heated by a number of fuel burners, the ore being reduced directly by CO . A hump at the lower end of the shaft holds the charge at the point of max. temp. of the furnace. C. A. KING.

Alloy for manufacture of cast iron. A. F. MEEHAN, Assr. to MEEHANITE CORP. (U.S.P. 1,790,552, 27.1.31. Appl., 29.8.28).—Graphitisation of cast Fe is effected by treatment with an "alloy" containing Ca and Si, with or without Mg, Ni, Cr, etc.; e.g., Ca 35, Si 51, Ni 5, Mg 9%. E. H. BUCKNALL.

Annealing grey iron. R. J. COWAN, Assr. to SURFACE COMBUSTION CO., INC. (U.S.P. 1,789,136, 13.1.31. Appl., 10.7.28).—Grey cast Fe is heated at 780 – 900° for 5 min.—1 hr. to initiate graphitisation and then cooled. C. A. KING.

Process of heat-treating steel. F. A. FAHRENWALD (U.S.P. 1,787,977, 6.1.31. Appl., 25.6.28).—Steel is heated rapidly in continuous annealing furnaces to a temp. above the crit. point and cooled below that temp. in a moderately oxidising atm. containing H_2O , CO , CO_2 , and N_2 produced by incomplete combustion of town gas. An adherent coat of oxide is formed in the early stages and further oxidation is slight.

E. H. BUCKNALL.

Magnetic material. J. H. WHITE and V. LEGG, Assrs. to BELL TELEPHONE LABS., INC. (U.S.P. 1,787,606, 6.1.31. Appl., 30.11.29).—Magnetic materials containing Ni and Fe, with or without other elements, are rendered less hot-short in the early stages of rolling by alloying with up to 4% Cu, which facilitates the production of finely disseminated materials by comminution.

E. H. BUCKNALL.

Heat-treatment of magnetic material. G. W. ELMEN, Assr. to WESTERN ELECTRIC CO., INC. (U.S.P. 1,788,017, 6.1.31. Appl., 6.7.25).—The permeability

at low field strength (<0.2 gauss) of alloys of the "permalloy" type, containing $>45\%$ (usually 78–80%) Ni, remainder Fe, is improved by heating to 1100° , slow cooling, reheating above the magnetic change point, say 600° , and cooling fairly rapidly, care being taken not to set up strains in the material.

E. H. BUCKNALL.

Tough stable-surface alloy steel. S. M. STODY, Assr. to STODY Co. (U.S.P. 1,790,177, 27.1.31. Appl., 14.11.28).—Steels containing about 2% C, 31.75% Cr, 10% Ni, and 4.75% Si have high hardness values, good resistance to acids, heat, and abrasion, and are especially useful as welding rods, as, *e.g.*, in mounting sintered WC cutting tools.

E. H. BUCKNALL.

Stable-surface alloy steel. R. P. DE VRIES, Assr. to LUDLUM STEEL Co. (U.S.P. 1,788,281, 6.1.31. Appl., 20.1.26).—An Fe alloy for general engineering and structural purposes contains approx. 1% Cr, 2% Si, 1% Cu, and $<1\%$ C.

C. A. KING.

Case-hardening metal. P. W. and E. B. SHIMER, Assrs. to AMER. CYANAMID Co. (U.S.P. 1,789,257, 13.1.31. Appl., 22.6.27).—Small quantities of Ca cyanamide or other cyanide-forming compound are added regularly to a bath of fused salts, *e.g.*, a mixture of CaCl_2 and NaCl, to maintain the efficiency.

C. A. KING.

Treatment [rust-proofing] of metals. F. D. BURKE, Assr. to PASSIVATION PRODUCTS Co. (U.S.P. 1,789,805, 20.1.31. Appl., 16.2.29).—The attack of acid cleaning baths on metals is inhibited by the addition of a small quantity of α -amino-acids, *e.g.*, hydrolysed animal proteins including keratin.

C. A. KING.

Casting copper or equivalent copper alloys. AMER. METAL Co., LTD., and W. F. EPPENSTEINER (B.P. 353,205, 24.6.30. Addn. to B.P. 305,998).—The moulds are cooled with water at $<100^\circ$ (88 – 93°).

Cold brass rolling. J. C. SHARP, Assr. to STANDARD OIL Co. (U.S.P. 1,789,054, 13.1.31. Appl., 30.9.29).—An alkaline compound of a petroleum sulphonic acid is applied to the wetted surface of a soft metal before entering the rolls.

C. A. KING.

Zinc alloy. L. E. WEMPLE and F. A. WARREN, Assrs. to ILLINOIS ZINC Co. (U.S.P. 1,789,854, 20.1.31. Appl., 18.10.29).—An alloy of substantially greater hardness than Zn contains Zn 100 pts., Cu 0.25–2 pts., and Ag 0.1–20% of the Cu.

C. A. KING.

Preparation of a metallic colloid [lead]. F. E. BISCHOFF, Assr. to H. J. ULLMANN (U.S.P. 1,787,659, 6.1.31. Appl., 12.10.26).—The metal is disseminated at temps. below 30° by striking an arc between Pb electrodes under an aq. solution (pH 7–8) of gelatin, or other dispersing agent, and an aliphatic polyhydroxy-compound, usually a saccharide, which protects the colloid against oxidation.

E. H. BUCKNALL.

Process for purifying [bearing] metals. W. J. MERTEN, Assr. to WESTINGHOUSE ELECTRIC AND MANUF. Co. (U.S.P. 1,790,164, 27.1.31. Appl., 4.6.27).—An addition of 1 lb. of CaC_2 is made to 50 lb. melts of Pb-bronze bearing metals with the object of improving the distribution of the Pb, removing the oxide from the melt, and strengthening the Pb by the presence of Ca.

E. H. BUCKNALL.

Amalgamator [for gold ores]. C. S. WHITE, Assr. to J. E. OGDEN and W. J. SCHEUSS (U.S.P. 1,787,923, 6.1.31. Appl., 26.9.28).—Removal of Au from previously ground sands is effected in two slightly sloping troughs, placed one above the other and rocked by mechanical means. Screens in the bottom of the upper trough retain coarse particles of Au while fine particles ("flour" Au) are caught in Hg cups in the lower trough.

E. H. BUCKNALL.

Chromium plating. J. A. HANLEY and W. L. PINNER, Assrs. to GEN. SPRING BUMPER CORP. (U.S.P. 1,787,477, 6.1.31. Appl., 24.1.27).—A Ni-plated article is cleaned firstly as a cathode in an alkaline bath, then in an acid bath, and dipped while wet into a Cr-plating bath for about 5 sec. before the current is turned on.

C. A. KING.

Manufacture of light metal [magnesium] alloy. E. C. BURDICK, Assr. to DOW CHEM. Co. (U.S.P. 1,788,616, 13.1.31. Appl., 11.12.24).—An alloy contains $>80\%$ (93%) Mg, not more than 2% (0.7%) Cu or 0.5% (0.25%) Mn, and $>2\%$ (6%) Al. It may be prepared by adding a Cu-Mn alloy to a molten rich Mg-Al alloy.

C. A. KING.

Removal of arsenic from [tungsten] ores. J. H. BRENNAN, Assr. to ELECTRO METALLURGICAL Co. (U.S.P. 1,790,088, 27.1.31. Appl., 8.12.26).—As contents up to 2% are almost entirely eliminated by treating the finely ground ore with S vapour, usually produced from S mixed with the ore, at about 800° .

E. H. BUCKNALL.

Treatment [preventing corrosion] of thorium. E. S. DAVENPORT, Assr. to WESTINGHOUSE LAMP Co. (U.S.P. 1,787,672, 6.1.31. Appl., 4.6.28).—Th is rendered resistant to atm. corrosion by anodic treatment in a bath consisting of glacial AcOH together with up to 30% of HNO_3 .

E. H. BUCKNALL.

Production of beryllium alloys. L. J. KEELER, Assr. to BERYLLIUM CORP. OF AMER. (U.S.P. 1,790,155, 27.1.31. Appl., 14.11.25).—Be alloys, *e.g.*, Be-Cu, may be formed by electrolysis of a fused salt bath, containing a Be fluoride, to which additions of oxides or other compounds of Be and of the alloying metal or metals are made either simultaneously or alternately.

E. H. BUCKNALL.

Flux for welding copper and steel. E. J. and N. E. SCHAFFNER, and K. E. FIELD (U.S.P. 1,787,553, 6.1.31. Appl., 12.4.30).—A flux for joining Cu to Fe consists of a mixture of 2 pts. $\text{Na}_2\text{B}_4\text{O}_7$, 1 pt. CuSO_4 , and 2 pts. of a pulverised alloy containing 10 pts. Cu, 25 pts. Zn, and 1.25 pts. Pb.

C. A. KING.

Extraction of metal values from ores. A. E. SMALL (U.S.P. 1,789,932, 20.1.31. Appl., 3.1.28).—Sulphide ores are roasted under conditions which result in max. solubility of non-ferrous metals, *e.g.*, Ni, Cu, etc., with the exception of precious metals, which remain with insol. Fe_2O_3 in the residue after leaching the roasted product. The residue is separated by selective gravitation.

C. A. KING.

Roasting and/or sintering fine ores etc. A. D. H. L. FASSOTTE (U.S.P. 1,789,895, 20.1.31. Appl., 17.11.27).—Threads of small diam. are expressed from a die almost vertically against a vibrationless conveyor belt

so that the ore is broken into short lengths, which are allowed to dry before the introduction into the blast roasting operation. C. A. KING.

Treatment of complex ores by flotation. W. SCHAFER (U.S.P. 1,788,332, 6.1.31. Appl., 18.9.29).—The use of simple or complex metallic salts of $H_2S_2O_4$ as flotation agents activates the separation of CuS and PbS in the froth and depresses ZnS.

C. A. KING.

Foundry facings. B. F. WALLACE (U.S.P. 1,787,964, 6.1.31. Appl., 18.12.26).—A facing composition for sand moulds contains carbonaceous dust made from retort coke, the particles of which are prevented from agglomerating by coating with a H_2O -sol. deflocculating agent. The dust is mixed with a highly colloidal clay such as bentonite.

E. H. BUCKNALL.

Acetylene.—See II. **Waste gases from contact plants.**—See VII. **Kilns.**—See IX. **Face plate.**—See XI.

XI.—ELECTROTECHNICS.

Theory of coreless induction furnaces. W. ES-MARCH (Wiss. Veröff. Siemens-Konz., 1931, 10, [2], 172—196).—Equations are derived for calculating the efficiency of high-frequency induction furnaces and the most suitable furnace and crucible dimensions for a given current frequency.

A. R. POWELL.

Power cost on an electric enamelling furnace. M. E. MANSON (J. Amer. Ceram. Soc., 1931, 14, 499—501).—Operating 12 hr. per day the consumption varied from 7 lb. Fe per kw.-hr. for light loads to 13 lb. per kw.-hr. for heavy loads.

J. A. SUGDEN.

Theory of the lead storage battery. C. LIAGRE (Compt. rend., 1931, 193, 236—238).—Experiments are described showing that the brown material from the positive plate of a Pb storage battery differs chemically in no way from ordinary PbO_2 , and that both positive and negative plates are sulphated and desulphated in conformity with Faraday's law.

C. A. SILBERRAD.

Rapid determination of current efficiency in the electrolysis of a zinc sulphate electrolyte. CONSOL. MIN. & SMELTING CO. (Trans. Amer. Electrochem. Soc., 1931, 60, 1—7).—The apparatus described gives a reliable indication of the electrolysing quality of a $ZnSO_4$ solution before it is discharged from the leaching plant to the cell rooms, the time required being only 45 min. The principle of the procedure is that if Zn is deposited from an electrolyte free from more electropositive impurities, using a Pb/PbO₂ anode and a Zn cathode, there will be a min. evolution of H₂ from the cathode, and the current efficiency of Zn deposition will be nearly 100%. On the other hand, if impurities such as As, Sb, etc. are present, they will tend to lower the H₂ overvoltage at the cathode and H₂ will be liberated in preference to Zn. Measurement of the amount of H₂ liberated in a definite interval of time gives, therefore, a measure of the purity of the solution and the current efficiency that can be expected at any given current density.

E. S. HEDGES.

Nature of the dielectric loss in oils. E. BORMANN and A. GEMANT (Wiss. Veröff. Siemens-Konz., 1931,

10, [2], 119—128).—The effect of additions to transformer and cylinder oils on their dielectric loss at temp. down to -40° has been investigated. No direct action in increasing the losses was found to be produced by dipolar substances.

A. R. POWELL.

Electrical purification of gases. W. DEUTSCH (Ann. Physik, 1931, [v], 9, 249—264).—It is shown that the suspended particles carried by the electric wind in an electric gas-cleaning plant require just as much time for their separation out of the wind as those in a gas at rest.

W. GOOD.

Cr plate. Plating Al. Depositing PbO₂. Sb. Ag.—See X.

See also A., Aug., 914, **Behaviour of Pt in HCl solution. Reduction of H₂PtCl₆ in HCl solution. 926, Determination of small quantities of alkalis in H₂O-insol. acids (H₂WO₄). 928, High-temp. furnace. 929, New cell for electro dialysis.**

PATENTS.

Electrodes for electrolytic cells. K. ROTH, Assr. to I. G. FARBENIND. A.-G. (U.S.P. 1,790,248—9, 27.1.31. Appl. [A] 21.1.26, [B] 7.2.28. Renewed 15.7.30. Ger. [A, B] 22.1.25).—An electrode comprising a framework divided by partitions into superposed pockets having permeable metal (A) front walls, (B) front and back walls, and connected by pipes for leading evolved gases upwards, is claimed.

J. S. G. THOMAS.

[Production of metallic salts and alkalis by] electrolysis. P. FIREMAN, Assr. to MAGNETIC PIGMENT CO. (U.S.P. 1,788,512, 13.1.31. Appl., 9.5.27).—An electrolytic cell comprising a sol. anode, a perforated cathode, and closely adjacent porous diaphragm at one side of the cell, spaced porous separators dividing the cell into anode and cathode compartments, and means for supplying electrolyte to and withdrawing products from the separate compartments, is claimed.

J. S. G. THOMAS.

Dry cell. G. W. HEISE, Assr. to NAT. CARBON CO., INC. (U.S.P. 1,788,870, 13.1.31. Appl., 2.12.24).—A dry cell of the bag type comprising a sheet of cellulosic material, e.g., paper, treated with $ZnCl_2$, and cemented to the cathode by the gelatinised cellulose so formed, is claimed.

J. S. G. THOMAS.

Active material for storage batteries. W. GARDINER and H. D. STALEY, Assrs. to VULCANITE, INC. (U.S.P. 1,788,571, 13.1.31. Appl., 2.2.27).—Active material containing PbO, PbO₂, and a Ta compound for absorbing gases is claimed. Thus a thick paste composed of 100 pts. PbO₂, 100 pts. PbO, 4 pts. TaO₂, and H₂SO₄ (*d* 1.050) may be used.

J. S. G. THOMAS.

Method of activating filaments. L. THOMPSON, Assr. to VICTOR TALKING MACHINE CO. (U.S.P. 1,790,449, 27.1.31. Appl., 1.4.25).—Filaments, e.g., of Pt, treated with Hg or an amalgam, e.g., of Hg and Zn, and one or more activating substances, e.g., Ba, Sr, are heated to drive off Hg.

J. S. G. THOMAS.

Electrical resistance element. A. H. HEYROTH, Assr. to GLOBAR CORP. (U.S.P. 1,787,749, 6.1.31. Appl., 4.10.27).—An extruded mixture of SiC₃, bentonite, C,

and H_2O is dried in air at about 100° , heated at above 815° , and finally fired at above 1149° for a much shorter period to glaze the outer surface. J. S. G. THOMAS.

Electron-emission material. J. W. MARDEN and H. C. RENTSCHLER, Assrs. to WESTINGHOUSE LAMP Co. (U.S.P. 1,787,694, 6.1.31. Appl. 8.3.26).—A cathode composed of Mo and about 1% V is claimed.

J. S. G. THOMAS.

Face plate for electrical contact. C. A. LAISE, Assr. to EISLER ELECTRIC CORP. (U.S.P. 1,788,243, 6.1.31. Appl. 25.8.27).—An alloy containing at least 75% W and more V than Si, and if desired Th, is claimed.

J. S. G. THOMAS.

Electric-discharge devices. GEN. ELECTRIC CO., LTD., J. W. RYDE, and H. G. JENKINS (B.P. 351,579, 2.4.30 and 1.1.31).—An electric discharge device, particularly an electric discharge lamp, is replenished continuously during operation with a permanent gas, e.g., H_2 or oxides of C, by connecting it with a supply of a substance, e.g., $C_{10}H_8$ or camphor respectively, capable of evolving at a temp. not far above atm., a vapour which under the action of the discharge yields the required gas.

D. F. TWISS.

Photoelectric apparatus. P. M. G. TOULON (B.P. 352,388, 27.2.30. Fr., 15.3.29).—A photoelectric cell provided with means for producing and utilising a secondary emission of electrons from the anode is claimed.

J. S. G. THOMAS.

Electrical precipitator. R. HELNRICH, Assr. to WESTINGHOUSE ELECTRIC & MANUF. CO. (U.S.P. 1,790,147, 27.1.31. Appl., 23.7.30).—A device is described for freeing the electrodes of an electrical precipitator from the collected dust by vibrating the whole device (elastically mounted) with a magnetically operated hammer. The dust is removed from the bottom of the device in the usual bin.

E. B. HUGHES.

Liquid for electric accumulators. G. SCHMAUS (B.P. 352,768, 6.8.30).—See U.S.P. 1,722,343; B., 1929, 824.

[Grid structures for] galvanic batteries. OLDHAM & SON, LTD., and T. G. MAIR (B.P. 353,378, 6.2.31).

[Construction of] electric incandescence lamps. FALK, STADELMANN & CO., LTD. From W. BERGER (B.P. 352,716, 30.6.30).

Electron-discharge apparatus. N. V. PHILIPS' GLOEILAMPENFABR. (B.P. 352,617, 9.5.30. Holl., 19.11.29).

Electric-discharge tubes. S. G. S. DICKER. From N. V. PHILIPS' GLOEILAMPENFABR. (B.P. 352,945, 10.4.30. Addn. to B.P. 340,049).

[Starting of] luminous electric-discharge tubes. GEN. ELECTRIC CO., LTD., Assees. of PATENT-TREUHAND GES. F. ELEKTR. GLÜHLAMPEN M.B.H. (B.P. 353,372, 30.12.30. Ger., 4.1.30).

Electric gas-discharge rectifiers with thermionic cathodes. GEN. ELECTRIC CO., LTD., F. CLARK, W. G. FROGLEY, and D. I. WATSON (B.P. 353,203, 23.6.30).

Indicating changes in gases.—See I. Carbon.—See II. Drying cellulose etc.—See V. Magnetic materials. Be alloys.—See X.

XII.—FATS; OILS; WAXES.

Optical activity of natural fats and oils. B. SUZUKI, Y. INOUE, and R. HATA (Proc. Imp. Acad. Tokyo, 1931, 7, 222—225).—Various oils, rapidly extracted (cf. A., 1930, 736) from living seeds, showed definite optical activity (e.g., $[\alpha]_D +0.5^\circ$ to $+0.35^\circ$) which decreased by racemisation of the glycerides to 0° in 70—200 hr. The fall was smooth in the case of soya-bean oil, but irregular for other seed oils. Similarly linoleo-dilinolenin bromides precipitated from fresh linseed oil at -10° to -15° had $[\alpha]_D -0.9^\circ$ falling to 0° in 5 hr. Oils from seeds killed by Et_2O vapour were inactive. Oil extracted from fresh tissues of living carp and eel had $[\alpha]_D +0.38^\circ$ and $+0.15^\circ$ respectively, falling to 0° and $+0.14^\circ$ (16 hr.). E. LEWKOWITSCH.

Potentiometric titration in non-aqueous solutions. I. Differential method for determining oil acidity. B. L. CLARKE, L. A. WOOTEN, and K. G. COMPTON (Ind. Eng. Chem. [Anal.], 1931, 3, 321—323).—A refined method is detailed; a dil. solution of LiCl in BuOH is used as fat solvent (cf. B. 1930, 248) with a quinhydrone electrode, and the thermionic titrometer (A., 1930, 1545) is adapted so that direct readings of the differential of the titration curves can be taken in systems having a high resistance. KOH in BuOH is used as reagent. The procedure is suitable for dark oils, asphalts, etc., and yields reproducible results which agree well with those obtained by the A.S.T.M. colorimetric method in cases where the latter is applicable (e.g., transformer oils). E. LEWKOWITSCH.

Fractional saponification of fatty substances. II. Detection of the commoner adulterants of olive oil. E. DE'CONNO and L. FINELLI (Annali Chim. Appl., 1931, 21, 203—210).—Partial saponification of olive oil (cf. B., 1930, 466), followed by determinations of the thermal value for the unsaponified residue and of the refractive index of the insol. non-volatile acids of the saponified portion, furnishes a means of detecting adulteration with arachis, colza, or sesame oil.

T. H. POPE.

Hardening of linseed oil at very high hydrogen pressure. H. I. WATERMAN and J. A. VAN DIJK (Rec. trav. chim., 1931, 50, 679—680).—Further experiments (cf. B., 1931, 499) show that hardening under high pressure of H_2 produces fats containing more saturated acids than oils hardened to the same I val. at 180° at ordinary pressure.

J. D. A. JOHNSON.

Influence of pressure and temperature on the hardening of soya-bean oil. H. I. WATERMAN, M. J. VAN TUSSENBOEK, and J. A. VAN DIJK (Rec. trav. chim., 1931, 50, 793—795).—The products formed when soya-bean oil is hardened under high pressure and low temp. contain more saturated fatty acids than those produced by Wilbuschewitsch's (cf. B., 1929, 608) or Normann's methods, even when the I vals. are identical.

H. BURTON.

"Kernel," the seed of the fruit of *Anacardium occidentale*. L. GOBERT (Ann. Falsif., 1931, 24, 260—268).—A description of the cashew apple and nut with microscopical character of the seed and analyses of the seed and the fat.

E. B. HUGHES.

Occurrence of arachidic acid in cacao butter. O. LÜNING and W. DRUDE (Z. Unters. Lebensm., 1931, 61, 491—494).—Arachidic acid does not normally occur in appreciable quantities in cacao butter, which contains no fatty acids higher than stearic acid. Graf's original method of fractional precipitation of the Mg salts (cf. A., 1889, 35) gives positive results unless the Mg salt is dried at 95° till const. in wt. instead of in a vac. desiccator, and the m.p. of the fatty acids should also be checked. A positive result obtained from a questionable milk chocolate (0.97 g. of arachidic acid from 20 g. of fat) indicated adulteration with hardened arachis oil (cf. A., 1929, 294; B., 1929, 785).

J. GRANT.

Analysis of fatty modifications obtained by action of sulphuric acid. M. DEGROOTE, B. KEISER, A. F. WIRTEL, and L. T. MONSON (Ind. Eng. Chem. [Anal.], 1931, 3, 243—252).—Cold sulphonation of oleic acid produces principally the *α*-sulphate, $\text{Me} \cdot [\text{CH}_2]_7 \cdot \text{CH}(\text{SO}_3\text{H}) \cdot [\text{CH}_2]_8 \cdot \text{CO}_2\text{H}$; with ricinoleic acid addition of H_2SO_4 at the double linking also occurs to some extent (cf. A., 1895, 82) but no compound with sulphate combined both at the double linking and at the OH group could be found. Use of the Parr peroxide bomb indicated a total combined S content of sulphonated castor oil considerably greater (up to 50%) than that obtained by the HCl-hydrolysis method (hydrolysable sulphate); the discrepancy (non-acidic, non-hydrolysable organically combined S) was not so great with oleic acid products, and both methods gave identical results with Na sulphoricinoleate and sulpholeate. The volumetric (double-titration) method tends to give low results, as boiling with H_2SO_4 may convert part of the fatty acid sulphates into a non-hydrolysable derivative. The Hübl-Waller (24 hr.) I val. determination gave concordant results (about half the Wijs val.) and is the most reliable for research work; the Margosches method (3—5 min.) may be conveniently employed in certain cases (e.g., in absence of free H_2SO_4) for plant control work. Determination of acetyl val., fatty matter, NH_3 , etc. is discussed. The characteristics of a recovered oil vary with the mode of prep. of the original sulphonated product. The determination of lactones is complicated by the fact that treatment with mineral acid favours the production of ester-acids from hydroxylated acids. A method for the determination of lactones, such as are regenerated after alkaline saponification and re-acidification, is described (28.5—29.5% of stearylactone was found in the product from an oleic acid sulphation). A stable hydroxystearic acid (m.p. 76°; cf. A., 1925, i, 5) may be prepared only from a pure γ -stearylactone or one containing oleic and/or *α*-hydroxystearic acid. The action of H_2SO_4 on oleic acid at about 100° yields a true sulphonic acid, probably $\text{C}_{17}\text{H}_{33}(\text{OH})(\text{SO}_3\text{H}) \cdot \text{CO}_2\text{H}$, non-hydrolysable by dil. acids at the b.p. Free H_2SO_4 , SO_2 , hydrolysable acid sulphate, SO_3H , and total organically-combined S (Parr bomb) should be determined for such products. Et_2O may be conveniently replaced by Pr^2O in many determinations E. LEWKOWITSCH.

Determination of glycerol in greases. M. H. PRAMME (Ind. Eng. Chem. [Anal.], 1931, 3, 232—233).—The glycerol in the aq. layer separated after treatment of the grease with H_2SO_4 is oxidised with excess of

$\text{K}_2\text{Cr}_2\text{O}_7$ and H_2SO_4 , and the CO_2 liberated is absorbed and weighed. The method is quick and suitable for normal greases etc. unless they contain H_2O -sol. org. matter (other than glycerol) which cannot be precipitated by inorg. salts. E. LEWKOWITSCH.

Soap boiling. I. Distribution of glycerin in curd soap and lye. Y. KAWAKAMI (J. Soc. Chem. Ind. Japan, 1931, 34, 186—188 B).—The distribution of glycerin between curd soap and lye is in agreement with the Freundlich adsorption isotherm. A method for calculating the number of times salting-out may be usefully employed in glycerin recovery is given.

A. A. LEVI.

Marzipan.—See XVII.

See also A., Aug., 1932, Preparation of hydrocarbons etc. by reduction of fats. 935, Determination of solid unsaturated fatty acids. Et_2O -sol. Pb salts of lumbang oil. 975, Fatty acids of egg-yolk lecithin. Wax of wool louse. 987, Influence of soaps on germicidal properties of certain Hg compounds. 988, Vitamins in liver- and butter-fat. 989, Fat-sol. vitamins.

PATENTS.

Method of making linseed oil. R. H. ADAMS and B. H. THURMAN, Assrs. to GOLD DUST CORP. (U.S.P. 1,790,494, 27.1.31. Appl., 3.7.25).—The seed is cleaned from dockage to a max. of 1—1.5% and cracked, and the oil is (expeller) expressed below 43°, and cleared by treatment with fuller's earth. The product can be used for varnishes etc. without further treatment.

E. LEWKOWITSCH.

Bleaching of [linseed] oil. B. H. THURMAN, Assr. to GOLD DUST CORP. (U.S.P. 1,790,514, 27.1.31., Appl., 18.3.26).—A good quality cold-pressed (cf. U.S.P. 1,790,494, preceding) or refined linseed oil, free from mucilage, is heated at 260—282°/ < 1 in. until sufficiently bleached, and is chilled rapidly to 93°.

E. LEWKOWITSCH.

[Continuous dry] rendering process. S. HILLER (U.S.P. 1,789,751, 20.1.31. Appl., 26.5.25).—Animal waste etc. is continuously passed through a digester where it is sterilised and disintegrated under steam pressure (conveniently developed from the material itself), through a vac. dryer until the moisture content is reduced to 20%, and is then drained and pressed.

E. LEWKOWITSCH.

Bleaching of soap. C. F. SCHUMAKER, Assr. to MATHIESON ALKALI WORKS, INC. (U.S.P. 1,788,848, 13.1.31. Appl., 26.6.28).—Stable bleaching is effected by mixing the soap (chips) with NaOCl (2%) and CH_2O (1%) before milling. E. LEWKOWITSCH.

Preserving soaps.—See XIV.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Diagnosis of oil paint failures. B. SCHEIFELE (Farben-Ztg., 1931, 36, 1767—1769).—The causes of oil paint failure are classified under: unsuitable quality of paint, faulty application, insufficient prep. of the surface to be painted, incorrect system of undercoats, and exposure to extreme conditions. Methods of diagnosis of failures are described. The details of

investigation of paint failure on the metal portions of an aq. NH_3 tank-car illustrate the foregoing. S. S. WOOLF.

Drying process of [artificial] iron oxide-boiled linseed oil paints. H. SALVATERRA and F. ZEPPELZAUER (*Farben-Ztg.*, 1931, 36, 1771—1773, 1812—1814, 1851—1853).—Dried films of paints containing artificial Fe oxides retain a stickiness for considerable periods. The O-absorption and drying time of films of Pb- and Co-boiled oils were found to be but little affected by the incorporation of synthetic Fe oxide "B 20," which is relatively inert, no Fe soaps being formed by combination with the acid decomp. products of the oil. The stickiness of such films is due to a tendency of the artificial pigment to increase the extent of acid formation over that of films of the oil alone, natural Fe oxide pigments not producing this increase. The addition of 10% of Pb_3O_4 cures this defect. A new apparatus for measuring the stickiness of paint films is described.

S. S. WOOLF.

Hardness of films. W. TOELDT (*Farben-Ztg.*, 1931, 36, 1769—1771, 1810—1811).—The significance of "hardening through" of a film is discussed and existing methods of measuring film hardness are criticised. A new method is described involving the measurement in μ of the extent of penetration of a loaded gramophone needle (selected microscopically). Complete penetration is indicated by the needle closing an electric circuit with the metal base and thus lighting a small lamp; the operation is then repeated with a smaller load until progressive penetration for 5 min. is recorded. Hardness at any given load is expressed as the percentage thickness of film penetrated after 1 min. Typical results are tabulated, graphed, and discussed.

S. S. WOOLF.

Loss of weight of paint films. H. WOLFF and G. ZEIDLER (*Farben-Ztg.*, 1931, 36, 1850—1851).—The loss of wt. in $13\frac{1}{2}$ months of a paint film comprising priming (Pb_3O_4) and 6 subsequent thin coats exceeded the wt. of the first coat, the loss being shown by analysis to be loss of vehicle, that of pigment being relatively small. No obvious disintegration of the final coat had occurred and the thickness of the composite film was not noticeably diminished. Weathering has thus taken place by formation of gaseous decomp. products throughout the system. The bearing of these results on previous work on the relation of "chalking" to loss of wt. is discussed.

S. S. WOOLF.

Identification of old paint and varnish films. A. NAUROY (*Peint., Pig., Ver.*, 1931, 8, 1538—1542).—The effects of ageing and weathering influences on the various constituents of paint and varnish films are discussed. Information as to the nature of old films can be obtained by visual and microscopical inspection, rubbing, gentle heating, determination of hardness and elasticity by the lead-pencil method, action of EtOH , CCl_4 , PhMe , BuOAc , etc.

S. S. WOOLF.

Measurement of effect of carbon black on fluidity of printing ink. E. P. W. KEARSLY and G. L. ROBERTS (*Ind. Eng. Chem. [Anal.]*, 1931, 3, 310—311).—The sample of C black to be tested (0.25 g.), ground into paste with lithographic varnish (2.5 g.) by standard procedure, is drawn into a 10-c.c. pipette which is

inserted in the top of a box maintained at standard temp. (45°), and after 5 min. preheating, 10 drops of the sample are allowed to drop on a horizontal glass plate inside the box. After 1 min. the plate is swivelled down to an angle of 30° with the horizontal and the extent of flow of the sample down the plate in 7 min. is measured. Standard samples may be run alongside and the results may readily be converted into poises. S. S. WOOLF.

Camphor white oil as a paint and varnish thinner. S. HIROSE (*Proc. World Eng. Congr.*, 1929, 31, 489—496).—Two samples of camphor white oil (a low-boiling distillation fraction of crude camphor oil, mainly comprising pinene and camphene) were found to be comparable with 3 representative samples of American turpentine in solvent power, rate of volatilisation, influence on drying times of varnishes, etc. Camphor white oil shows advantages in higher flash point (49.5°) and in cost.

S. S. WOOLF.

Testing of coloured pigments. I. Staining power. H. WAGNER and M. ZIFFEL (*Farben-Ztg.*, 1931, 36, 1889—1892).—Staining power is expressed as the difference in white content of ZnO and a 1:20 mixture of coloured pigment and ZnO as measured by the Ostwald half-shadow photometer. The usual method of determining staining power is outlined and the accuracy of the determination is discussed from the following aspects: type and concentration of oil, degree of mixing, weighing procedure, method of painting out, test surface. From these considerations a detailed standard method is developed.

S. S. WOOLF.

Analysis of chrome-green and similarly composed pigments. C. P. A. KAPPELMEIER (*Rec. trav. chim.*, 1931, 50, 711—718).—The method, which is suitable for chrome-green and many other pigments containing Prussian-blue, is based on the decomp. of Fe complex cyanides by yellow HgO in boiling H_2O . This treatment, followed by the addition of Na_2O_2 , permits the determination of Fe as Fe_2O_3 , Cr as Na_2CrO_4 , and Pb as PbSO_4 by the usual methods. SO_4^{2-} is determined as BaSO_4 in a separate portion.

E. S. HEDGES.

New methods of surface protection [by poly-vinyl esters]. A. EIBNER (*Farben-Ztg.*, 1931, 36, 1849—1850, 1892—1894).—The inherent disadvantages of combinations of drying oils with natural and synthetic resins are discussed. The desirable properties of poly-vinyl resins (derived from chlorinated and non-chlorinated vinyl acyl esters), e.g., freedom from sensitiveness to light, hardness, elasticity, high pigment-binding capacity, etc., are put forward.

S. S. WOOLF.

Varnish from xylose and aniline. J. P. MONTGOMERY (*Ind. Eng. Chem.*, 1931, 23, 761—762).—Equimol. proportions of xylose (obtained from cottonseed hulls) and NH_2Ph are heated for 10 min. at 75 – 80° , and the product is dissolved in COMe_2 . The varnish dries in $\frac{1}{2}$ hr., giving, according to concentration of solution, a dark oak- to cherry-coloured film, resistant to H_2O , alkalis, and acids.

S. S. WOOLF.

Viscosity increase and gelation in phenolic resin varnish cooking. V. H. TURKINGTON, R. C. SHUEY, and W. H. BUTLER (*Ind. Eng. Chem.*, 1931, 23, 791—797).—The time of gelation of tung oil with various

additions of Bakelite resin XR 254, ester gum, rosin, etc. was determined in a modified Brown-Worstell test which is fully detailed. The rate of increase in viscosity of such mixtures was also determined under varnish-cooking conditions, viscosity being measured by a De Vilbiss viscosimeter inserted periodically in the kettle. Resin XR 254 accelerated the gelation of tung oil in the first series of experiments, but in the viscosity measurements this is shown to be a nett acceleration arising from a decrease in "thickening time" and a slight restraining effect during subsequent gelation (all the viscosity-time curves showing such a division into at least two sections). S. S. WOOLF.

Detection and identification of synthetic resins. T. F. BRADLEY (Ind. Eng. Chem. [Anal.], 1931, 3, 304—309).—The types of synthetic resins most commonly found in protective coatings are summarised, constituents, general characteristics, and usual occurrence being detailed. A scheme for isolation of the synthetic resin component involves removal of pigment by repeated filtrations after addition of kieselguhr and COMe_2 , precipitation of cellulose esters by dilution with C_6H_6 , PhMe, etc., steam-distillation, and extraction with light petroleum. Densities and refractive indices of resins are tabulated, the figures for the synthetic products being in general higher than those for the natural resins. These are considered as characteristic criteria which, in conjunction with other indicated physical and chemical tests, form a basis for the identification of synthetic resins. Qual. tests for halogens, S, N, phthalates, phenols, vinyl esters, etc. are described. S. S. WOOLF.

Phenol resin as moulding composition. T. HIRAOKA (Proc. World Eng. Congr., 1929, 31, 481—488).—The solubility in NaOH solution of the initial condensation products of PhOH and CH_2O in the presence of alkaline catalysts was examined. Powdered resins, softening at 80—90° and suitable for direct conversion into moulding powder by incorporation with wood flour etc. on the hot roller, were obtained by adding excess of H_2O to NaOH solutions of the initial condensation products or by neutralisation of such solutions with acid, e.g., HCl. S. S. WOOLF.

Macromolecules and micelles in organic polymers. S. E. SHEPPARD (Ind. Eng. Chem., 1931, 23, 781—784).—The methods used for examining the structure of the high-mol. aggregates found in rubber hydrocarbons, cellulose derivatives, and synthetic resins, and the reaction mechanism of polymerisation are discussed. The formation of films of paint, varnish, and lacquer depends greatly on the group behaviour of such macromols. Evidence for the individual existence of the latter is summarised. S. S. WOOLF.

Resin of *Ipomœa*. Balsams.—See XX.

See also A., Aug., 937, **Intermediate stage of formation of bakelite from PhOH and CH_2O .** 960, **Separation of aleuritic and shellolic acids [from shellac]. Resin of *Garcinia Mangostana*.** **Elemic acid from Manila elemi resin.** 961, **New resin from Manila elemi resin.** 967, **Bilirubinoid pigments.**

PATENTS.

Duplicating [inks]. L. SILBERSTROM (U.S.P. 1,789,783, 20.1.31. Appl., 5.6.26).—The use of hexamethylenetetramine or its salts in duplicating inks, for processes involving neutral or acid plates, is claimed. S. S. WOOLF.

Writing fluid. R. A. BELMONT (B.P. 351,611, 9.4.30).—A solution formed of H_2O -sol. colour ingredients and an aq. carrier solution comprising as penetrating agent a deliquescent salt of an alkaline-earth metal, an alkali hydroxide or sulphide, etc. is claimed as a quick-drying, non-smearing, and highly absorbent writing fluid. S. S. WOOLF.

Manufacture of printing colours. E. FRENKEL (B.P. 351,824, 5.9.30. Ger., 10.9.29).—Printer's ink which dries very rapidly is prepared with a blown linseed oil having Ac val. not less than 100. A. J. HALL.

Treatment of rosin. W. B. LOGAN (B.P. 351,583, 2.4.30).—A bleached grade of rosin is heated for 10 min.—8 hr. below decomp. temp., e.g., at 260—325°, the content of potential colour body (i.e., that producing a yellow colour on dissolution in alkali and subsequent treatment with Al salts) and/or the tendency of the rosin to crystallise being thereby reduced considerably. The optical rotation is increased to at least +20°. S. S. WOOLF.

Treatment of low-grade resins. M. T. LACRUE (B.P. 351,065, 22.3.30. Sp., 22.3.29).—A low-grade resin containing about 15% of turpentine, 50% of rosin, 25% of H_2O , and 10% of impurities is heated with 15—75 wt.-% of turpentine, and after decantation and filtration, the solution is steam-distilled, all the turpentine being recovered, and light-coloured rosins obtained. S. S. WOOLF.

Synthetic resins and methods of manufacturing them. BRIT. THOMSON-HOUSTON CO., LTD. Assees. of R. H. KIENLE and W. J. SCHEIBER (B.P. 352,140, 30.4.30. U.S., 30.4.29).—An aromatic amine, e.g., NH_2Ph , and an aldehyde, e.g., CH_2O , are caused to react in acid, e.g., HCl, solution at temps. rising to 40°, a fibrous pulp with or without fibrous and/or non-fibrous filling materials, e.g., mica, is added to the resulting clear acid liquor, and the mixture is stirred for 1 hr. until the fibrous pulp is saturated. After dilution, alkali, e.g., CaO, is added to neutralise the acid and ppt. the resin, which is then flocculated by raising the temp. to 60°, and fixed on and/or in the fibres by continued stirring. The resulting product is moulded at about 150° under pressure of >1000 lb./sq. in. The flocculated product may be diluted to about 1% consistency and formed into sheets, which are dried, calendered, and heated under pressure. S. S. WOOLF.

Manufacture of artificial masses and articles therefrom. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 351,508, 24.2.30).—Halides or nitriles of monomeric unsaturated aliphatic carboxylic acids, preferably of the acrylic acid series, are polymerised in known manner and heated to 35—150° under pressure with agents containing a reactive H atom, e.g., H_2O , inorg. bases, alcohols, H_2S , NH_3 , amines, etc., in the presence, if desired, of inert diluents, e.g., aliphatic esters (when

working with halides) and H_2SO_4 or H_3PO_4 (when working with nitriles). Org. film-forming substances, *e.g.*, nitrocellulose, may be incorporated. S. S. WOOLF.

Artificial [resinous] masses. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 352,042, 3.3.30).—Film-forming substances (*e.g.*, natural or synthetic resins, cellulose derivatives) are incorporated with the viscous or solid products of the polymerisation of alkylene oxides (cf. B.P. 346,550; B., 1931, 666) with or without addition of solvents etc. E. LEWKOWITSCH.

Resinous compositions particularly for use in coating compositions. H. A. GARDNER (B.P. 351,637, 22.4.30. U.S., 12.2.30).—Chlorinated diphenyls are heated with natural and/or synthetic resins, *e.g.*, rosin, ester gum, toluenesulphonamide- CH_2O , the resinous composition being used as such or incorporated with nitrocellulose or drying oil components as lacquers. S. S. WOOLF.

Resinous materials. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 351,945, 16.12.29).—Alcohols containing more than three OH groups (excluding carbohydrates), *e.g.*, pentaerythritol, are esterified with higher cyclic or open-chain aliphatic acids, *e.g.*, fatty acids (or glycerides), naphthenic acids, and simultaneously with resin acids. The products may be blown with air or vulcanised. E. LEWKOWITSCH.

Resin or resinous product and process of making same. C. ELLIS (U.S.P. 1,787,618, 6.1.31. Appl., 2.7.21. Renewed 1.3.30).— S_2Cl_2 , a phenolic substance, and CH_2O or a derivative, *e.g.*, hexamethylenetetramine, are heated together, giving a fusible resinous material containing 20–60% of combined S. S. S. WOOLF.

Preparation of condensation products from urea and formaldehyde. G. C. A. MANESSE and J. SECHAYE (B.P. 352,288, 6.8.30. Fr., 7.8.29).—Urea and CH_2O are condensed at 80° , in presence of glucose or lactose and a metallic oxide, preferably ZnO. The plastic products are known as "Veryx" and "Cristalyx." S. S. WOOLF.

Condensation product of urea and formaldehyde. O. A. CHERRY, Assr. to ECONOMY FUSE & MANUF. Co. (U.S.P. 1,790,461, 27.1.31. Appl., 3.6.27).—Urea (1 pt.) is condensed in small quantities at a time with CH_2O (1–5 pts.) in solution of p_H about 3, and the H_2O -sol. condensation product is hardened by heat, after elimination of H_2O . S. S. WOOLF.

Production of vinyl ester resins. CANADIAN ELECTRO PRODUCTS Co., LTD., Asses. of F. W. SKIRROW, G. O. MORRISON, and K. G. BLAIKIE (B.P. 351,082, 25.3.30. U.S., 25.3.29).—A vinyl ester polymeride or the reaction product of an aliphatic vinyl ester, *e.g.*, the acetate, with a saturated aliphatic aldehyde, *e.g.*, MeCHO, is heated with mineral acid, *e.g.*, HCl, and H_2O , and the hydrolysed product is further condensed with an aldehyde, *e.g.*, CH_2O , MeCHO. S. S. WOOLF.

Production of artificial resin from polyhydric phenols and aldehydes. INTERNAT. GEN. ELECTRIC Co., INC., Asses. of ALGEM. ELEKTRICITÄTS-GES. (B.P. 350,934, 11.3.30. Ger., 11.3.29).—Polyhydric phenols, *e.g.*, resorcinol, and carbonyl compounds, *e.g.*, CH_2O , are caused to interact in stages, part only of the

carbonyl compound being added initially to form a "semi-condensate," an acid resin with free phenolic OH groups, the reaction being subsequently completed by the addition of the rest of the carbonyl compound. Fillers and colouring matter and natural and artificial resins up to 250% of the "semi-condensate" may be added. S. S. WOOLF.

Manufacture of synthetic resins and moulding powders obtained therefrom. BRIT. CYANIDES Co., and E. C. ROSSITER (B.P. 351,093–4, 25.3.30).—(A) A salt of hexamethylenetetramine, *e.g.*, the thiocyanate, with or without urea or thiourea, or (B) free thiourea, is added to synthetic resins or moulding powders made substantially from CH_2O and urea, as accelerators of "curing." S. S. WOOLF.

Thermoplastic materials. BRIT. THOMSON-HOUSTON Co., LTD., Asses. of B. W. NORDLANDER (B.P. 351,188, 14.5.30. U.S., 14.5.29).— SeS_2 , prepared by direct union, is fused with a filler, *e.g.*, Fe_2O_3 , asbestine, wood flour, etc., at about 125° , the mass is cooled and pressed, and finally "cured" for about $\frac{1}{2}$ hr. at 80 – 90° , giving a hard, dense product. S. S. WOOLF.

Manufacture of mouldable materials. R. E. ELLIS. From SOC. DES USINES CHIM. RHÔNE-POULENC (B.P. 351,390, 20.1.30).—A cellulose ester, *e.g.*, the acetate, is stirred vigorously with plasticisers, *e.g.*, camphor, Et phthalate, in suspension in H_2O (>twice the wt. of cellulose derivative), fillers and colouring matter are added if desired, and the suspended mixture is mechanically separated, giving homogeneous easily-moulded mixtures. The cellulose derivative may be precipitated from solution in the presence of fillers, to ensure uniform distribution. S. S. WOOLF.

Shellac composition. A. P. THURSTON. From CALCO CHEM. Co., INC. (B.P. 352,720, 2.7.30).—See U.S.P. 1,781,711; B., 1931, 643.

Coating compositions.—See V. Emulsion.—See IX.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Natural and synthetic rubber. VII. Fractional precipitation of natural rubber. T. MIDGLEY, JUN., A. L. HENNE, and M. W. RENOLL (J. Amer. Chem. Soc., 1931, 53, 2733–2737).—A method of separation of N-free rubber hydrocarbon (resembling the " α -rubber" of Pummerer), based on the progressive precipitation of natural rubber from a mixture with EtOH and C_6H_6 by slow cooling, is given. Temp.-concentration diagrams of the systems natural rubber-EtOH- C_6H_6 , pure rubber-EtOH- C_6H_6 , and synthetic rubber-EtOH- C_6H_6 are also given. H. BURTON.

Permeability of rubber to air. II. Effect of stretch, thickness, milling, compounding ingredients, kind of crude rubber, and temperature of vulcanisation. V. N. MORRIS (Ind. Eng. Chem., 1931, 23, 837–843; cf. B., 1930, 112).—The permeability of rubber membranes is approx. inversely proportional to their thickness; the increase in permeability of stretched rubber is mainly attributable to the accompanying decrease in thickness. The degree of milling, variation in the temp. of vulcanisation, and alteration in the type of plantation rubber used have little

influence, but caucho ball rubber gave a mixture of somewhat lower permeability. None of the various softeners or other org. materials was found to have appreciable beneficial effect. Permeability appears to be roughly proportional to the vol. of rubber hydrocarbon present in the mixture, but the nature of the principal compounding ingredients has a slight influence, clay, channel black, and blanc fixe being the most beneficial. D. F. TWISS.

Value of softeners in [rubber tyre] tread stock. M. J. DE FRANCE and W. J. KRANTZ (Ind. Eng. Chem., 1931, 23, 824—827).—If max. abrasion-resistance is to be economically obtained, it is desirable to use the min. proportion of pine tar or mineral oil commensurate with good factory processing. The proportion of stearic acid in a tyre-tread mixing accelerated with mercapto-benzthiazole should be maintained at about 4% on the rubber content. The results of laboratory abrasion tests with 30% slippage do not coincide exactly with road tests, but give indications in the same direction. D. F. TWISS.

Effect of scrap-drying temperature on quality of reclaimed rubber. H. F. PALMER, G. W. MILLER, and J. E. BROTHERS (Ind. Eng. Chem., 1931, 23, 821—827).—Experiment shows that a max. ultimate drying temp. of 121.1° to a min. moisture content of 3% may be used for all standard types of "devulcanised" rubber scrap. It is recommended, however, that a lower ultimate temp. be used and that more rapid drying be promoted by the use of higher temps. in the wet end of the dryer. Increase in drying temp. does not affect the proportion of acetone-sol. matter, but raises the CHCl_3 extract and increases the softness of the material. Vulcanised rubber mixtures containing 35% of reclaimed rubber do not exhibit undesirably abnormal stress-strain characteristics either before or after ageing. D. F. TWISS.

γ -Methyl- α -pentadiene.—See III. Rubber for pickling baths.—See X. Macromols. and micelles.—See XIII.

PATENTS.

Preservation of oxidisable hydrocarbons [including rubber, also soaps]. A. M. CLIFFORD (B.P. 351,645, 29.4.30).—Naphthylformamidines, of the general formula $\text{R}\cdot\text{N}'\cdot\text{CH}\cdot\text{NHR}'$, where R and R' represent C_{10}H_7 groups, are efficient preservatives for rubber, transformer oils, soaps, etc. Di- α - or di- β -naphthylformamidine can be obtained by heating the naphthylamine and formic acid in NH_2Ph for 6 hr. under conditions permitting the escape of H_2O vapour formed in the reaction. D. F. TWISS.

Preservation of rubber. GOODYEAR TIRE & RUBBER Co. (B.P. 351,844, 26.9.30. U.S., 6.11.29).—Aminohydroxy diphenyl, prepared by successive nitration and reduction of *p*-hydroxydiphenyl (B.P. 302,147; B., 1929, 990), is a more powerful antioxidant than the parent compound; it is also non-poisonous and inodorous. D. F. TWISS.

Retardation of deterioration of rubber. W. S. CALCOTT and W. A. DOUGLASS, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,789,696, 20.1.31. Appl., 17.9.29).—The reaction product of C_2H_2 and an NH_2 compound, e.g., NH_2Ph , produced preferably with the

aid of a catalyst such as Cu_2Cl_2 , is used as an antioxidant for rubber. The product from C_2H_2 (2 mols.) and NH_2Ph (1 mol.) contains 9.82% N and has m.p. 92.4—93.7°. D. F. TWISS.

Manufacture of rubber articles. PIRELLI, LTD. From Soc. Ital. PIRELLI (B.P. 351,012, 17.3.30).—Articles are manufactured from vulcanised substantially uncoagulated aq. dispersions of rubber and the like by local heating in the presence of a destabilising agent (cf. B.P. 284,608; B., 1929, 612). D. F. TWISS.

Treatment of rubber. [Vulcanisation accelerators.] DEUTS. HYDRIERWERKE A.-G. (B.P. 351,356, 3.10.30. Ger., 22.10.29).—Alcohols of high mol. wt., particularly fatty or wax alcohols or cyclic alcohols, are used as softeners, vulcanisation accelerators, and anti-agers for rubber; e.g., incorporation of 5—10% of dodecyl or octadecyl alcohol gives an excellent finished product. D. F. TWISS.

[Accelerator for] manufacture of rubber. GOOD-YEAR TIRE & RUBBER Co. (B.P. 351,832, 18.9.30. U.S., 5.10.29).—Vulcanisation is accelerated by the condensation product of cyclohexylamine with an open-chain aldehyde such as aldol, CH_2O , crotonaldehyde, or heptaldehyde; the products have high tensile strength and good resistance to ageing. D. F. TWISS.

Vulcanisation of rubber articles [inner tubes etc.]. M. A. MARQUETTE, Assr. to FISK RUBBER Co. (U.S.P. 1,790,011, 27.1.31. Appl., 22.7.26).—In the vulcanisation of articles on mandrels with the outer surface of the rubber exposed to the steam, air is introduced together with the steam into the vulcanising chamber; the resulting excess pressure increases the moulding effect and reduces the risk of formation of air pockets. Uniformity of temp. is maintained by subsequently opening a vent to permit slight discharge of the gaseous mixture, the supply of steam being maintained so as to ensure a const. vulcanising temp. D. F. TWISS.

Rubber process and product. E. E. AYRES, JUN., Assr. to B.A.S. Co. (U.S.P. 1,789,062, 13.1.31. Appl., 21.2.23).—Rubber latex is mixed with oils, fats, waxes, resins, or liquid hydrocarbons either in aq. dispersion or under such conditions that they readily become emulsified; the emulsified mixture of added ingredient and rubber is then separated from the water by evaporation or coagulation. D. F. TWISS.

XV.—LEATHER; GLUE.

Tanning with nepheline. N. V. BELOV (Bull. Acad. Sci. U.S.S.R., 1931, 315—318).—Kay's experiments with silicic acid as a tanning material (Le Cuir, 1919, 209, 257, 314) yielded unsatisfactory products. Good results are, however, obtainable with a solution of nepheline in acid, diluted and stabilised with the salts commonly used in tanning, such as NaCl , from 5 to 6% of nepheline (on the dry skin) being absorbed. T. H. POPE.

Influence of tanning substances on certain metals. A. GANSSER (Boll. Off. Staz. Sperim. Ind. Pelli, 1931, 9, 2—5, 90).—The use of metal wire in baling salted hides is inadvisable, Fe being especially

harmful. The resistance to corrosion of various metals used in tanning is considered. Monel metal resists superheated steam and is particularly useful, being more easily worked than Ni-Cr steels of the V2A and V4A types. Monel metal and V2A steel resist cellulose sulphite liquor satisfactorily. Al is unsuitable, as it is attacked by tanning extracts producing yellow lakes, and by various materials commonly used in tanning. The use of standardised dishes of monel metal and Ni-Cr steel V2A, in place of Ag basins for evaporation in the analysis of tanning substances, is being tried.

T. H. POPE.

See also A., Aug., 929, Cell for electro dialysis [of gelatin]. 971. Amorphous and cryst. gelatin.

PATENTS.

Tannage of sole leather. C. KANNEL (U.S.P. 1,789,629, 20.1.31. Appl., 4.4.28).—The limed hides are treated first with a mixture of K_2CrO_4 , H_3BO_3 , glycerin, H_2O , and H_2SO_4 , formic or butyric acid for 16–24 hr. and subsequently drummed for 24 hr. in a tanning solution of d 1.080–1.092, in a rotating drum mounted on a longitudinally perforated shaft, one end of which is continuously evacuated during the tannage.

D. WOODROFFE.

Culture of micro-organisms for unhairing [hides]. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 351,600, 4.4.30).—Proteolytic bacteria, e.g., *B. vulgatus*, *B. megatherium*, are cultivated in nutrient media containing degraded keratin, e.g., meat extract, peptone, agar, 1–2% keratose, and 0.1% K_2HPO_4 , the bacterial films isolated, killed with $COMe_2$, dried, and powdered.

D. WOODROFFE.

Imparting lustre to lambskins and sheepskins. M. LASKIN (U.S.P. 1,788,026, 6.1.31. Appl., 19.8.29).—The dyed skins are immersed in a 1% emulsion of sulphonated neatsfoot or other oil, centrifuged, dried, milled in sawdust mixed with a small amount of oil emulsion, combed, beaten, and ironed hot after spraying the wool with white paraffin oil.

D. WOODROFFE.

Leather dye [for shoes]. L. A. WATT. Assr. to MONSANTO CHEM. WORKS (U.S.P. 1,789,375, 20.1.31. Appl., 7.5.27).—A mixture of o - $C_6H_4Cl_2$, spirit-sol. nigrosine, oleic acid, and denatured EtOH.

D. WOODROFFE.

Vegetable glue. E. H. HARVEY, Assr. to PERKINS GLUE Co. (U.S.P. 1,790,346, 27.1.31. Appl., 19.9.23).—Cassava starch (1 pt.) of sp. viscosity < 60,000, H_2O (2–3 pts.), NaOH (3%), and $FeSO_4$ (0.2%) are heated together at 77–5°.

D. WOODROFFE.

Adhesive. L. BRADSHAW, Assr. to CASEIN MANUFG. Co. (U.S.P. 1,787,611, 6.1.31. Appl., 8.6.27).—A mixture of an alkali-sol. protein, a commercial oil-seed cake, "starch-viscose" (made by treating starch with CS_2 and NaOH), $Ca(OH)_2$, and H_2O alone or with one or more of the following: $Na_2B_4O_7$, NaF, Na_2CO_3 , Na_3PO_4 , Na_2SO_3 .

D. WOODROFFE.

Production of articles [buttons etc.] from water-insoluble albuminous substances of casein-like character. J. H. SMIDT (B.P. 352,100, 9.4.30. Ger., 2.8.29).—Articles cut or stamped from sheets or rods of unhardened casein, preferably of animal origin, are

partly hardened by treatment with CH_2O for, e.g., 1 week, dried superficially in the air, softened at about 100°, and pressed hot to their final form. A uniform H_2O content is maintained at each stage of the process.

L. A. COLES.

Colloidal solutions.—See XIX.

XVI.—AGRICULTURE.

Mechanical analysis of soils by the pipette method. M. KÖHN (Z. Pflanz. Düng., 1931, 21A, 211–222).—Criticisms of the author's method by Köttgen and Heuser (B., 1931, 453) are unjustifiable. In viscous liquids the hydrodynamic behaviour of an ordinary vertical pipette and a horizontal pipette with a lateral jet is similar. In H_2O and liquids of low viscosity all pipettes induce a simple streaming motion, whereas in viscous liquids a swirling or turbulent streaming occurs. Glycerin is a very unsuitable medium for pipette analysis owing to the high temp. coeff. of viscosity and the wide variations in viscosity brought about by small additions of H_2O .

A. G. POLLARD.

Use of sodium hypobromite for the oxidation of organic matter in the mechanical analysis of soils. E. TROELL (J. Agric. Sci., 1931, 21, 476–483).—A modified method of analysis is based on the substitution of H_2O_2 by NaOBr in the preliminary oxidation process, excess of the reagent being removed by the addition of aq. NH_3 . Large amounts of org. matter and MnO_2 in soils may thus be decomposed in the cold and the decomp. of clay minimised. The customary preliminary acid treatment is unnecessary, no further addition of deflocculant is needed, the shaking period is reduced, and the separation of the coarser particles is more precise. In soils having a high ratio of org. : inorg. colloids, oxidation is necessary for complete dispersion.

A. G. POLLARD.

Soil sampling tube. H. J. HARPER (Soil Sci., 1931, 32, 65–69).—The sampling tube has two opposite longitudinal ribs. By rotation of the tube after insertion, the hole is enlarged to permit easy withdrawal.

A. G. POLLARD.

Soil reaction. VII. Electro dialysis apparatus for the determination of replaceable bases in soils. J. K. BASU (J. Agric. Sci., 1931, 21, 484–492).—A battery of two-compartment electro dialysis cells is described. A modified technique permits the elimination of H_2O -sol. cations from the analytical values.

A. G. POLLARD.

Effect of dilution on the p_H of soils treated with various cations. A. T. PERKINS and H. H. KING (Soil Sci., 1931, 32, 1–8).—In determinations of the p_H of soil suspensions by the quinhydrone electrode, values obtained increased with the ratio H_2O : soil used. The dilution effect was not materially influenced by treatment of the soil with commonly occurring cations.

A. G. POLLARD.

Pipe-line currents and soil resistivity as indicators of local corrosive soil areas. E. R. SHEPARD (Bur. Stand. J. Res., 1931, 6, 683–708).—Corrosion is most severe at points of abrupt discharge and abnormal resistivity. Soil resistivities of about 500 ohms per cm. usually indicate severe corrosion; above 1000 ohms

per cm. there is little connexion between resistivity and corrosion. C. W. GIBBY.

Effects of various sources of organic matter on the properties of soils as determined by physical measurements and plant growth. H. B. SPRAGUE and J. F. MARRERO (Soil Sci., 1931, 32, 35—49).—The effect on the physical properties of various types of soils of well rotted manure, spent mushroom soil, raw and cultivated peat, and peat moss are recorded. A sandy soil and a loam were improved by all the materials in the order named. On a clay-loam the more fibrous materials were superior. Peat produced too open a structure. Rates of decomp. of the org. matter were in the order manure > peat moss > raw peat > mushroom soil > cultivated peat. A. G. POLLARD.

Carbon-organic matter factor in forest soil humus. H. A. LUNT (Soil Sci., 1931, 32, 27—33).—The org. matter of forest soils and peat contains <58% C. Numerous analyses show that the customary factor (1.724) for calculating amounts of org. matter from C determinations should be increased to 1.89 for freshly fallen leaves, 1.85 for the decomp. or "duff" layers and 1.80 for structureless humus in forest soils. A. G. POLLARD.

Electrokinetic determination of colloids [in soils]. A. REIFENBERG (Z. Pflanz. Düng., 1931, 21A, 138—160).—A modification of Michaelis' cataphoresis apparatus is utilised to determine the colloidal content of soil suspensions. Results agree closely with those of sedimentation methods. The method is rapid and the disturbing influence of perikinetic coagulation is avoided. Applications of the method for determining adsorbed cations of the soil colloids, the fineness of division of ground rock phosphate, etc. are discussed. A. G. POLLARD.

Lime studies. Relationships between various methods for determining the lime and acid condition of soils and a method for determining the base required to neutralise exchange acidity. S. GOY [with P. MÜLLER and O. ROOS] (Z. Pflanz. Düng., 1931, 21A, 160—187; cf. B., 1931, 556).—The rapid electrometric titration of acid soils (1 min. intervals) requires a smaller proportion of base than for the electrometric neutralisation after 24 hr. The difference is ascribed to the presence of bases not easily adsorbed by the soil. Only insignificant amounts of base are adsorbed after 24 hr. Rapid titration of soils to p_H 5.5 (except in the case of very highly buffered soils) indicates approx. the same amount of acid as the exchange acidity recorded by Daikuhara's method. A method for determining the base required to neutralise exchange acidity is described. A. G. POLLARD.

Fixation of phosphoric acid [in soils] by titanium dioxide. E. UNGERER (Z. Pflanz. Düng., 1931, 21A, 129—138).—Artificial and naturally occurring TiO_2 adsorbed H_3PO_4 from alkali phosphate solutions. Such adsorbed PO_4 was practically insol. in H_2O and dil. acids and was not assimilable by seedlings. It is suggested that a portion of the soil phosphate may be rendered unavailable by this means. The presence of TiO_2 in soil may introduce error into determinations of total P through the occlusion of P by titanate acid

formed during the evaporation of the acid extract of soil and again in the subsequent dissolution of the phosphomolybdate prior to precipitation with magnesia mixture. A. G. POLLARD.

Transformations of phosphoric acid in soil and its determination. W. SAUERLANDT (Z. Pflanz. Düng., 1931, 21A, 187—210).—The effects of fertilisers of CaO , S, and rock phosphate on the available P content of soils are examined by Neubauer tests and by chemical extraction methods. A modification of Wrangell's formula for determining the total P content of soils from that of successive soil extracts is suggested. Results of Nemeč's extraction method for determining soil P are dependent on the total surface area of the soil particles as measured by means of the heat of wetting. A. G. POLLARD.

Colorimetric determination of the citric-soluble phosphoric acid of soils. W. LESCH (Z. Pflanz. Düng., 1931, 21A, 222—231).—The phosphate in citric acid extracts of soils may be determined by the colorimetric phosphomolybdate method provided the disturbing effects of citric acid and SiO_2 are avoided. Oxidation of citric acid by $KMnO_4$ is satisfactory and the effect of SiO_2 is obviated by the use of $SnCl_2$ as the reducing agent. A. G. POLLARD.

Comparison of the colorimetric determination of the citric-soluble phosphoric acid in soil by the permanganate method and that of Arrhenius. A. NĚMEČ [with J. LANIK and A. KOPPOVA] (Z. Pflanz. Düng., 1931, 21A, 231—233).—For soils of low P content results of Arrhenius' method (B., 1929, 31) do not agree with those of the author's (B., 1930, 207). By the latter method, differences between the values obtained by use of 5 c.c. of extract (= 0.5 g. of soil) and 10 c.c. of extract (= 1.0 g. of soil) are much smaller than by Arrhenius' method. A. G. POLLARD.

Mobility of phosphoric acid [in soils]. M. ESCHENHAGEN (Z. Pflanz. Düng., 1931, 10B, 313—332).—Significant variations in the solubility of soil phosphate during a 6 months' period could not be detected by either of the several methods employed. Discrepancies between laboratory determinations of assimilable PO_4 and the results of field trials cannot be explained on this basis. The true value of laboratory tests of PO_4 availability and the significance of "limiting values" are probably much less than those usually attached to them. A. G. POLLARD.

Exchangeable cations of the soil and the plant. I. Relation of plant to certain cations fully saturating the soil exchange capacity. K. K. GEDROIZ (Soil Sci., 1931, 32, 51—63).—Growth of oats was compared in a chernozem soil after saturation with various bases. Saturation with Ca produced the same yield as the natural soil. Soil saturated with Sr produced nearly as great a yield and, moreover, needed no fertilisation with Ca. Plants did not grow at all in soils saturated with H, NH_4 , Na, K, Mg, Cd, Ba, Mn, Fe^{2+} , Fe^{3+} , Co, Ni, Cu, or Al, whether unfertilised or receiving N and P. Addition of $CaCO_3$ with N and P to the H-saturated soil produced a crop equal to that from the original soil. Smaller crops were similarly obtained from samples saturated with Mg, Mn, Fe^{2+} , Fe^{3+} , and Al, but soil

saturated with any of the remaining bases was unproductive. Plants can utilise the unexchangeable Mg and K but not the Ca in soils. Removal of the exchangeable Mg and K still permitted the growth of a normal crop, but no growth whatever occurred in soils devoid of exchangeable Ca.

A. G. POLLARD.

Method for the study of *Azotobacter* and its application to fertility plot soils. I. H. CURIE (Soil Sci., 1931, 32, 9—25).—*Azotobacter* were more numerous in limed soils than in those receiving CaO and fertilisers. NaNO_3 promoted the growth of *Azotobacter* to a greater extent than did superphosphate or KCl. Manure reduced the *Azotobacter* population. The organism was not found in soils more acid than p_{H} 6.0. A new agar plate method for enumerating *Azotobacter* colonies is described.

A. G. POLLARD.

Causes of the beneficial effect of brown coal on the growth of crops. III. A. KISSEL (Brennstoff-Chem., 1931, 12, 245—251; cf. B., 1931, 507).—Field experiments with humin preps. from brown coal show these to be efficient fertilisers. The theory of their effect is discussed in detail. It is attributed not only to the improved physical nature of the soil but to a stimulation of the physiological processes in the plant, in particular the CO_2 assimilation, by certain of the org. constituents of the humin prep. The use of such preps. as fertilisers constitutes a more efficient method of utilising the energy of low-value carbonaceous materials than either applying the materials themselves directly as fertilisers, or by burning them by any of the technical processes at present available.

A. B. MANNING.

Effect of summer green manures on the ammonia and nitrate content of soils cropped for winter wheat; examination of the Woburn green manure plots. T. J. MIRCHANDANI (J. Agric. Sci., 1931, 21, 458—468).—Poor crops of wheat following green manuring with tares and with mustard are ascribed to the heavy leaching of nitrate and a consequent deficiency at the crit. growth period. During the winter months $\text{NH}_3\text{-N}$ exceeded the $\text{NO}_3\text{-N}$ in the soil.

A. G. POLLARD.

Winter leaching and the manurial value of green manures and crop residues for winter wheat. E. M. CROWTHER and T. J. MIRCHANDANI (J. Agric. Sci., 1931, 21, 493—525).—The nitrification in soil of org. matter with C:N ratio 13:1 was more rapid than that with C:N = 26:1. In corresponding pot cultures wheat yields were higher in untreated soil and in soil receiving the 13:1 than the 26:1 material. After systematic winter leaching equal yields resulted from the use of the two materials. Crop reduction due to leaching was closely correlated with but not proportional to the amount of NO_3^- leached. Early nitrification reduces crop yields not only through the leaching of nitrate but by increasing the amount of N converted by micro-organisms into relatively unavailable forms. The failure of wheat after summer crops of tares and of mustard (cf. preceding abstract) is explained on the above basis. The C:N ratio of tares permits rapid nitrification, and early leaching losses are heavy. Mustard reduces the winter loss, but the N compounds present and those produced during the microbiological

decomp. of the excess C compounds become available too slowly for their adequate utilisation by the crop.

A. G. POLLARD.

Action of frost on various arable soils and the resulting effects on the growth of oats and barley. E. GÜNTHER (Landw. Jahrb., 1931, 73, 893—922).—Freezing increased the pore space, hygroscopicity, and H_2O capacity of acid soils but was without effect on soils containing chalk. The extent of the frost action was largely controlled by the H_2O content of the soil when frozen. Although the adsorptive power of soils for acid was increased by freezing, there was no change in reaction. Freezing did not increase the solubility of plant nutrients, but in acid soils the resulting improvement in physical condition permitted an increased intake of K and P by plants.

A. G. POLLARD.

Value of lucerne. F. MÜNTER (Z. Pflanz. Düng., 1931, 10B, 332—344).—Field trials are recorded establishing the value of lucerne as a fodder crop and as a soil improver for subsequent crops.

A. G. POLLARD.

Nutritional physiology of buckwheat. UMBERG (Z. Pflanz. Düng., 1931, 10B, 344—347).—In field trials with buckwheat, K fertilisers increased the hectolitre wt. of the grain and reduced frost injury. The efficiencies of the fertilisers used were in the order $\text{K}_2\text{SO}_4 > 40\%$ potash salts $>$ kainite.

A. G. POLLARD.

Availability of phosphoric acid in ammoniated superphosphates. K. KITSUTA and R. M. SALTER (Ind. Eng. Chem. [Anal.], 1931, 3, 331—333).—Max. solubility of H_3PO_4 was obtained from the H_2O -insol. residues of the ammoniated superphosphates when 0.1 g. of the sample was used in 100 c.c. of citrate solution for 30 min. at 65°. Similar results were obtained using a 2-g. sample in 100 c.c. of citrate solution containing 4 g. of $(\text{NH}_4)_2\text{C}_2\text{O}_4$ and digesting for 2—4 hr. The time of digestion may be shortened to 30 min. by addition of larger quantities of $(\text{NH}_4)_2\text{C}_2\text{O}_4$ in the case of highly ammoniated superphosphates, but not when the content of NH_3 is less than 2.5%. There was no noticeable decrease in the availability of the P_2O_5 of ammoniated superphosphates to buckwheat and barley when the material contained as much as 6.2% NH_3 .

E. S. HEDGES.

Chemical treatments to shorten the rest period of tree seeds. C. G. DEUBER (Science, 1931, 73, 320—321).—Dormant seeds of sugar maple, Norway maple, and acorns of black oak and red oak can be stimulated into germination by treatments with solutions of thiocarbamide and ethylene chlorohydrin and the vapour of the latter.

L. S. THEOBALD.

Effect of ammonium sulphate on the field germination of rape and turnips. J. W. WOODCOCK (N. Zealand J. Agric., 1931, 42, 89—90).—Sown with the seed of rape and turnips $(\text{NH}_4)_2\text{SO}_4$ caused a heavy reduction in germination. The effect was similar when superphosphate, with or without lime, was applied simultaneously.

A. G. POLLARD.

Yield in cereals. Victoria. I. H. C. FORSTER and A. J. VASEY (J. Agric. Sci., 1931, 21, 391—409).—Factors affecting grain yields in Australia are examined. Superphosphate increased the number of plants per unit

area, number of ears per plant, and the size of the heads. Top-dressing with N produced a type of growth of lowered drought-resistance.
A. G. POLLARD.

Influence of sulphur compounds in breaking the dormancy of potato tubers. L. P. MILLER (Contr. Boyce Thompson Inst., 1931, 3, 309—312).—Among S compounds stimulating the sprouting of potatoes were thiosemicarbazide, thioglycolic acid, AcSH, H₂S, Me disulphide, EtSH, thioglycol, and various derivatives of dithiocarbamic acid. The NH₄-salt of the last-named was particularly effective.
A. G. POLLARD.

Fumigation of seed maize. W. H. DARRAGH (Agric. Gaz. N.S. Wales, 1931, 42, 377—378).—Fumigation of maize of high moisture content with CS₂ leads to lowered germinative vitality if the treatment is prolonged at summer temp. A safe dosage should not exceed 5 lb. of CS₂ per 1000 cu. ft., for not more than 48 hr. Thorough aeration should follow immediately.
A. G. POLLARD.

Wheat.—See XIX. **Tobacco.**—See XX.

See also A., Aug., 930, **Soils of bed of Lake Albert, S. Australia.** 986, Nitrite formation by soil bacteria. 990, Effects of X-rays on growth of wheat seedlings.

PATENTS.

Manufacture of an ammonium potassium phosphatic fertiliser and of a utilisable slag. E. URBAIN (B.P. 351,749, 4.7.30. Fr., 29.8.29).—A mixture of crude Ca₃(PO₄)₂ rock containing Si, Al, and K (1 mol. K₂O per 2 mols. P₂O₅), coal, and sufficient CaO to give a slag suitable for use as cement, is agglomerated by heating in steam at 180° in an autoclave and then heated in an electric or shaft furnace. The gases evolved are treated with atomised liquor containing the sol. constituents maintained at *d* 1.5 by the addition of H₂O, and the excess liquor is treated with crude Ca₃(PO₄)₂, (NH₄)₂SO₄, and NH₃ to yield on drying at 100° a fertiliser containing 30—34% P₂O₅, 8—11% K₂O, and 10—11% N.
L. A. COLES.

Production [ageing] of mixed fertilisers. A. C. FINCH, K. W. YOUNG, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 351,609, 8.4.30).—Mechanical mixtures comprising, e.g., (NH₄)₂SO₄, NH₄H₂PO₄ and/or (NH₄)₂HPO₄, and K₂SO₄ are rendered non-caking by spraying with water or an aq. solution of one of the salts with agitation and heating.
L. A. COLES.

Production of fertilisers. R. GOLDBERG and K. O. SCHMITT, ASSTS. to I. G. FARBENIND. A.-G. (U.S.P. 1,788,828, 13.1.31. Appl., 28.2.28. Ger., 16.12.26).—Crude Ca₃(PO₄)₂ is treated with a wt. of HNO₃ at least 10% in excess of that required for decomp., the product is treated with K₂SO₄ and (NH₄)₂SO₄, gypsum is removed, and the liquor is neutralised with NH₃ conc., and dried by spraying.
L. A. COLES.

Manufacture of products for use as manures and weed killers. CHINOIN GYÓGYSZER ÉS VEGYÉSZETI TERMÉKEK GYÁRA R.T. (KERESZTY & WOLF) (B.P. 351,515, 20.3.30. Hung., 21.3.29).—Bauxite etc. is treated cold with conc. H₂SO₄ and a H₂O-binding agent, e.g., calcined CaSO₄, or with oleum, in proportions such as

to yield a dry, easily strewn product; S or its ores, fertilisers, Ca ores, etc. may also be added.

L. A. COLES.

Insecticides and fungicides. I. G. MCBETH and J. R. ALLISON, ASSTS. to LEFFINGWELL RANCHO CO. (U.S.P. 1,787,585—6, 6.1.31. Appl., [A] 25.2.27, [B] 20.8.27).—(A) An insecticide with an oil and water emulsion basis contains as stabilising and spreading material a protein, e.g., dried blood dissolved in dil. NH₃. (B) An emulsion of slow-drying oil containing a toxic compound sol. in the oil in preference to H₂O is intimately mixed with an emulsion of a penetrating oil, or the latter emulsion containing an alkaloid combined with a fatty acid and saturated with HCN is mixed with an emulsion of a slow-drying oil.
W. G. CAREY.

Insecticides. STANDARD OIL DEVELOPMENT CO., ASSCES. of N. A. SANKOWSKY (B.P. 352,062, 2.4.30. U.S., 29.4.29).—The use is claimed of H₂O-white petroleum naphtha, b.p. about 205—283°, containing the extracts from $\frac{1}{2}$ —3 lb. of dry pyrethrum flowers per gal.

L. A. COLES.

Germicides, fungicides, etc. for soil sterilisation. M. S. KHARASCH, ASS. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,787,581, 6.1.31. Appl., 10.11.26).—A fertiliser is mixed with a small quantity of a mercuri-org. compound, e.g., a mercurised phenol or chlorophenol.
W. G. CAREY.

XVII.—SUGARS; STARCHES; GUMS.

Photomicrographic studies of sucrose crystals. S. WOODRUFF and H. VAN GILDER (J. Physical Chem., 1931, 35, 1355—1367).—Photomicrographs of sucrose crystals in fondants containing dextrose, lævulose, and different amounts of invert sugar are recorded. Dextrose, lævulose, and invert sugar regulate the size of crystals equally well. No relation could be found between *p*_H of the syrup and amount of inversion using different acids. Syrups containing more than 43.43% of invert sugar do not crystallise and those containing 16.3—23.55% give a semi-fluid cryst. mass. A difference of 6—10 μ represents that between a smooth and a gritty texture as judged by the sense of touch in the mouth.
L. S. THEOBALD.

Value of the diastase test for honey in artificial honey. J. PRESCHER and E. BOHM (Z. Unters. Lebensm., 1931, 61, 500—508).—Auzinger's test (B., 1910, 291) gives reliable results for artificial honey containing >10% of bee honey, but is doubtful for <10% or if the latter has been heated, when pollen analysis should be used. The test, which was carried out at 40° for 1 hr., was used for starch solutions of various concentrations with various sugar-honey mixtures. The results show that 5 c.c. of 20% pure honey will readily hydrolyse 1 c.c. of a 3—5% starch solution, but that addition of other substances, particularly sugars, inhibits enzyme action; e.g., in the presence of 90% of maltose and lævulose respectively, the hydrolysis is nil and 60% of that for pure honey. Allowance should be made for the extreme variations in enzyme activity shown by different honeys and for the colours developed by certain sugars on addition of I. The starch substrate should

be prepared by adding a suspension of 2.5 g. of sol. starch in 15 c.c. of cold H_2O to 50 c.c. of boiling H_2O .

J. GRANT.

Determination of the fat content of marzipan and persipan products. K. BRAUNSDORF (Z. Unters. Lebensm., 1931, 61, 494—500).—The fresh undried sample (10 g.) is ground and heated with 100 c.c. of H_2O , and 10 c.c. of Fehling's $CuSO_4$ are then added followed by 10 c.c. of 0.25N-NaOH. The ppt. is washed with hot water, dried with the paper for 8 hr. at 100—110°, ground with 20 g. of sand, and extracted for 24 hr. (Soxhlet) with Et_2O , the residue after evaporation being dried for 1 hr. at 100—110° and weighed. Equally good results are given by C_2HCl_3 , which, however, is more troublesome to use, whilst direct extraction, after grinding with sand, with Et_2O (B., 1925, 822) and especially with light petroleum may give results 3—5% low.

J. GRANT.

Calculation of sucrose and dextrose contents of marzipan and persipan preparations from the polarisation before and after inversion. J. GROSSFELD and M. SCHNETKA (Z. Unters. Lebensm., 1931, 61, 485—490).—Fincke's method (*ibid.*, 1926, 52, 423) is modified, a 10% solution of the sample being cleared with $K_4Fe(CN)_6$ and $Zn(OAc)_2$, and 50 c.c. heated with 5 c.c. of 25% HCl at 67—70° for 5 min., cooled, and made up to 100 c.c. without neutralisation, $[\alpha]$ being read before and after inversion in a 400-mm. tube. Clerget's formula is then used to calculate sucrose contents of about 80%, and a table of factors is given for other amounts (5.66 for 100% and 5.69 for 10%). Correction factors for the vol. of insol. matter are also tabulated. In certain cases (*e.g.*, in presence of invert sugars) it is preferable to determine the levulose content by Krushner's method (B., 1929, 533) and thence the original sucrose, using the factor 1.90.

J. GRANT.

See also A., Aug., 939, **Microchemical determination of dextrose in sugar solutions.** 941, P and N in potato- and wheat-starch. 973, **Determination of sugar and non-fermenting Cu-reducing substances.**

PATENTS.

Gluing wood.—See IX. Adhesive.—See XV.

XVIII.—FERMENTATION INDUSTRIES.

Determination of alcohol in alcoholic beverages. E. DE'CONNO and D. FUSCO (Annali Chim. Appl., 1931, 21, 288—295).—The sample (5—20 c.c. according to strength) is diluted with 30 c.c. of H_2O and distilled, 30 c.c. of the distillate being diluted to 100 c.c. 5 c.c. of this solution (containing less than 16 vol.-% EtOH) are added to a mixture of 20 c.c. of $K_2Cr_2O_7$ solution (33.382 g. per litre) and 10 c.c. of H_2SO_4 (*d* 1.84). After being kept in a stoppered vessel for 5 min. the excess of $K_2Cr_2O_7$ is titrated with $Fe(NH_4)_2(SO_4)_2 \cdot 6H_2O$ (135.31 g. per litre), using 0.1% aq. $K_3Fe(CN)_6$ as indicator; 1 c.c. $K_2Cr_2O_7$ solution = 7.943 mg. EtOH.

O. F. LUBATTI.

Influence of bottle glass on the quality of wines. R. MUMMENDEY (Z. Unters. Lebensm., 1931, 61, 514—519).—Bottle glasses are classified according to their respective contents of SiO_2 , $(Al_2O_3 + Fe_2O_3)$, $(MnO +$

$CaO + MgO)$, and $(K_2O + Na_2O)$: (1) French champagne (oldest) type, 60.4, 7.4, 26, 6.2; (2) German mouth-blown, 62.6, 10, 19, 8.5; (3) German Owens glass, 64.0, 8.8, 15.5, 11.7; (4) Anglo-American feeder glass, 70.5, 2.1, 9.8, 17.6; (5) American carbon yellow glass, 73, 1, 9, 17.2%. The solubility of the glasses in water increases with the alkali-metal content, and is due mainly to Na_2O , which, however, is present in quantities too small to neutralise the acidity of the wine to an appreciable extent. A poor and a good-quality wine were stored in bottles of various colours, shapes, and compositions for 6 months, but the max. differences in pH value between the contents of any pair of the bottles were then only 0.013 and 0.05, respectively. No marked differences in taste were detectable in these experiments or after addition of 24 mg. of Na_2CO_3 per litre of wine.

J. GRANT.

Qualitative evaluation of spirits, particularly rum, arrack, and kirsch. H. WÜSTENFELD and C. LUCKOW (Z. Unters. Lebensm., 1931, 61, 465—479).—Spirits may be assessed qualitatively by determination of the max. dilution at which the characteristic flavour is still detectable. These values are tabulated for 83 samples of rum, and are correlated with EtOH content (43.4—80.8 vol.-%; 71—81, mean 77, vol.-% for Jamaica rum), and ester val. (11—3081 g. of AcOEt per 100 litres of pure EtOH present). The best types contained about 75% of EtOH and had ester val. 600—700. Arrack (23 samples): 58—60 vol.-% of EtOH and ester val. 228—471. Kirsch (23): EtOH 31.0—54.5%, acid val. (as AcOH) 12—308, ester val. 56—684, and fusel oil 65—572 (all as mg./100 c.c. of pure EtOH). An approx. correlation exists between the ester and fusel oil contents. A special rectification apparatus is described.

J. GRANT.

See also A., Aug., 975, **Sol. enzymes in the spleen.** 984, **Zookinase.** 985, **Co-zymase.** **Decomposition of malic acid by Saccharomyces in wines.** 986, **N fixation and NH_3 production by Azotobacter.** **Nitrite formation by soil bacteria other than Nitrosomonas.**

XIX.—FOODS.

Influence of manurial treatment on the baking quality of English wheat. I. Quality of Rothamsted Broadbalk wheats. E. A. FISHER and C. R. JONES (J. Agric. Sci., 1931, 21, 574—594).—A consistent increase in N content of wheat was produced only by heavy dressings of N fertilisers. Improved baking quality was not a necessary outcome of an increased protein content. Poor quality of flour was not due to unsoundness of grain or to poor gas production during fermentation. Neither baking quality nor storage properties of wheat could be correlated with manurial treatment.

A. G. POLLARD.

Lævulosans in cereals. [Detection of rye flour.] A. GIOVANARDI (Annali Chim. Appl., 1931, 21, 296—302).—The presence of 0.4 to 0.8% of a lævulosan in rye flour is confirmed. This carbohydrate has properties similar to those of secalose (β -lævulin; B., 1895, 377) and trifructose (B., 1929, 70). Traces of this lævulosan were found in wheat but could not be isolated from barley and oats. On this property is based a test for the detection of rye flour

in mixtures. 10 g. of flour are shaken for 15 min. with 40 c.c. of 70% EtOH; after cooling for 5 min. at -3° the mixture is centrifuged and 10 c.c. of supernatant liquid are treated with 0.5 c.c. of *N*-NaOH in 70% EtOH. A product containing more than 10% of rye flour will show a strong turbidity followed by formation of a ppt. The test is applicable to bread after drying for 3 days in the air at room temp. O. F. LUBATTI.

Normal variation in the f.p. of milk and in the "simplified molecular constant." J. STRAUB (Chem. Weekblad, 1931, 28, 427—430).—The normal f.p. is for America $0.54(7)^{\circ}$ or $0.54(3)^{\circ}$; Germany $0.54(2)^{\circ}$; Holland 0.54° ; Dutch E. Indies $0.53(2)^{\circ}$ with a total normal variation (min. to max.) of 0.010° . Occasional abnormal variations are noted and discussed. The low f.p. for Dutch E. Indies confirms Donath's results. S. I. LEVY.

Analysis of butter. A. VERCILLO (Annali Chim. Appl., 1931, 21, 229—238).—For 10 genuine Italian butters, determinations have been made of the Reichert-Meissl and Polenske vals., the insol. Ag value (cf. B., 1928, 208), Savini's acetic index (Ann. Ist. Sperim. Caseif. Lodi, 1, 199), Kuhlmann and Grossfeld's butyric acid val. (B., 1926, 447), and the *A* and *B* vals. of Bertram *et al.* (B., 1926, 140). All these vals. give useful information on the composition of butter, but vary over such wide ranges that none of them allows a definite judgment to be made in the majority of doubtful cases. T. H. POPE.

Fat and phosphatide contents of cacao beans. B. REWALD and H. CHRISTLIEB (Chem.-Ztg., 1931, 55, 393—394).—The average water and fat contents of cacao beans are 5.2% and 53.4% respectively. The fat content is normally never below 50%, irrespective of the origin of the beans. The phosphatide content varies from 0.02 to 0.27% (av. 0.1%). In determining the phosphatide content the ground beans are exhaustively extracted with a 4:1 mixture of C_6H_6 and EtOH; the solvent is distilled off, the fat and phosphatide are taken up with Et_2O , and after removal of the latter are filtered. The P content of the fat is determined and the phosphatide content is calc. on the assumption that lecithin contains 3.94% P. Analytical data for beans of various origins are given. W. J. BOYD.

Natural phosphatide content of cacao beans and its change during manufacture. B. REWALD and H. CHRISTLIEB (Z. Unters. Lebensm., 1931, 61, 520—523; cf. preceding abstract).—The phosphatide content of cacao beans is not affected by roasting and/or treatment with alkali. Phosphatide occurs only in small amounts in cacao butter separated by pressure and, as in other foods (cf. A., 1930, 261, 642), appears to be closely related to the protein constituents. J. GRANT.

Determination of caffeine in coffee infusions and coffee extract. (MME.) S. GOBERT (Ann. Falsif., 1931, 24, 288—290).—The sample is treated with a little NH_3 after dilution with water and the mixture extracted with $CHCl_3$ in the automatic apparatus of Jalade, for 5 hr. in the case of infusions and 10 hr. for extracts. The caffeine so extracted is purified with $KMnO_4$ and weighed after re-extraction with $CHCl_3$. E. B. HUGHES.

Evaluation of coffee [labelled] "non-injurious to health." H. SCHLOSSMANN (Z. Unters. Lebensm., 1931, 61, 509—511).—A prep. sold for addition to coffee consisted of packets containing 4.5 g. of ground active charcoal, which removed 31—32% of the total caffeine and 4—6.5% of other N compounds from 20 g. of ground coffee in 400 c.c. of hot H_2O . Merck's carbo medicinalis removed 97.5 and 43.5%, respectively, but impaired the flavour and inhibited filtration; kieselguhr was also unsuitable (cf. Rinck and Kaempfer, B., 1930, 790). J. GRANT.

Test for predetermining the culinary quality of potatoes as affected by the accumulation of soluble sugars. W. M. PEACOCK and B. C. BRUNSTETTER (U.S. Dept. Agric. Circ., 1931, No. 158, 4 pp.).—Potatoes for "chips" should have a min. sol. sugar content. The picric acid test (heat 1 c.c. of saturated picric acid solution + 1 c.c. of 20% aq. Na_2CO_3 + $1 \times \frac{1}{8}$ -in. potato core for 1 min. and allow to cool) should give a light yellow colour only. A. G. POLLARD.

Bleaching almonds. A. A. RAMSAY and G. W. NORRIS (Agric. Gaz. N.S. Wales, 1931, 42, 153—154).—Lightly weather-stained almonds are bleached by immersion in 1% aq. H_2SO_3 for 2—5 min. and spread out to dry. For black-stained nuts this process should be preceded or followed by dipping in aq. bleaching powder (1 oz. per gal.) acidified with AcOH for 20 min. with an intervening drying period of 12—24 hr. A. G. POLLARD.

Possible effect of sulphur dioxide when used as a preservative for dried fruits etc. C. E. SAGE (Analyst, 1931, 56, 451—452).—"Sulphured" fruit and "sulphited" pulps when moistened or diluted with syrup develop an objectionable amount of H_2S if fermented by yeast. In the prep. of soft drinks etc. sterilisation is essential. T. McLACHLAN.

Pectin from *Citrus limetta*, Risso. A. ROMEO (Annali Chim. Appl., 1931, 21, 268—287).—This fruit, rich in linalyl acetate (26—30% of epicarp) and containing 8.5% of sugar, may be utilised for the extraction of pectin. The rind treated by G. Romeo's method yielded 3% of pectin. Analytical data show that the protopectin of *Citrus limetta* is hydrolysed to an araban identical with Ehrlich's tetra-araban and a sol. pectin (Ca and Mg pectate) the mol. of which contains 3 OMe groups and has $[\alpha]_D^{25} +177.77^{\circ}$, jelly grade 150. O. F. LUBATTI.

Chemical changes in fish flesh and [brine] pickle produced by different pickling processes. W. UGLOW and O. DONETZKY (Z. Unters. Lebensm., 1931, 61, 479—485).—Fish dry-salted and stored for 7 months increased in dry solids 18.8, ash 12.2, NaCl 10.1, protein 2.3, and fat 4.3%. The pH val. of an extract of salted fish is normally 6.6—7.2, but may be higher for non-eviscerated samples, in which cases the NH_4 salts are also increased. HNO_3 and H_2SO_4 were not detectable in the extract. The ratio NH_3 : total N of the fish varies according to the conditions, e.g., 1:640 for fresh fish, 1:232 after evisceration, storage 3 days on ice, and pickling in fresh brine, 1:118 for fresh fish and 1:108 for foul fish in used brine, and 1:40 for unsalted fish kept for 3 days at room temp.

The ratios found for the pickle itself were 1:15 with salted, frozen eviscerated fish, 1:9, 1:5, and 1:3.6, respectively, if drawing, freezing, and both were omitted from the process, and 1:5.5 for foul eviscerated fish.

J. GRANT.

Injury of foodstuffs by "menstrual poison." T. SÜTTERLIN and B. SZELINSKI (Z. Unters. Lebensm., 1931, 61, 511—514).—Evidence from medical literature indicates that excessive sweat from the hands of menstruating women may contain substances such as choline (from lecithin), β -hydroxybutyric acid, and "menotoxin" (cf. Böhrer, A., 1928, 912) which inhibit fermentation by yeast. Spoilage of handled food in this way is, however, improbable.

J. GRANT.

Digestibility and utilisation of hay and straw in the feeding of working horses. K. HÖTZEL (Landw. Jahrb., 1931, 73, 937—998; cf. B., 1931, 741).—Chopped rye straw is used to replace an equal wt. of hay in rations for working horses. Experimental results indicate that the standards of Kellner and of Nils-Hansson for the starch val. and digestible protein in straw rations should be lowered.

A. G. POLLARD.

Cacao butter.—See XII. **Honey. Marzipan.**—See XVII. **Waste-water fungi.**—See XXIII.

See also A., Aug., 926, **Determination of Na + K in milk etc.** 975, **Egg-yolk lecithin.** 978, **Mn in foodstuffs.** 988—9, **Vitamins, various.** **Vitamins in liver- and butter-fat, and in cereals.**

PATENTS.

Extraction of albumin and sugar from milk whey. (MISS) E. M. MEYER (U.S.P. 1,787,754, 6.1.31. Appl., 16.4.29).—Whey is treated with up to 4% of slaked lime and then water, up to 100%, added slowly with gentle stirring. After keeping, the upper layer containing albumin and some sugar is removed. Addition of 1—2% KNO_3 prior to the CaO may be advantageous.

E. B. HUGHES.

Treating or packaging ripe or green olives. A. B. STEWART (B.P. 351,813, 27.8.30).—On the top of the brine in which olives are preserved is placed a layer of edible oil. Flavouring materials such as garlic may also be added to the brine.

E. B. HUGHES.

Concentrated fruit juice. P. GARRETT (U.S.P. 1,790,140, 27.1.31. Appl., 14.2.27).—Fruit juices are conc. in vac. at low temp. (38°) to such concentration as will prevent fermentation. Normal bacteria are inhibited, but become active on dilution of the concentrate so that natural fermented beverages can be thus prepared. Apparatus is claimed.

E. B. HUGHES.

Meat treating method and product. SWIFT & Co. (B.P. 351,700, 28.5.30. U.S., 6.6.29).—Fresh meat is cooled to a uniform temp. of -8° to -2° and cured meat to -10° to -7° .

E. B. HUGHES.

Decolorising and deflavouring colloidal solutions. W. A. BENDER, R. DOUGLAS, and L. H. CUTHBERT, Asss. to GEN. FOODS CORP. (U.S.P. 1,787,467, 6.1.31. Appl., 19.8.25).—Colloidal solutions, e.g., pectin, gelatin, may be clarified by passing through layers composed of powdered charcoal mixed with fibrous

material such as sulphited paper pulp, giving rapid percolation and min. C turbidity of the filtrate.

E. B. HUGHES.

Process of and apparatus for the production of a chocolate mass ready for rolling. HERMANN BAUERMEISTER MASCHINENFABR. & MÜHLENBAUANSTALT G.M.B.H. (B.P. 352,852, 22.10.30. Ger., 22.10.29).

Rendering process.—See XII.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Assay of the cinchona galenicals. P. A. W. SELF and C. E. CORFIELD (Pharm. J., 1931, 127, 74).—2 g. of *Extractum cinchonæ* are washed into a separator with 10 c.c. of a mixture of equal vols. of EtOH and H_2O , 1 c.c. of $N\text{-HCl}$ and 20 c.c. of CHCl_3 are added, and after shaking the CHCl_3 layer is run into a second separator and washed with 5 c.c. of $N\text{-H}_2\text{SO}_4$. The first extraction is repeated, using two further quantities of CHCl_3 , and washing the CHCl_3 layers with the same acid liquid as before. To each separator 2.5 c.c. of NaOH solution are added and the contents of the first are extracted with successive portions of 20 c.c. of CHCl_3 , transferring the extracts in turn to the second separator until the alkaloids are completely removed. The mixed extracts are washed with H_2O , the CHCl_3 is distilled off, 5 c.c. of EtOH are added, and the evaporated product is dried at 100° and weighed. The method, which is but slightly varied for other cinchona preps., is claimed to overcome emulsification difficulties.

E. HOPKINS.

Determination of morphine. II. L. DÁVID (Pharm. Ztg., 1931, 76, 748—749; cf. A., 1931, 972).—The method is applied to the determination of morphine in Domopon (opium concentratum), Capita Papaveris, and Syrupus Diacodii.

E. H. SHARPLES.

Determination of strychnine in Easton's syrup. L. A. HADDOCK and N. EVERS (Pharm. J., 1931, 127, 72).—Detailed procedure for extracting the HCl solutions of the alkaloids with CHCl_3 and separating the strychnine is given.

E. HOPKINS.

Biological and spectroscopic tests on ergot alkaloids: Maurice Smith colour test. F. WOKES and H. CROCKER (Pharm. J., 1931, 127, 83—84).—Ergotoxine, ergotamine, ergotinine, and ergotamine all show in aq. or alcoholic solutions as dil. as 0.001% a characteristic absorption band with max. at 316 $\text{m}\mu$, whilst ergotinine and ergotamine also give a smaller band with max. at 242 $\text{m}\mu$, although this cannot be used for their quant. differentiation. The blue colour given by all four alkaloids with Maurice Smith's reagent has a max. at 580 $\text{m}\mu$ and a smaller band at 401 $\text{m}\mu$, but the colour intensity as determined by tintometer and spectrophotometer is not a satisfactory measure of the physiological activity, values for ergotinine and ergotamine being much higher than their relative activity. Parallel tests by spectroscope and biological methods on fresh and deteriorated ergot preparations do not give concordant results.

E. HOPKINS.

Variations in potency and total solids of tinctures of digitalis. F. WOKES (Pharm. J., 1931, 127, 82—83).—No definite relation exists between the potency and total solids of the tinctures examined, even in those

prepared from the same batch of leaf. The total solids of 100 commercial tinctures vary from 1.8 to 5.98% wt./vol., whilst 40 tinctures prepared in the laboratory from 11 different samples of leaf show a small variation, 2.56 to 4.16%, with, however, the same average, 3.24%. Total solids of tinctures from the same batch of leaf may show differences of 20% from one another and 11% from the average. The potencies of the 100 commercial tinctures ranged from 49 to 100% of that of the standard tincture. 24 samples of leaf had potencies of from 63 to 156% of that of the international standard digitalis powder, with nearly the same average potency, 114%, as for the tinctures, 113%. Tinctures from the same batch of leaf varied in potency as much as 34% from the average. E. HOPKINS.

Quantitative methylation of theobromine and theophylline, and determination of these substances in theobromine sodium salicylate and theophylline sodium acetate. P. A. W. SELF and W. R. RANKIN (Pharm. J., 1931, 127, 75—76).—Compounds or mixtures containing theobromine or theophylline are methylated with Me_2SO_4 and NaOH. A CHCl_3 extract gives anhyd. caffeine on evaporation and drying at 100° , in yield of 99.5% from theobromine and 98% from theophylline. E. HOPKINS.

Theophylline sodium acetate of commerce. G. J. W. FERREY (Pharm. J., 1931, 127, 74—75).—Of 12 samples examined, 3 consisted of theobromine-NaOAc, whilst most of 8 others were deficient in theophylline, mainly due to excess of H_2O . A standard of not less than 60% of anhyd. theophylline and not more than 5% H_2O is suggested. E. HOPKINS.

Assay of the official balsams. T. T. COCKING (Pharm. J., 1931, 127, 73—74).—The balsamic acids are present as esters of aromatic and resinoid alcohols, and in the free state. Extraction with boiling H_2O is incomplete, but boiling with H_2O and MgO in the presence of xylene is satisfactory. The total acids from the saponified balsams are converted into Mg salts, and the balsamic acid salts separated from those of the resin acids by filtration. An Et_2O solution is then extracted with aq. NaHCO_3 to remove aromatic alcohols, and the balsamic acids are finally extracted from an acidified solution with Et_2O , dried in vac. over H_2SO_4 , and weighed. The method is adaptable to the determination of the free balsamic acids of benzoin and balsam of tolu. E. HOPKINS.

Resin of *Ipomœa*: Mexican scammony root: its solubility in ether and the acid value as a test for rosin. C. E. CORFIELD and W. R. RANKIN (Pharm. J., 1931, 127, 76).—Differences in the results of previous workers were caused by variations in the vol. and sp. gr. of the Et_2O used in extraction. 1 g. of resin, after drying at 100° , should yield less than 0.4 g. of Et_2O -insol. material on extraction with 50 c.c. of Et_2O of d 0.720. Determination of the acid val. of the Et_2O -sol. portion is recommended as a test for the absence of colophony. E. HOPKINS.

Potassium, chlorine, and sulphate content of Kentucky tobacco as related to grade. O. M. SHEDD (Kentucky Agric. Exp. Sta. Res. Bull., 1930, No. 308, 447—471).—Wide variations in the mineral

contents of tobaccos are recorded (0.8—7.3% K, 0.02—1.50% Cl, 0.09—0.81% SO_4). High proportions of Cl and SO_4 were not usually accompanied by high K. Good quality tobaccos were usually rich in K, and in general the K, Cl, and SO_4 contents were higher in good than in inferior grades. Burley tobaccos had higher K contents, much higher Cl, and slightly lower SO_4 than dark grades. Variations in K contents were paralleled by the market values. In dark grades the leaves were richer in K than the trash. Organically combined K predominated in the better grades of smoking tobaccos. Leaf disease tended to cause a decrease in the proportion of K, Cl, and (to a small extent) SO_4 in the leaves and is associated with nutritional disorders. A. G. POLLARD.

Volumetric assay of lactic acid, B.P. H. BRINDLE (Pharm. J., 1931, 127, 80).—Consistent results, within 1% of those given by the B.P. 1914 method, are obtained for total acidity by keeping the sample for 0.5 hr. with excess of NaOH, and back-titrating with standard acid. In all cases boiling with excess of alkali for 5 min. gives results identical with those obtained by longer boiling. A separate determination of lactide is difficult and unnecessary. E. HOPKINS.

Hydrolysis of acetylsalicylic acid in alcohol, glycerol, and alcohol-glycerol solutions. F. G. GERMUTH (J. Amer. Pharm. Assoc., 1931, 20, 568—572).—Acetylsalicylic acid is hydrolysed at slightly more rapid rate in aq. EtOH than in aq. glycerol of similar concentration, but in an aq. mixture of the two alcohols hydrolysis is not so great as in either alone containing the same amount of H_2O . No hydrolysis occurs with the pure alcohols. E. H. SHARPLES.

Correlation of chemical and toxicity tests on mercurochrome. H. A. MITCHELL (Pharm. J., 1931, 127, 72—73).—Of the 9 examined, 4 samples having relatively high toxicity contain much ionic Hg and give a large sediment. Maladjustment of p_{H} or use of an excess of Hg in manufacture might cause decomp. on dissolution to give an ionised Hg compound which later ppt. Toxicity on rabbits does not vary with Hg content. Total Hg is determined by oxidising the sample with alkaline KMnO_4 , adding excess of oxalic acid and dil. H_2SO_4 , and precipitating as HgS , while ionic Hg is similarly precipitated from the filtrate from an acidified solution of the drug. Standards suggested: moisture content of commercial samples to be stated (it may vary from 2.65 to 15.96%); content of Hg to be 26—28% of dry wt.; p_{H} to be 8.25—8.55; ionic Hg in 100 c.c. of a 2% solution and sediment from 100 c.c. of a 0.05% solution to be only a trace. E. HOPKINS.

Solubility relationships of iodine and tannin in water. "Iodotannicum" produced in dry form. A. MIHALOVICI and G. SPECH (Pharm. Zentr., 1931, 72, 419—421).—During the preparation of Sirupus iodotannicus according to the French Pharmacopœia, free HI is formed first due to I substitution in the tannin and this with excess I forms HI_3 which again reacts with the tannin and finally an I-free solution is obtained, but on keeping a cryst. I-free ppt. is formed by disruption of the tannin and free I is liberated. The solution probably consists of iodotannin and I-substitution products of gallic, ellagic, and luteolic acids together

with HI_3 . Prep. in H_2O -free solvents forms no I-substitution products. Dry iodotannicum is prepared from a solution of powdered I (30 g.) and tannin (60 g.) in H_2O (410 g.) made by heating at 45–50°, by evaporation in vac. at 30–33° until of syrupy consistency; after filtering and drying over H_2SO_4 it forms reddish-brown plates (23% I). E. H. SHARPLES.

Characteristics and assay of colloidal silver prepared by the chemical method. G. GAUME (J. Pharm. Chim., 1931, [viii], 13, 609–617).—Colloidal Ag prepared by Paal's method with protalbic acid for therapeutic use should be grey-blue and lustrous. It should contain 70–72% Ag and 1–1.5% alkali (as NaOH), and give a clear 0.1% solution in water, unaffected by mixing with an equal vol. of 5% NaCl (cf. D.A.B. VI). R. K. CALLOW.

Assay of drugs yielding essential oils. G. R. A. SHORT (Pharm. J., 1931, 127, 84–85).—A quantity of drug sufficient to produce 2–3 g. of volatile oil is distilled under reflux with 500 c.c. of H_2O into a receiver containing H_2O and 5 c.c. of light petroleum. After 6 hrs.' distillation the petroleum extract is filtered, evaporated on the water-bath at 80° in a current of air, dried over H_2SO_4 , and weighed. Results are in fair agreement with those obtained by larger-scale distillations. E. HOPKINS.

Pharmacopœial constants of chenopodium oil. J. C. MUNCH and W. F. REINDOLLAR (J. Amer. Pharm. Assoc., 1931, 20, 564–568).—The ascaridole content of normal wormseed oils varies directly with the density and inversely with the alcohol-solubility. Other variables show no relationship. Consts. of 39 oils are given.

E. H. SHARPLES.

Essential oil of hyacinth flower. I. L. HOEJENBOS and A. COPPENS (Rec. trav. chim., 1931, 50, 708–710).—The essential oil of the hyacinth flower extracted by light petroleum (0.01% from the calyx) had d_4^{15} 1.0423, n_D^{20} 1.4981, α_D^{20} –0° 12', acid val. 3, ester val. 143, do. after acetylation 272. It contained eugenol, BzOH (possibly formed by hydrolysis during steam-distillation), cinnamaldehyde, PhCHO, benzoic esters, cinnamic alcohol, higher aliphatic alcohols, and possibly cœnanthol, but no $\text{CH}_2\text{Ph}\cdot\text{CHO}$. J. D. A. JOHNSON.

Fluorescence of orange-flower water. F. GRÉGOIRE and J. RIPERT (Ann. Falsif., 1931, 24, 290–295).—The fluorescence in Wood's light is measured, giving an index of the quantity of Me anthranilate present (limit of visibility, 1 mg. per litre). The method offers a means of distinguishing between the flower water and leaf water. E. B. HUGHES.

Extraction of lemon essence by Peratoner's process. P. LEONE (Annali Chim. Appl., 1931, 21, 259–268).—Bonelli's apparatus provided with a plate fractionating column operates directly on the oil contained in the acid liquid from the lemon presses. This liquid contains about 15 g. of essential oils (90% of limonene) per litre together with other volatile and non-volatile substances and some vegetable debris. The process is continuous, enzymic and bacterial action has no time to develop, and less water needs to be distilled, with consequent great fuel economy. O. F. LUBATTI.

Cresylic acid.—See III. **Hypochlorites.**—See VII.

See also A., Aug., 959, Separation of carotene into its constituents. 966, Diagnosis of "veronalides." 970, Prep. of 3-carbamido-4-hydroxyphenylarsinic acid. "Tryparsamide." 972, Determination of citronellol and rhodinol in presence of geraniol and nerol. Determination of morphine. 981, Biological assay of ergot preparations. 987, Influence of soap on germicidal properties of certain Hg compounds. Prep. of adrenal extract. 988–9, Vitamins, various.

PATENTS.

Manufacture of hydroxyacylaminoarsenobenzenes. I. G. FARBENIND. A.-G. (B.P. 348,480, 15.8.30. Ger., 27.8.29. Addn. to B.P. 318,491; B., 1931, 654).—The glycollamidoarsenobenzenes etc. of the prior patent are made by condensing an arsine with a suitable arsenoxide or dichloroarsine. C. HOLLINS.

Manufacture of [formaldehyde-bisulphite] derivatives of arseno-compounds. I. G. FARBENIND. A.-G. (B.P. 348,479, 13.8.30. Ger., 24.8.29).—Unsymmetrical arseno-compounds, $\text{OH}\cdot\text{CH}_2\cdot\text{CO}\cdot\text{NH}\cdot\text{C}_6\text{H}_4\cdot\text{As}_2\cdot\text{C}_6\text{H}_3(\text{OH})\cdot\text{NH}_2$, where X is H or a substituent, are converted into non-irritant, H_2O -sol. CH_2O -bisulphite derivatives. Compounds from 3'-amino-4-glycollamido-4'-hydroxyarsenobenzene and its 2-Me derivative are described. C. HOLLINS.

Preparation of tobacco free from nicotine. ZIGARETTENFABRIK R. GREILING A.-G. (B.P. 351,779, 25.7.30. Ger., 14.11.29).— H_2O is added until the moisture content is 20–25% and the tobacco extracted with low-boiling light petroleum in a chamber through which air mixed with NH_3 is passed. E. B. HUGHES.

Freezing colloidal liquids.—See I. Cotton etc. pulps.—See V.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

See also A., Aug., 917, Reduction of Ag halides, and a cheap developer. 920, Action of low-speed electrons on photographic emulsions. 928, X-Ray fibre photography.

PATENTS.

Treatment of photographic pictures and kinephonographic films. SOC. INDÉPENDANTE DE TELEGRAPHIE SANS FIL (B.P. 351,956, 26.3.30. Fr., 27.3.29).—The whole width of the film can be used for the acoustic record when the Ag is replaced by BaCl_2 , which is transparent to visible light and opaque to infra-red radiation. Methods effecting the replacement via BaO , or the double chloride, or $\text{Ba}_2\text{Fe}(\text{CN})_6$, are detailed. J. LEWKOWITSCH.

Production of corrected colour-selection positives for colour-photography and multi-colour printing. L. O. VAN STRAATEN (B.P. 353,151, 22.5.30. Holl., 6.9.29).

[Photomechanical] method of transferring the pattern of materials, fabrics, skins, furs, etc. MASA G.M.B.H. ZUR HERSTELLUNG KÜNSTLICHER OBERFLÄCHEN (B.P. 352,498, 9.4.30. Ger., 10.4.29).

XXII.—EXPLOSIVES; MATCHES.

Determination of sulphur in black powder.

V. ÖHMAN (Chem.-Ztg., 1931, 55, 394—395).—The H_2O -insol. material from 0.5 g. of the sample is burned in the bomb calorimeter at an O_2 pressure of 25—30 atm. To ensure complete combustion, the material (contained in the filter-paper) and the wall of the calorimeter must be perfectly dry. 10 c.c. of H_2O are placed in the bottom of the calorimeter beforehand. After the bomb has cooled for 5—10 min. the contained gas is passed through dil. H_2O_2 (10 c.c. of a 3% solution diluted with 50 c.c. H_2O). The H_2O in the bomb and the rinsings are united, boiled to remove CO_2 , and titrated with 0.1N-NaOH using phenolphthalein as indicator. The H_2O_2 solution is also titrated. The titration of the latter should not exceed by more than 0.2 c.c. that of a blank, otherwise the combustion has been incomplete. The amount of the titration in excess of the blank (being < 0.2 c.c.) is added to the amount of the titration of the solution from the bomb. The weight of S present is calc. from the acidity of the solution.

W. J. BOYD.

Deflagration temperature of colloidal powders.

A. MICHEL-LEVY and H. MURAOUR (Compt. rend., 1931, 193, 40—42).—The most satisfactory deflagration temp. is that obtained by heating thereto very rapidly 1—2 mg. of the explosive, for which an arrangement is described. Const. results are obtained. Nitrocellulose powders and nitroglycerin powders and also similar powders containing centralite deflagrate at 197—203°, pure glyceryl trinitrate at 206°, pentaerythritol tetranitrate at 213°, and an unstabilised guncotton at 154°. There seems no connexion between these temps. and the results of the ordinary stability test at 110°.

C. A. SILBERRAD.

PATENTS.

Smokeless powder. S. G. NORTON, ASSR. to HERCULES POWDER Co. (U.S.P. 1,788,438, 13.1.31. Appl., 28.5.28).—A homogeneous smokeless powder is made from nitrocellulose (60—90%), nitroglycerin (5—30%), and Et abietate (5—25%).

W. G. CAREY.

Flashlight powders. C. KREBS (B.P. 352,118, 16.4.30).—A high-combustion smokeless flashlight powder is made by mixing powdered Zr (3 pts.) with Zr nitrate (4 pts.) or $Ba(NO_3)_2$ (3 pts.). Other O-containing substances, e.g., chlorates, permanganates, etc., may be used combined with alkaline earths or with NH_4 . Carbohydrates increase the rapidity and Al or Mg alters the spectrum.

W. G. CAREY.

XXIII.—SANITATION; WATER PURIFICATION.

Processes for de-acidifying drinking water. R. SCHMIDT (Gas- u. Wasserfach, 1931, 74, 635—637).—Water with a carbonate hardness of 6° or more can generally be sufficiently de-acidified by aeration. If the carbonate hardness after de-acidification amounts to 4—6° sufficient de-acidification to ensure the production of a protective layer on the walls of the conduit can be effected by treatment with marble. With very soft waters containing little free CO_2 treatment with marble brings about only a diminution and not a complete removal of the corrosive action. With waters of more

than 6° carbonate hardness treatment with marble effects the desired de-acidification only within certain narrow limits of water composition. Where aeration and treatment with marble fail de-acidification can generally be effected by treatment with lime water; this, however, requires careful supervision.

A. B. MANNING.

Damage caused by waste-water fungi. H. AMELUNG (Chem.-Ztg., 1931, 55, 394).—Injurious effects of fungal growths in streams polluted by waste waters from factories producing foodstuffs are described.

W. J. BOYD.

Cresylic acid.—See III.

PATENTS.

Boiler feed-water treatment. P. M. CONTANT, ASSR. to NECKAR WATER SOFTENING CORP. (U.S.P. 1,788,149, 6.1.31. Appl., 11.10.28).—Feed water containing $NaHCO_3$ is heated in the boiler to form Na_2CO_3 and NaOH, and this water is continuously blown off and mixed with additional feed water containing $NaHCO_3$ and with $FeSO_4$, forming Na_2SO_4 and $FeCO_3$.

W. G. CAREY.

Apparatus for sterilising liquids. G. LAKHOVSKY (B.P. 351,992, 28.3.30. Fr., 18.9.29).—Small chains are made of platonix (25% Zn, 75% Ni) or any highly conductive and rustless bactericidal metal and after use are cleaned from CaO and org. matter by agitation.

W. G. CAREY.

Material for killing insects. R. C. ROARK and R. T. COTTON, ASSRS. to U.S.A. (U.S.P. 1,789,322, 20.1.31. Appl., 23.11.27).—A mixture of 1—9 vols. of an ester of monochloroacetic acid or other halogeno-fatty acid and 9—1 vols. of CCl_4 or other non-inflammable chlorohydrocarbon.

W. G. CAREY.

Fumigant solution. H. W. HOUGHTON, ASSR. to SAFETY FUMIGANT Co. (U.S.P. 1,790,095, 27.1.31. Appl., 1.7.25).— $CNCl$ or other CN halide and HCN gas are dissolved in H_2O containing about 25% of glycerol or sol. carbohydrate and 10% of $COMe_2$.

W. G. CAREY.

Purification of air. P. O. ROCKWELL (U.S.P. 1,789,194, 13.1.31. Appl., 20.3.25).—Air vitiated with toxic gases, particularly $CNCl$ and HCN, is passed through granular alkaline material (e.g., pumice + aq. NaOH), and then through granular activated C impregnated with hexamethylenetetramine.

W. G. CAREY.

Purification of air. G. ST. J. PERROTT and M. YABLICK, ASSRS. to MINE SAFETY APPLIANCES Co. (U.S.P. 1,787,875, 6.1.31. Appl., 2.11.25).—Air vitiated with NH_3 is rendered suitable for breathing by passing it through SiO_2 gel.

W. G. CAREY.

Preservation of bodies and anatomical specimens. J. O. FENÉS (B.P. 352,001, 28.12.29).—A support carrying the specimen is saturated with a substance containing CH_2O which is brought into action in the presence of $CaCl_2$, glycerin, or other hygroscopic substance to absorb the heat of reaction and to dry the gaseous CH_2O .

W. G. CAREY.

[Valves for] gas masks etc. SOC. ITAL. PIRELLI (B.P. 353,380, 5.3.31. Ital., 6.3.30).

Germicide. Insecticides.—See XVI.