

BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

MAY 26 and JUNE 2, 1933.*

I.—GENERAL; PLANT; MACHINERY.

Shaft drying apparatus. K. KUTZNER (Chem. Fabr., 1933, 6, 155—156).—Hot air is passed up the shaft across which a no. of sheets of wire gauze or the like are suspended on arms pivoting on members on each side, which are moved up and down by a geared drive. The damp material is fed in at the top and passes through the sheets as it dries. Contact with the air is very good, and as the mechanical movement of the material is only lateral the power required is small. A horizontal dryer may be constructed on the same principle. C. I.

Diphenyl ether as a means of rationalising heat-producing plant and the possibility of its utilisation in the aniline dye industry. B. I. FINTINTINOV (Anilinokras. Prom., 1932, 2, No. 11, 24—31).—The thermodynamic properties of Ph_2O and possible application in industry are discussed. G. A. R. K.

Heat-insulation. A. L. FORSTER (J. Inst. Fuel, 1933, 6, 255—265).—A review, with special reference to the use of Al foil and glass silk for boiler insulation. R. N. B.

Boiler corrosion and its prevention. H. RICHTER (Chem.-Ztg., 1933, 57, 241—242).—Most cases of local pitting and caustic embrittlement in boilers are due to settlement of slimes which entrain bubbles of CO_2 , and, when the H_2O has been chemically softened, are permeated with relatively conc. NaOH produced by hydrolysis of the Na salts in the H_2O . Prevention of corrosion thus resolves itself into periodic removal of these slimes; this should be done at least every 2 hr. to prevent them settling into a coherent hard layer under the high pressure in the boiler. A new type of desliming valve (*A*) is described which effectively removes the slimes in 1—2 sec.; it comprises a Cr-Ni steel pipe, 40 mm. in diam., extending along the bottom of the boiler and provided at regular intervals with knee-shaped injector side-tubes projecting downwards so that when *A* is opened the pressure in the boiler and the injector action of these tubes serve to scour the bottom of the boiler of all slime without removing a great deal of H_2O . A. R. P.

Thermal conductivity of liquids. O. K. BATES (Ind. Eng. Chem., 1933, 25, 431—437).—An apparatus is described for the determination of the conductivity of a liquid at a series of temp. Data obtained for H_2O are higher than published vals., due to the erroneous assumption by previous investigators that the temp. of the plates is equal to that of the liquid with which they are in contact. For H_2O , $K_e = 0.00158$ at 30° , temp. coeff. = $+0.25\%$ per 1° . D. R. D.

New extraction method. W. J. D. VAN DIJCK (Petroleum, 1932, 28, No. 8, 7—10).—The method of extraction is based on the principle claimed in B.P. 355,294 (B., 1931, 954) for the separation of mixed liquids. E. D.

Demonstration of pumping action of water-jet, mercury vapour-jet, and diffusion pumps. G. MÖNCH (Physikal. Z., 1933, 34, 303—304).—An apparatus is described making use of the effect of pressure on the discharge through gases to show the effectiveness of these pumps. A. J. M.

Elimination of dust and sulphur from boiler flue gases. H. E. WALLSOM (J. Inst. Fuel, 1933, 6, 226—237).—The emission of dust may be minimised by use of clean coal and by suitable design of chimneys and boilers. The efficiencies of dust removal by electrostatic pptn., centrifugal collectors, and by washing are approx. 90.5, 88.4, and 75%. The efficiency of the first-named process decreases with increasing load, and the initial cost is high (25% of the boiler costs). The efficiency of centrifugal separation is proportional to particle size, although small particles are removed by the trapping action of larger ones. In all cases disposal of the fine dust or slurry is difficult. The various methods of S removal are reviewed. The amount of H_2O necessary in the washing process is about 30 tons per ton of coal burnt, with a time of contact of < 7 sec. Fe and Mn salts have a marked catalytic effect in the oxidation process, particularly when combined in controlled amounts at a definite temp. This action is inhibited by phenols or by $> 0.2\%$ H_2S . R. N. B.

Sulphite-cellulose waste liquors.—See V. Absorption of SO_2 in H_2O .—See VII. Al alloys for stills etc.—See X. Elastometer.—See XV. Percolating filters. See XXIII.

PATENTS.

Making a heat-resisting composition. A. JACKSON, and W. KENYON & SONS, LTD. (B.P. 389,663, 20.4.32).—A slurry of peat is mixed with plaster of Paris, and the mixture is allowed to set in forms suitable for the kiln. The blocks are fired and, after cooling, reduced to a fine powder with addition, if desired, of powdered asbestos. B. M. V.

Fire-extinguisher charge. R. W. AUSTIN (U.S.P. 1,863,321, 14.6.32. Appl., 18.7.31).—Sufficient "technical" K_2CO_3 is dissolved in H_2O to yield a solution having $d < 1.400$ (preferably 1.465); the f.p. is $< -40^\circ$. L. A. C.

Crushing apparatus. E. B. SYMONS, Assr. to NORDBERG MANUFG. Co. (U.S.P. 1,868,338, 19.7.32. Appl.,

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

11.7.30).—In a gyratory cone crusher, means are provided for the lubrication and dust protection of the main bearing of the cone, adjustment of the bowl, and yielding of the bowl to uncrushable pieces. B. M. V.

Pneumatic apparatus for separating or sorting solid materials. E. LAURENT (B.P. 389,769, 31.10.32. Fr., 24.11.31).—A pneumatic shaking table is supplied with air at const. pressure, but the effective pressure is reduced (in the various zones) according to the thinness of the bed of material by by-passes or leaks automatically controlled by anemometer fans. Knives for removing the heavy layer are adjustable by hand while the table is reciprocating. B. M. V.

Apparatus for controlling the flow of liquids, particularly in filters and the like. W. PATERSON (B.P. 389,494, 12.8.31).—Means for automatically controlling the operation of the discharge valve in accordance both with the rate of discharge and with the level of H_2O above the filter bed are claimed. B. M. V.

Washing of gases. PEASE, ANTHONY EQUIPMENT CO., ASSECS. OF F. F. PEASE (B.P. 389,462, 4.9.31. U.S., 2.4.31).—The gas is caused to whirl freely (by tangential injection or induction) and preferably upwardly in a cylindrical chamber in which are a series of superposed centrifugal or other sprayers on the axis, producing spray so fine that its initial momentum is insufficient *per se* to cause it to reach the wall of the chamber, though the centrifugal effect of the whirling gas eventually conveys the liquid to the wall. B. M. V.

Apparatus for treating air with water. CARRIER ENG. CO., LTD. (B.P. 389,707, 11.7.32. Ger., 23.11.31).—A humidifier is controlled pneumatically, the compressed air for the purpose being produced by a H_2O injector supplied from the same pump as the sprays. B. M. V.

Rotary pumps of the centrifugal type and apparatus for bringing gases and/or vapours into intimate contact with liquids. C. COOPER, D. M. HENSHAW, and W. C. HOLMES & Co., LTD. (B.P. 389,653, 19.3.32).—In multi-stage scrubbing or other apparatus needing several centrifugal pumps operating at approx. the same pressure, the pumps are mounted on a single shaft with only 2 or 3 bearings and the runners are of the single-sided entry type with the inlets alternately right and left of the runners, the casings of all the pumps being bolted up into one body. Individual control of the pumps is effected by throttle valves or by-passes. B. M. V.

Separation of materials of different specific gravities. GEN. ELECTRIC CO., LTD. From T. CHANCE (B.P. 389,567, 24.11.31).—See U.S.P. 1,854,107; B., 1933, 180. B. M. V.

Steel pressure vessel.—See X. Temp.-controlling apparatus. **Liquid purification.** **Gas-analysis apparatus.** See XI. **Centrifuging crystals.**—See XVII. **Mixing fluids [sewage].**—See XXIII.

II.—FUEL; GAS; TAR; MINERAL OILS.

Distribution of ash in coal and coke. A. MARSDEN (Gas J., 1933, 202, 54–58).—The chemical and mineralogical composition of the ash in coal is discussed in relation to the best types of fuel for domestic

appliances. A test apparatus (brazier) burning 20 lb. of coal is described, which is used for determining the proportion of "bats" (lumps of shale) left behind after combustion. G. E. F.

Artificial formation of peat: coalification of sphagnum moss. C. G. SCHWALBE and K. E. NEUMANN (Angew. Chem., 1933, 46, 177–179).—The concept of coalification is briefly discussed. Sphagnum moss was converted into peat, as shown by the change in ultimate composition and the rise in humic acid content, by heating at $100^\circ/25$ atm. with CO_2 for 1600 hr. The amount of conversion under similar conditions but in the absence of CO_2 was slight. A. B. M.

Characteristics of pulverised fuels. H. HEYWOOD (J. Inst. Fuel, 1933, 6, 241–248).—The characteristics of pulverised coals produced by various methods are the same provided that the mill is air-swept. By plotting the fineness-characteristic curve on a scale that is independent of particle size it is found that curves for products from different air-swept mills are almost identical. The nature of the fuel also has little effect. The shape of coal particles from different industrial mills is very similar. The finest fraction from air-swept mills contains the highest % of ash; the reverse is true when the mill is not air-swept. Homogeneous fuels, e.g., low-temp. cokes, have a uniform ash distribution, whilst natural coal dusts have a max. ash content in the fractions between 100- and 270-mesh. R. N. B.

Modern methods of treatment and utilisation of fine coal. C. BERTHELOT (Rev. Mét., 1932, 29, 588–600).—A review of recent progress in the cleaning of coal, low-temperature carbonisation, and coal-dust firing of boilers etc. A. R. P.

Economics of new coke-oven constructions. G. E. FOXWELL (Colliery Eng., 1933, Mar., 76–80).—The financial aspects of new plants, of rebuilding old ovens in SiO_2 and in fireclay, and of reconditioning existing plants are discussed. G. E. F.

Technical research on a large scale [in coal carbonisation] and tests on plant and materials. M. W. TRAVERS (J. Inst. Fuel, 1933, 6, 249–253; cf. B., 1924, 354 r).—The results obtained by Cobb and Parker (Rept. IV, Inst. Gas Eng., 1920) and by the Fuel Research Board (Rept. I, 1920) on the steaming of continuous vertical retorts have been analysed, expressing all quantities in mol.-lb./ton of dry coal. A calculation of the H_2 balance in the former work shows a loss of 4000 cu. ft. of H_2 /ton of coal. It is stressed that by use of this method any errors in the analysis of coals etc. may be checked. Statistical treatment of published results should save the necessity of further large-scale tests. R. N. B.

Formation of methane in the process of carbonising gas coals. M. W. TRAVERS (J. Inst. Fuel, 1933, 6, 253–254).—Analysis of published results (cf. preceding abstract) indicates that, for the coal used, the CH_4 production is nearly independent of the rate of steaming, and the quantity of CH_4 formed per ton of coal is closely related to the C content of the coal, but is independent of the conditions of carbonisation. A

method of formation of CH_4 by internal rearrangement of the C_6 ring structures present in coal is postulated.

R. N. B.

Coal testing and other aids in the control of carbonisation. N. C. STURROCK (Gas J., 1933, 201, 754—756).—Sizing, coking, and carbonising tests are carried out in addition to the usual laboratory tests.

R. N. B.

Changes in the composition of by-products during coking in high-temperature ovens. S. W. SAUNDERS and F. F. SMITH (Gas World, 1933, 99; Coking Sect., 40—43).—A Durham coking coal (26% of volatile matter, plastic range 400—470°) was carbonised in an oven 16 in. wide with an average flue temp. of 1440° and a coking time of 14 hr. The liquid and gaseous by-products were collected by a sampling apparatus from the base of the ascension pipe, the rate of evolution of volatile products being measured (accuracy $\pm 5\%$) by a Pitot tube inside the same pipe. The temp. at various parts of the oven and the rate of travel of the plastic layer are shown by thermocouple readings. Even after the first hr. of coking, cracking is sufficient to ensure only high-temp. products, there being practically no phenols in the tar and 5% of C_{10}H_8 + free C, whilst the gas has H_2 52, CH_4 35, unsaturated 4.6%. The high-temp. conditions favour production of C_6H_6 with little PhMe and $\text{C}_6\text{H}_4\text{Me}_2$. Between the 3rd and 8th hr. conditions give max. benzol production without decomp. into H_2 and C; after this, benzol and hydrocarbon gases all fall considerably in amount, coinciding with the disappearance of the primary tar when the plastic layers meet about the 11th hr. Cracking reactions, except for a little cracking of the tar, occur in the charge, there being very little in the free space above the charge.

G. E. F.

Wet charring of timber refuse and spent caustic liquors from the sulphite process of manufacturing cellulose. N. I. NIKITIN and N. P. NEMTZOVA (J. Appl. Chem., Russia, 1932, 5, 981—990).—When timber refuse is heated for 6 hr. at 180° with 30% aq. MgCl_2 the resulting charcoal (58%) contains C 69, H 4.5% and has a calorific val. of 5300 g.-cal. The yield of acids is 2.4% (as AcOH). Addition of sulphite liquor, or the liquor alone, yields a product of lower C content and containing about 3% S. The yield of AcOH is slightly decreased, and that of MeOH increased (0.4 to 0.86%). The resulting C has a C_6H_6 adsorption activity of 34% as compared with the best active C.

CH. ABS.

Theoretical aspects of benzol recovery from coal gas. C. M. WEARING (Gas J., 1933, 201, 750—754, 814—818).—A study of adsorptive capacity, break point, degree of preferential adsorption, and retentivity shows that active C is a better material than SiO_2 gel for benzol recovery. H_2O vapour lowers the break point of C. The efficiency of the C is impaired by the formation of resinous substances in the pores, due to polymerisation of unsaturated hydrocarbons during the steaming period. This is reduced by passing the steam in a direction countercurrent to the gas flow. C_{10}H_8 in the gas shortens the life of the C. The yield of benzol recovered by oil washing is increased by $\frac{1}{3}$ gal./ton of coal carbonised if the gas is first dehydrated. Increased

efficiency is attained by using multi-bay washers; however, > 6 bays are required for 95% absorption. The temp. of the oil entering the washer should be about 2° $>$ the gas temp. to prevent H_2O deposition. Tar fog and NH_3 conen. should be kept at a min. val., to prevent sludging and corrosion troubles. The optimum vol. of gas oil of 3 wt.-% absorptive capacity is 112 gals./10,000 cu. ft. of gas. If the vol. is $<$ this val. C_6H_6 is left in the gas and the hydrocarbons in the gas tend to approximate closer to their saturation val., thus decreasing the ratio $\text{C}_6\text{H}_6/(\text{PhMe} + \text{C}_6\text{H}_4\text{Me}_2)$.

R. N. B.

Production of organic compounds from coke-oven gas. J. E. OSTERRIETH (J. Inst. Fuel, 1933, 6, 215—225).—MeOH and NH_3 may be produced simultaneously by high-pressure synthesis from a mixture of CO, H_2 , and N_2 obtained from coke-oven gas. Pre-heated purified gas containing a small amount of H_2O vapour is oxidised by O_2 -enriched air over a catalyst at 800°. The CO content is adjusted to 12% and the gases are circulated through 2 high-pressure converters in series, to give 80% yields of both compounds. Gases rich in CH_4 heated to 800° are injected with a pre-determined quantity of O_2 into a reaction chamber. The heat of combustion of part of the gas raises the temp. to 1600°, whereby C_2H_2 is produced (8% yield per pass). This is extracted for the synthesis of org. substances, any CO left being used for MeOH synthesis. C_2H_4 is converted into EtOH by the H_2SO_4 process, the by-product dil. acid being used to make $(\text{NH}_4)_2\text{SO}_4$. C_3H_6 must first be removed by preferential acid absorption to obtain a product free from PrOH, which itself can be dehydrogenated at 400° to give COMe_2 .

R. N. B.

Flame temperatures of combustible gas-oxygen mixtures. H. H. LURIE and G. W. SHERMAN (Ind. Eng. Chem., 1933, 25, 404—409).—Flame temp. are given for mixtures of C_2H_2 , H_2 , and various fuel gases with different proportions of O_2 . The max. temp. for the O_2 - C_2H_2 (42.5% C_2H_2) flame is 3410° abs., and for the O_2 - H_2 (77% H_2) flame is 2933° abs. The other gases give intermediate vals.

D. R. D.

Possibilities of hydrogen as a fuel. E. P. A. HEINZE (Engineering, 1933, 135, 399—400).—High-pressure electrolyzers as designed by Noeggerath or Lawaczek yield 7 cu. ft. of H_2 and 3.5 cu. ft. of O_2 at 2150 lb. per sq. in. per unit. Capital charges on the electrolyser are taken as 0.05d. per unit. An Erren H_2 engine consumes 17.6—21.2 cu. ft. of H_2 per h.p.-hr. With current at 0.25d. per unit this use would not be economical unless a sale is found for the O_2 . It is possible that compressed H_2 may afford a means of distributing power.

C. I.

Extraction of bituminous coal-tar pitches. W. DEMANN (Brennstoff-Chem., 1933, 14, 121—123).—A no. of pitches have been extracted with C_6H_6 at 110° and the extracts separated into the fractions insol. (β) and sol. (γ) respectively in light petroleum. The C_6H_6 -insol. (α) fractions varied from 8 to 32%, the β -fractions from 14 to 27%, and the γ -fractions from 47 to 66%, of the original pitch. There was no correlation between these vals. and the softening points of the pitches. The corresponding fractions from the different pitches had similar

chemical and physical properties. The α -fractions had no coking properties; the β -fractions had high caking powers (Damm's method) at 900°; the γ -fractions had high caking powers at 400° but no caking power at 900°. The suitability of a pitch for briquetting can be correlated with its content of β - and γ -fractions. A. B. M.

Behaviour of bitumens in filtered ultra-violet light. S. BRUCKNER and P. MEINHARD (Petroleum, 1933, 29, No. 13, 8—10).—The colour of the fluorescence of coal-tar pitch, petroleum pitch, stearin pitch, and crude montan wax, either in the solid form or in solution in CCl_4 , CHCl_3 , C_6H_6 , or light petroleum, can be used to identify these materials when they are alone, but not in admixture with one another. The materials are most conveniently examined either in solution or by impregnating filter paper with the solution and allowing the solvent to evaporate. A. B. M.

Conversion of crude oils containing paraffin into asphalts for road-making. J. HAUSMAN (Petroleum, 1932, 28, No. 8, 1—7).—The general opinion that crude oils containing paraffin are unsuitable for producing asphalts is contradicted. It is essential, however, that raw materials contain hydrocarbons which after being cracked and polymerised help in the formation of asphalts. A description is given of the non-residuum and flashing process of Dubbs' patents, and it is shown that by blowing steam or air through the residue from the flashing process asphalts are obtainable which are almost equiv. to those produced by the old method. E. D.

Determination of hard and soft asphalt, resin, paraffin-free oil, and paraffin in bitumen. W. MAASS (Petroleum, 1932, 28, No. 21, 1—4).—A known wt. of bitumen is extracted with light spirit for 12 hr. and the residue after washing is dried at 105° and weighed as hard asphalt. The resulting liquid is distilled continuously over fuller's earth to remove resins, the solvent removed, and the total oil fraction measured. Soft asphalt is pptd. by treating an Et_2O solution with 96% EtOH , washing the solid with a 1:2 Et_2O - EtOH mixture, and weighing after drying at 105°. Resins are estimated by difference. Paraffins in the oil fraction may be determined by (a) pptn. by EtOH at -20°, shaking with conc. H_2SO_4 alone or with fuller's earth, and measuring the residue; (b) a combination of these two methods, or (c) heating with H_2SO_4 at 180° and extracting the residue with light spirit. The comparative merits of these methods are discussed; complete agreement is not obtained. R. N. B.

Sulphur content of crude naphtha from Turner Valley in relation to refining practice. J. W. SHIPLEY (Canad. J. Res., 1933, 8, 119—128).—Samples from four sources contained H_2S , mercaptans, disulphides, and thiophens. Free S or peroxide was not detected. Treatment with H_2SO_4 , NaOCl , NaOH , $\text{Pb}(\text{ONa})_2$, or CuCl_2 is partly effective in removing S compounds, but does not prevent coloration and gum formation after prolonged exposure to light. Distillation after treatment with NaOH , or NaOH and Na_2S , is recommended for obtaining a satisfactory gasoline. The colour- and gum-producing compounds are conc. in the higher-boiling fractions. Recovery of the C_3H_8 and C_4H_{10} is recommended. A. A. L.

Mercaptans as gumming agents in motor benzols. O. KRUBER and W. SCHADE (Brennstoff-Chem., 1933, 14, 124—128).—Unsaturated hydrocarbons such as cyclopentadiene, cyclohexene, styrene, etc. form high-boiling additive products with mercaptans. The formation of such compounds may be responsible for the gum-forming tendency of benzols, as was shown by the increased gum formation on storage of benzols to which 0.001—0.05% of EtSH has been added. Dicyclopentadiene, however, did not readily form such an additive product and had little influence on gum formation either in presence or absence of EtSH . The importance of removing all mercaptans from motor benzols by an alkali wash after acid refining is emphasised. A. B. M.

Causes of wash-oil thickening. J. A. BORDO and W. MÜHLENDYCK (Brennstoff-Chem., 1933, 14, 107—112).—The thickening of the tar oils used for benzol recovery is due mainly to the presence of O_2 in the crude coke-oven gas. The rate of oxidation is slow but measurable at room temp. and increases rapidly with rise of temp. The thickening is accelerated by the presence of H_2S in the gas; this is oxidised to S, which brings about mol. condensations in the oil with the formation of asphalt. Both processes are catalytically accelerated by the presence of Fe salts. The small quantities of tar, NH_3 , HCN , $(\text{CN})_2$, C_{10}H_8 , H_2O , etc. in the crude gas are of little importance as causes of wash-oil thickening, nor does the continuous temp. fluctuation in itself have any influence thereon provided the max. temp. is ∇ about 180°. The phenol content of commercial wash oils inhibits thickening of the oil. A. B. M.

Refinery wastes as fuel oil. J. K. FIGLMÜLLER (Petroleum, 1933, 29, No. 12, 1—4).—The sludge from the acid refining of lubricating oils is partly or completely neutralised with NH_3 or NaOH and is then blended with a low-viscosity oil; the mixture is utilised for firing under boilers, for which purpose a special burner (described) is used. A min. of excess air is used to prevent oxidation of SO_2 to SO_3 , and the chimney temp. is maintained at ∇ 150° to avoid corrosion effects. A. B. M.

Ease of starting with benzol, with petrols, and with benzol-petrol mixtures. W. H. HOFFERT and G. CLAXTON (Engineering, 1933, 135, 300—302, 374—376; cf. B., 1930, 802).—An 11.9 h.p. Morris-Cowley engine was fitted with a special carburettor and was otherwise modified to permit concordant determinations to be made of the ease of starting (no. of revolutions of the crankshaft required for the engine to fire) under controlled conditions. The ease of starting using benzol (I) (C_6H_6 72%, PhMe 18%, solvent naphtha 10%) was ∇ that with petrol (II) at 10—20°, but decreased more rapidly than with (II) on lowering the temp.; below 0° starting was easier with a good-quality (II) than with (I). At 0—10° certain blends of (I) and (II) gave easier starting than either constituent alone. Even (II) of poor starting quality could be blended with (I) to form a motor spirit of satisfactory ease of starting. (I) and (I)-(II) blends gave a wider range of mixture strengths at which starting was possible than petrols. A knowledge of the distillation characteristics of blended

fuels did not always permit the ease of starting on such fuels to be predicted. A. B. M.

Relation between constitution and anti-knock value of hydrocarbons. II. F. HOFMANN, K. F. LANG, K. BERLIN, and A. W. SCHMIDT (Brennstoff-Chem., 1933, 14, 103—106; cf. B., 1932, 585).—The C_8H_{18} nos. of the following hydrocarbons have been determined: cyclopentane 59/60, methylcyclopentane 56/57, cyclopentene 62/63, methylcyclopentene (I) 67/68, cyclopentadiene (II) 74/75, and dicyclopentadiene (III) 81 (cf. *n*- C_6H_{14} 37, cyclohexane 54, methylcyclohexane 62). After 40 days' storage, in half-filled glass vessels, in the dark, the anti-knock vals. of the first three remained unchanged, that of (I) decreased, whilst that of (II) increased, probably owing to the formation of (III). The C_8H_{18} nos. of styrene and CPh:CH were 69 and 54/55, respectively (cf. PhEt 70); that of the former rose to 72 on storage, whereas that of the latter remained unchanged. The results are discussed briefly in relation to the behaviour of commercial benzines. A. B. M.

Combustion of aromatic hydrocarbons. A. STEIMLE (Brennstoff-Chem., 1933, 14, 128—129).—Details in the design of a burner for the combustion of coal-tar oils are briefly discussed. A. B. M.

Infra-red radiation from an Otto cycle engine. I. Apparatus and technique. S. STEELE (Ind. Eng. Chem., 1933, 25, 388—393).—Radiation from different sections of the engine cylinder under working conditions passed through one of a series of fluorite windows and was focussed on a stroboscope slit and then on a vac. thermocouple, the e.m.f. being measured (Thomson galvanometer). Curves are given showing the radiation for different window positions, and for varied engine-operating conditions with a benzol fuel. H. J. E.

Solid dispersions in oil. E. KADMER (Petroleum, 1932, 28, No. 45; Motorenbehr., 5, 2—4).—Particle size and character and their influence on lubricating properties are discussed; coarse ($> 10 \mu$) and fine ($1-10 \mu$) suspensions, coarse ($0.5-1 \mu$) and fine ($0.2-0.5 \mu$) emulsions, and colloidal solutions both opalescent ($50-200 m\mu$) and bright ($1-50 m\mu$) have been examined. Mineral oil raffinates are regarded as colloidal solutions of higher-mol. hydrocarbons in lower-mol. media. Micrographs for a range of commercial lubricants, before and after use, are compared and discussed. H. E. T.

Lubricants and their application in chemical works. K. O. MÜLLER (Chem. Fabr., 1933, 6, 179—185).—A review.

Tests on automobile lubricating oils. R. LEVI (Petroleum, 1932, 28, No. 15; Motorenbehr., 5, 2—3).—A brief review and discussion.

Rumanian transformer oils. N. DĂNĂILĂ and M. BOLTUS-GORUNEANU (Petroleum, 1932, 28, No. 45; Motorenbehr., 5, 4—7; cf. A., 1931, 821).—Characteristics of 5 such oils were compared, and attempts then made to prepare and refine a transformer oil from crude paraffin-free Moreni oil, to determine the effect of refining methods on essential properties. Repeated fractionation at $100-170/0.1-0.3$ mm. abs., followed by shaking with 20% of preheated SiO_2 gel for 30 min.

at 50° and extracting with liquid SO_2 , failed to remove asphalt and mineral oil resins. Treatment with 15% of 80% H_2SO_4 at room temp. and then with 5% of the acid for 2 hr. at 60° gave a satisfactory product. H. E. T.

Modified Heyde testing instruments for asphalt, bitumens, and tars. F. KRAUTSCHNEIDER (Petroleum, 1932, 28, No. 8; Asphalt u. Strassenbau, 4—5).

Extraction method. Boiler flue gas.—See I. **Autoxidation of tetralin.**—See III. **Combustion of waste liquor.**—See V. H_2 .—See VII. **Identifying wood charcoals.**—See IX. **Grape-seed [residue as fuel].**—See XII. **Flotation S.**—See XVI.

PATENTS.

Separation of fusain from the remaining components of coal by flotation. ERZ-U. KOHLE FLOTATION G.M.B.H. (B.P. 389,401, 22.9.32. Ger., 26.9.31).—A small quantity of dextrin or starch, which has been pretreated with HCl, inorg. chlorides, or org. acid chlorides, is added to the coal slurry, whereby the vitrain (I) and durain (II) are rendered non-floatable whereas the floatability of the fusain (III) is unaffected. Wood-tar oils of low b.p. are used for separating (III). By the subsequent addition of alkali (I) and (II) are again rendered floatable and can be separated as a product low in ash and free from (III). A. B. M.

Regenerative coke oven. J. SCHAEFER (U.S.P. 1,868,223, 19.7.32. Appl., 26.10.29. Ger., 27.12.28).—The 3-way plug cock for changing over the gas supply to regenerators is converted into a 4- or 5-way cock: gas to A, gas to B, off position, air to A, air to B. The last two positions are used to blow out "dead" gases. B. M. V.

Apparatus for heating and treating subdivided carbonaceous material and the like. J. J. NAUGLE (U.S.P. 1,867,750, 19.7.32. Appl., 14.6.27).—The C to be reactivated is leached and dried and then passed in succession through a hopper with agitators, vertical tubes heated by electric induction, and tubes continued as coolers; it then drops into acidified H_2O . Cooling H_2O after passing through the jackets of the cooling tubes may be converted into steam in the jackets of the heating zones and the steam passed through coils in the hopper. B. M. V.

Production of oil gas. L. C. HUFF, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,868,462, 19.7.32. Appl., 15.6.25).—Part of the new heavy hydrocarbon oil together with liquid condensed out of the gas after leaving the column are returned to the top of a dephlegmating column as reflux, but the larger part of the new oil is passed, together with residue from the column and superheated steam, through an externally-heated coil (temp. $648-815^\circ$), and thence to a reaction chamber where the solid and a little liquid are deposited and kept in agitation by additional steam; the vapours pass to the side of the column, whence the gas and steam pass away for separation elsewhere. B. M. V.

Distillation of tar. S. P. MILLER, Assr. to BARRETT Co. (U.S.P. 1,868,394, 19.7.32. Appl., 4.6.27).—Tar is subjected to auto-distillation by fresh coke-oven gases

in a collector main, the gases are cleaned in an electrostatic precipitator while still at a temp. to maintain the tar oils volatilised, and these oils are then condensed in clean condition without further treatment.

B. M. V.

Distillation of tar and apparatus therefor. L. R. FORREST and E. B. CONKLIN, Assrs. to BARRETT Co. (U.S.P. 1,868,470, 19.7.32. Appl., 10.5.27).—Tar from a previous period or separate source is run back through a collector main (*A*) and is sprayed into stills (*B*) in parallel, the liquid from *B* running back into the same main. *B* are heated by gases from a series of coke ovens over or adjacent to which *A* runs, and pitch of any desired composition can be run off at various points of *A*; the vapours etc. are passed to an enriched gas collector main.

B. M. V.

Treatment of tars [for road purposes]. C. F. BROADHEAD and R. S. ANDREWS (B.P. 389,280, 30.3.32. Austral., 2.7.31).—The tar is treated with < 5% of substances containing nitrogenous bases and polymerised triglycerides, e.g., bone tar, fatty acid pitch, or native asphalt with vulcanised marine oil, or a mixture of < 2 of these; an asphaltic hydrocarbon is added, if desired, and the mixture is heated at 205–235° until it has acquired the desired viscosity. The product is substantially impervious to oxidation.

A. B. M.

Production of asphaltic emulsion. F. QUECK (U.S.P. 1,867,923, 19.7.32. Appl., 20.3.31).—An emulsion suitable for waterproofing fibrous material is prepared by adding an asphalt product (*A*) to a mixture (*B*) in H₂O of rosin soap and protein; the ratio wt. of *A* to wt. of *B* should be 60:40.

B. M. V.

[Petroleum] distilling process and apparatus. E. H. LESLIE and E. M. BAKER (U.S.P. 1,868,466, 19.7.32. Appl., 29.6.25).—The oil is passed through a no. of stills in series, and the vapours pass at different levels to a common rectifier, in equilibrium as far as possible; part of the vapour from the top of the column is condensed and returned as the sole reflux. Auxiliary columns are provided for withdrawing intermediate products of exact composition, the vapours therefrom being returned to equilibrium points in the main column.

B. M. V.

Resistance element for hydrocarbon cracking processes. R. CARTER (U.S.P. 1,860,322, 24.5.32. Appl., 12.2.29).—An electrical heating unit comprises a bar of carbonaceous material covered with a C deposit-resisting coating of fireclay, SiO₂, and Na₂SiO₃, which is baked at a temp. and rate sufficiently low and slow, respectively, to avoid disruption and thereafter raised to a temp. > the max. temp. of the unit during regular use.

H. S. G.

Treatment of petroleum emulsions. J. HYMAN and A. F. SCHLANDT, Assrs. to PURE OIL Co. (U.S.P. 1,860,248, 24.5.32. Appl., 17.8.29).—A treating agent comprising the sulphides, hydrosulphides, and polysulphides of Na, K, or NH₄ is added to the emulsion and the mixture heated until the emulsion breaks.

H. S. G.

Forming coke from mineral hydrocarbons. R. A. HALLORAN and W. H. SHIFFLER, Assrs. to STANDARD OIL Co. OF CALIFORNIA (U.S.P. 1,867,823, 19.7.32. Appl.,

1.6.27).—AlCl₃ residue is removed from an oil-cracking still just before it would solidify, passed at once to a preheated coking zone, and held at about 980° to liberate the chloride compounds.

B. M. V.

Production of motor fuel. L. M. HENDERSON and S. W. FERRIS, Assrs. to ATLANTIC REFINING Co. (U.S.P. 1,868,102, 19.7.32. Appl., 24.12.28).—Hydrocarbon oil is very closely fractionated and the graph of the fractions plotted, 50% b.p. against *d*; the peaks of high *d* indicate less detonation because less paraffin is present, and these fractions are mixed to produce a superior petrol.

B. M. V.

Prevention of pre-ignition in internal-combustion engines. A. J. DUCAMP (U.S.P. 1,868,053, 19.7.32. Appl., 23.1.31. Fr., 24.3.28).—An antiknock composition is composed of Hg(CN)₂ dissolved in glycerin and suspended in the lubricating oil, with the aid of fatty acid and alkali if necessary.

B. M. V.

Manufacture of lubricating oil. E. W. ISOM, Assr. to SINCLAIR REFINING Co. (U.S.P. 1,859,514, 24.5.32. Appl., 6.6.27).—An increased yield of high-viscosity constituents is obtained by subjecting a petroleum oil containing a lubricating oil fraction to digestion for 4–12 hr. at 338–404°/ > 125 lb. per sq. in., treatment with H₂SO₄, and fractionation to obtain the desired product. Wax and more volatile constituents are preferably removed first.

H. S. G.

Treatment of lubricating oil stocks. J. C. BLACK, W. D. RIAL, and J. R. MCCONNELL, Assrs. to RICHFIELD OIL Co. (U.S.P. 1,859,692, 24.5.32. Appl., 23.3.27).—The "cold test" of lubricating oils containing wax is lowered by adding to such oils a coal-tar pitch containing extractable aromatic compounds and a solid mineral absorbent, heating and agitating the mixture, and separating the oil from the solid residue.

H. S. G.

High-temperature lubricant. H. H. DOW, Assr. to DOW CHEM. Co. (U.S.P. 1,867,968, 19.7.32. Appl., 13.7.29).—The use of diphenylene oxide alone or with a petroleum base oil is claimed.

B. M. V.

CaC₂ cakes.—See VII. Sealing cracks in metal.—See X. Polishes.—See XIII.

III.—ORGANIC INTERMEDIATES.

Preparation of methylaniline. G. S. TSYPIN (Anilinokras. Prom., 1932, 2, No. 12, 9–12).—The optimum conditions for the prep. of NHPMe from NH₂Ph, MeOH, and H₂SO₄ are a 50% excess of MeOH and heating for 10 hr. at 180–200°; the amount of H₂SO₄ is of secondary importance. A diminution in the amount of MeOH used leads to an increased content of NH₂Ph; the latter cannot be completely eliminated by treatment with H₂SO₄. The reaction mixture should be filtered to remove 2NH₂Ph.H₂SO₄.

G. A. R. K.

Isomerides contained in technical chlorodinitrobenzene and their influence on the shade of sulphur black. V. KRASOVA (Anilinokras. Prom., 1932, 2, No. 10, 17–20).—The principal product of dinitration of PhCl is chloro-2:4-dinitrobenzene (I), together with small amounts of the 2:6-isomeride (II); the presence of the 2:3- (III) and 3:4-isomerides (IV) can be recognised by the elimination of a NO₂ group as HNO₂

on alkaline hydrolysis. The Cl in both (I) and (II) is completely hydrolysed with 5% aq.-alcoholic alkali in 2 hr., whilst only 4.5% of (IV) is attacked; (IV) can thus be determined. (I) and (II) are separated through their Ba salts, that of (I) being more sparingly sol., especially in EtOH. (II) gives a reddish-violet S dye, (IV) a faint grey one. G. A. R. K.

Tendency of tetralin to autoxidation. H. HOCK and W. SUSEMIHL (Brennstoff-Chem., 1933, 14, 106—107; cf. A., 1933, 153).—The peroxide formed by the oxidation of tetralin (I) with air explodes on being heated to about 130°, or at lower temp. in the presence of alkalis or finely-divided metals. Care should therefore be taken in technical processes in which (I) is exposed to oxidation. Addition of $\text{Fe}(\text{CO})_5$ forms a delicate test for the presence of peroxide, giving a dark red coloration of the liquid and evolution of gas. The peroxide may be determined by treatment with KI in aq. AcOH and titration of the liberated I. Oxidation may be inhibited by the addition of 0.1% of quinol. Treatment with aq. FeSO_4 converts the peroxide catalytically into 1-ketotetrahydronaphthalene and H_2O . A. B. M.

Cyclic process for preparation of β -naphthol. G. I. JABELBERG and A. F. TSCHEGIS (Anilinokras. Prom., 1932, 2, No. 11, 21—23).—The salting-out of naphthalenesulphonic acid from the crude sulphonation product of C_{10}H_8 can be carried out with Na_2SO_3 , which is a waste product, whilst the SO_2 formed is used to liberate β - $\text{C}_{10}\text{H}_7\text{OH}$ from the Na salt. G. A. R. K.

Preparation of Naphthols AS, AS-BS, and AS-BO. A. E. VOLCHIN (Anilinokras. Prom., 1933, 3, No. 1, 11—18).—The prep. of these Naphthols according to G.P. 264,527, 293,897, and 294,799 has been studied. The best solvent is found to be a petroleum fraction, b.p. 110—130° or 120—150°, but PhCl can be used; polychlorobenzenes are unsatisfactory. An excess of amine gives an impure product and it is best to use the theoretical quantities of reactants and a 10-fold amount of solvent which should be kept boiling; a 30% excess of PCl_3 is recommended. G. A. R. K.

Preparation of Naphthol AS-BS. D. Z. ZAVELSKI (Anilinokras. Prom., 1933, 3, No. 1, 19—22; cf. preceding abstract).—The condensation of 2:3-hydroxynaphthoic acid with *m*- and *p*-nitroaniline and PCl_3 has been carried out and the *m*-derivative, m.p. 245—246°, found to be identical with the commercial product (cf. Colour Index No. 39,334); the *p*-compound has m.p. 258—259°. The use of Russian petroleum, b.p. 130—135°, in place of PhMe as solvent gives an improved yield (95—96%). G. A. R. K.

Sulphonation of naphthalene *in vacuo*. I. J. GRISCHIN and A. A. SPRYSKOV (Anilinokras. Prom., 1932, 2, No. 11, 19—21).—An apparatus for the sulphonation of C_{10}H_8 is described. 70% of C_{10}H_8 is introduced into a sulphonator heated to 155°, then the whole of the 93% H_2SO_4 preheated to 70—80°, and the mass stirred for 10 min. The vessel is now gradually evacuated to 600 mm. to remove the H_2O formed, any unchanged C_{10}H_8 being recovered in a trap. A further 20% of the C_{10}H_8 is then treated in the same way and finally the remaining 10%; no excess of H_2SO_4 need be employed. G. A. R. K.

Hydrolysis of the urea of J-acid. G. I. OSTROSHINSKAJA and N. A. KOSLOVA (Anilinokras. Prom., 1932, 2, No. 10, 21—24).—The hydrolysis of the urea of J-acid by warm aq. Na_2CO_3 , which diminishes the yields of Benzo Fast Orange S and Azidine Scarlet 4BS obtainable from it, has been followed quantitatively by measuring the CO_2 evolved. No hydrolysis occurs at room temp.; the dry acid is stable at 100°. G. A. R. K.

Monobenzoyldiaminoanthraquinones. M. A. ILJINSKI and A. A. ZATKIN (Anilinokras. Prom., 1932, 2, No. 10, 24—27).—The prep. of these compounds according to G.P. 462,053 and B.P. 276,692 (B., 1929, 123) has been reinvestigated; the former method may be simplified by using BzOH and P_2O_5 in PhCl in place of Bz_2O . They have also been prepared by the partial hydrolysis of the Bz₂ compounds with oleum; the method is particularly recommended for the 1:4-compound (m.p. 268—270°). G. A. R. K.

Uses of Ph_2O .—See I. [Products from] timber refuse etc. Org. compounds from coke-oven gas. Naphthenic acids in petroleum.—See II. Al alloys for EtOH.—See X. Identification of org. accelerators.—See XIV.

PATENTS.

Filling and sealing ether or like perishable material in cans or like containers. MALLINCKRODT CHEM. WORKS (B.P. 389,978, 2.3.32. U.S., 2.3.31).—Air above the liquid in the container is replaced by Et_2O vapour. E. H. S.

Manufacture of acid anhydrides. N. V. DE BATAAFSCHE PETROLEUM MAATS., Assees. of M. DE SIMO (B.P. 389,049, 3.11.32. U.S., 3.11.31).—Keten is converted by a carboxylic acid (PrCO_2H or EtCO_2H) into a mixed acetic anhydride. This is heated to decompose it into the 2 anhydrides, and the mixture is separated by distillation. C. H.

Manufacture of thiourea [thiocarbamide]. Soc. CHEM. IND. IN BASLE (B.P. 389,033 and Addn. B.P. 389,042, [A] 6.10.32, [B] 26.10.32. Switz., [A] 6.10.31, [B] 27.1.32).—(A) In the manufacture of thiocarbamide from CaCN_2 , alkaline-earth sulphide (A), and CO_2 , dil. H_2SO_4 , $\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$, or other precipitant for the alkaline earths, the solid reactants are thoroughly ground together. (B) H_2S is substituted for A. C. H.

Production of chlorinated derivatives of benzene. T. S. WHEELER, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 388,818, 4.9.31).— C_6H_6 vapour and Cl_2 are passed, preferably at 400—500°, through a reaction chamber at a space velocity, when temp. is 650—700°, of < 100 reciprocal min. The Cl_2 may be added in stages. C. H.

Dithiophosphates.—See VII. Tartaric acid etc. from grape juice.—See XVIII. Trimethylene-nitroamine.—See XXII.

IV.—DYESTUFFS.

Dyestuffs manufacture. J. BLAIR (J. Soc. Dyers and Col., 1932, 48, 85—86).—A lecture.

Quantitative analysis of dyestuffs. S. R. TROTMAN and T. B. FREARSON (J. Soc. Dyers and Col., 1931,

47, 344—347).—Direct dyes and those acid dyes which can be dyed from a neutral or feebly acid bath are quantitatively pptd. from their aq. solutions by means of cinchonine sulphate (I); the ppt. containing 1 mol. of the alkaloid is associated with each SO_3H group in the dye mol. The ppt. is slightly sol. in H_2O , but insol. in H_2O containing (I). This method of determination by pptn. has been successfully applied in the case of 32 direct and 9 acid dyes. Acid dyes which require much acid in dyeing are either not pptd. by (I), or, if they are, the ppt. is sol. in dil. AcOH . A mixture of direct and acid dyes in dil. aq. solution can be separated by a slight modification of the above method. Cinchonine may be used to separate certain acid dyes if their ppts. with cinchonine differ as regards their solubility in dil. AcOH . The SO_4^{--} and Cl^- present in commercial dyes may be easily determined after first removing the dye by means of cinchonine acetate. To determine basic dyes by pptn. with silicotungstic acid in the presence of HCl , the ppt. is weighed and then ignited to yield a residue of $\text{SiO}_2 \cdot 12\text{WO}_3$, the dye being then determined by difference. Quinine, quinidine, strychnine, and $\text{C}_5\text{H}_5\text{N}$ also ppt. direct dyes. A. J. H.

Determination of sulphur dyes. B. S. SMIRNOV (Anilinokras. Prom., 1932, 2, No. 10, 28—30).—The pure dye content of commercial S dyes is readily determined by electrolysis of a solution of the dye in Na_2S , aq. until oxidation is completed and weighing the ppt. of pure dye. Pt electrodes and a current of 3 amp. are most suitable; the time required varies from 30 to 75 min. G. A. R. K.

Dyes from α -naphthylamine-5-sulphonic acid. S. F. FILIPITSHEV and M. A. TSCHÉKALIN (Anilinokras. Prom., 1932, 2, No. 12, 13—15).—New substantive azo dyes have been prepared from α -naphthylamine-5-sulphonic acid (I). Dinaphthyl-J-acid (II) couples in alkaline solution with diazosulphoazonaphthalene [from (I) and $\alpha\text{-C}_{10}\text{H}_7\text{NH}_2$] to Anil Fast Blue 2N, giving bright blue shades on cotton, similar to Benzo Fast Blue BN (By), but somewhat less resistant to light and ironing; a blue-black dye is obtained by replacing (II) by the urea of J-acid. A violet dye is obtained from (I), "cresidine," and phenyl-J-acid, which resembles Diamine Fast Violet BBN; attempts to obtain the latter from J-acid, "cresidine," and J-acid gave a dye of totally different properties. On coupling 1 mol. of the urea of J-acid with 1 mol. of (I) and 1 mol. of $\alpha\text{-C}_{10}\text{H}_7\text{NH}_2$ a red dye, somewhat bluer than Benzo Fast Scarlet 6BA (By), is obtained, whilst with NH_2Ph in place of $\alpha\text{-C}_{10}\text{H}_7\text{NH}_2$ a yellow dye is produced, closely resembling Benzo Fast Scarlet 4BS. $m\text{-C}_4\text{H}_4(\text{NH}_2)_2$, (I), and $\alpha\text{-C}_{10}\text{H}_7\text{NH}_2$ give a brown dye related to Benzo Brown BR, which contains naphthionic acid in place of (I). By treating the monoazo dye from (I) and Cleve's acid with COCl_2 a yellow-brown dye is produced; the monoazo dye from (I) and naphthionic acid similarly yields a reddish-orange dye. (I), H-acid, and the urea of J-acid give a yellowish-green dye, and a yellower dye results from (I), H-acid, and J-acid.

G. A. R. K.

Chemical assay of nigrosines. N. A. SYCHRA (Anilinokras. Prom., 1932, 2, No. 12, 16—18).— H_2O -sol.

nigrosines can be determined by titrating the solution with acid KMnO_4 , which gives the total oxidisable matter, then titrating the solution (after adsorption of the dye) by chromed hide powder, the difference in titre representing the dye originally present. The figures are compared with those given by sulphonated indigotin. Chromed hide does not ppt. the dextrin or sugar present. EtOH - or oil-sol. nigrosines are sulphonated and then assayed as above. G. A. R. K.

Comparative tests of Japanese and foreign dyes. Y. KONDO (Shikisen, 1930, 1, 10—15).—The following dyes were compared: Congo-red, Nippon-blue conc., $\text{C}_{32}\text{H}_{20}\text{O}_{14}\text{N}_6\text{S}_4\text{Na}_4$, Japanese-black BH conc., $\text{C}_{32}\text{H}_{21}\text{O}_{11}\text{N}_6\text{S}_5\text{Na}_3$, Nippon-green G, $\text{C}_{35}\text{H}_{21}\text{O}_{12}\text{N}_8\text{S}_2\text{Na}_3$, benzopurpurin, Nippon-green B, $\text{C}_{34}\text{H}_{22}\text{O}_{10}\text{N}_8\text{S}_2\text{Na}_2$, Nippon-orange R, $\text{C}_{23}\text{H}_{19}\text{O}_6\text{N}_5\text{SNa}_2$, and chrysophenine NS conc. CH. ABS.

Uses of Ph_2O .—See I. Shade of S black.—See III.

PATENTS.

Manufacture of sulphur dyes. E. I. DU PONT DE NEMOURS & Co. (B.P. 388,814, 4.9.31. U.S., 5.9.30).—Thionation is effected in presence of an alkyl ether of glycol or diglycol, whereby the time of heating is shortened. *E.g.*, the indophenol from 5-ethylcarbazole is added with S to a mixture of glycol Et ether and Na polysulphide solution (b.p. 170°) and boiled for 2 hr. C. H.

Meat-stamping ink.—See XIII.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Degumming of real silk. J. STOCKHAUSEN (Seide, 1932, 37, Nov.; Rev. Gén. Mat. Col., 1933, 37, 95—99).—By comparison of the losses of wt. produced by degumming raw silk in solutions of soap and mixtures of soap and soap substitutes, it is concluded, in agreement with Hart (B., 1930, 1020), that the removal of sericin in the usual 2-stage process is mainly due to the action of NaOH resulting from hydrolysis of the soap; ordinary soap is the most satisfactory degumming agent, and soap substitutes and soaps containing excess of fatty acid are ineffective. A. J. H.

Heat test applied to tendered cotton and linen fabrics. M. FORR (J. Soc. Dyers and Col., 1932, 48, 94—96).—Tendering in such fabrics by oxidation and acid treatment may be distinguished by the much greater tendency of the oxidised fabric to become brown when heated at $175\text{--}190^\circ$, even when all alkali-sol. degradation products on which the Cu no. depends have been removed by an alkali boil (1 hr. in NaOH , d 1.025), and provided that all free and combined acid is removed before the heating. Cotton impregnated with dil. $\text{H}_2\text{C}_2\text{O}_4$ and dried becomes brown in the heat test equally with cotton severely tendered by oxidation. The heat test was effective with cotton tendered 6% by oxidation followed by two reflux boils each of 6 hr. with NaOH (d 1.025) and then successively steeped for 15 min. in aq. NaOH (d 1.2) and for 1 hr. in aq. NaOH (d 1.04). Imperfectly scoured and bleached cotton and linen fabrics become brown in the heat test; in such cases a CaO is better than a NaOH boil. A boil for 6 hr.

with aq. NaOH (*d* 1.025) purifies imperfectly scoured cotton so that it may be used in the heat test, but this treatment is insufficient for linen. A. J. H.

Destructive action of moths (*Dermestids*) and its prevention. A. HERFS (Melliand Text. Month., 1932, 4, 555—558; 1933, 4, 625—628, 681—685).—The various types of moth which attack textiles, especially wool, are described, with illustrations. Eulan NK (for after-treatment of dyed and finished materials) and Eulan NKF (for furs) are considered to be the only satisfactory moth-proofing agents. A. J. H.

Cell walls and their value in textile chemistry. M. LÜDTKE (Melliand Text. Month., 1932, 4, 259—262, 310—312; 1933, 4, 635—636, 714—717).—An account is given of the fine structure of fibrous materials as revealed by swelling treatments, reference being made to wood, grasses, cotton, and cereals. The low tensile strength of artificial silk is attributed to the absence of a cementing substance within the individual fibres to bind together the micelles, and the increased strength of mercerised cotton to the formation during mercerisation of a cellulosic cementing substance within the individual fibres. A. J. H.

Laboratory analysis of fibrous materials. F. BRIDGE (Paper Maker, 1933, 85, 94—96 ts).—A no. of well-known chemical tests are described. It is stated that overbleaching and decomp. of cellulose by heat do not appreciably increase its furfural yield. H. A. H.

Paulson process of evaporation and combustion of sulphite[—cellulose] waste liquor. H. S. KIMBALL (Paper Trade J., 1933, 96; T.A.P.P.I. Sect., 156—158).—Mathematical. The physics (heat balance etc.) of the process are investigated. H. A. H.

Nature and functions of hygroscopic water in cellulose and paper. J. STRACHAN (Paper Maker, 1933, 85, 81—82 ts).—The adsorbed H₂O content of cellulose and paper is determined by the colloidal structure and micelle size of the fibres. Its presence affects such physical properties as pliability, elasticity, and printability, and such chemical properties as ageing and permanence. Various papermaking processes, especially dyeing and calendering, are also affected. H. A. H.

α-Cellulose in pulp. W. R. WILLETS (Paper Trade J., 1933, 96; T.A.P.P.I. Sect., 141—142).—Further amendments to the T.A.P.P.I. standard method of determination are proposed. H. A. H.

Acetylation of cellulose. O. B. LITVIN (Cellulose-chem., 1933, 14, 49—50).—The acetylation process is followed by determinations of Ac₂O. 10—20 g. of the syrup are diluted with 50—70 c.c. of CH₂Cl₂, 25—30 drops of C₅H₅N are added, and the mixture is titrated with freshly distilled NH₂Ph until a drop colours furfuraldehyde paper red. Reaction of NH₂Ph with AcOH is prevented by the dilution with CH₂Cl₂ and by titrating below 45°, and reaction with H₂SO₄ by the addition of C₅H₅N. A titration requires 10 min. and is sensitive to 0.03 g. Ac₂O. A. G.

Properties of rayons manufactured in Japan. III. Chemical properties. K. TATSUKI and S. MINAMI (Shikisen, 1931, 2, 204—208).—Residual S

(0.024—0.124%) is high; the Fe content is 2—3 mg. per 5 g. The fixed Cu (0.826—1.65) is proportional to the absorptive power for direct dyes, but not for methylene-blue, at low temp. The ash content is 0.174—0.239% and its alkalinity 2.185—3.882. CH. ABS.

Defects in rayon goods. E. GRAEBNER (Melliand Text. Month., 1933, 5, 9—10).—A discussion of causes and remedies.

Cellophane roll films and the fixing of carbon-paper typing on cellophane. R. BONAR, F. BONAR, and E. C. H. DAVIES (Science, 1933, 77, 217—218). L. S. T.

Drying rate of kraft paper. A. E. MONTGOMERY (Paper Trade J., 1933, 96; T.A.P.P.I. Sect., 138—141).—Drying rate is defined as the wt. in lb. of paper dried or of H₂O evaporated per hr. per sq. ft. of total paper- and felt-drying surface covered by the width of the sheet. It varies as a straight-line function of the steam temp. in the drying cylinders, but differs for kraft and board. Freeness and substance have no effect on drying rate expressed in terms of paper dried, but increase in substance diminishes it when expressed in terms of H₂O evaporated. H. A. H.

[Sodium] aluminate size [for paper]. J. J. HEALY, JUN., and C. P. DYER (Paper Trade J., 1933, 96; T.A.P.P.I. Sect., 151—153).—By using a combination of Al₂(SO₄)₃ (I) and Na₂Al₂O₄ (II) instead of (I) alone, in conjunction with rosin size, efficient sizing can be obtained at much higher *p_H* vals. than usual. The resulting paper is therefore comparatively free from acid. Sizing is considered to be due to the excess of Al₂O₃ present. Data are given to enable the additional (II) necessary with different % of (I) to be calc. Several advantages are claimed, including more permanent paper, freedom from foaming troubles, and increased beating capacity due to depression of acidity in the back-H₂O. H. A. H.

Cellulose waste liquor.—See I. Resins in alkali.—See XIII. Glucose as coagulant.—See XVII. Pulp-mill effluents.—See XXIII.

PATENTS.

Digestion of nitrocellulose. A. C. PRESTON and G. C. GRESS, Assrs. to FIBERLOID CORP. (U.S.P. 1,867,757, 19.7.32. Appl. 6.5.29).—A digesting liquid is circulated in a closed system under pressure, passing in contact with the nitrocellulose at some part of the circuit and being heated in another part. The system is supplied with compressed air to maintain the pressure sufficient to prevent the formation of steam. B. M. V.

Production of artificial filaments and other products. BRIT. CELANESE, LTD., H. DREYFUS, and W. I. TAYLOR (B.P. 389,870, 25.6.31. Cf. B.P. 385,617; B., 1933, 187).—Filaments of round cross-section are produced by dry-spinning a 20—25% solution of a high-viscosity cellulose ester or ether in COME₂ containing > 10% H₂O. F. R. E.

Treatment [increasing the extensibility] of artificial filaments and like products. BRIT. CELANESE, LTD., W. A. DICKIE, and P. F. C. SOWTER (B.P. 389,823, 18.6.31).—Materials composed of org.

derivatives of cellulose, which have been wet- or dry-spun with stretching, are treated, in the absence of tension sufficient to stretch them, with org. solvents, latent solvents, or swelling agents (COMe_2 , EtOAc , etc.) in a diluent (C_6H_6 or other hydrocarbon) and allowed to shrink. F. R. E.

Treatment [hydrolysis] of cellulose carb-oxylic ester materials. H. DREYFUS (B.P. 389,876, 30.9.31).—The materials are treated at $100\text{--}150^\circ$, in the pressure of a swelling agent if desired, with a stream of NH_3 , volatile org. base, or EtOH , diluted with N_2 or an inert gas. (Cf. B.P. 313,971; B., 1930, 1148.) F. R. E.

Manufacture of artificial filaments and similar products [of reduced lustre]. BRIT. CELANESE, LTD. (B.P. 389,484, 14.9.31. U.S., 13.9.30).—The spinning solution, e.g., cellulose acetate, has incorporated in it a finely-divided, insol. Sn compound (oxide, phosphate, oxychloride); oil, dispersing agents, and/or protective colloids may be added if desired. F. R. E.

Production of [artificial] filaments and the like [of reduced lustre]. H. DREYFUS (B.P. 389,518, 16.9.31).—An insol., white, inorg. substance [$\text{Al}(\text{OH})_3$, basic ZnCO_3] in gelatinous or flocculent form, together with oil, dispersing agents, and/or protective colloids, if desired, are incorporated with the spinning solution. F. R. E.

Manufacture and treatment of artificial silk, films, etc. H. DREYFUS (B.P. 389,521, 18.9.31. Addn. to B.P. 346,678; B., 1931, 715).—The high-boiling substance, e.g., diacetyl- or dibenzoyl-benzidine, mentioned in the prior patent, is formed *in situ* in the material composed of org. derivatives of cellulose by adding one component (benzidine) to the spinning solution or to the material, and subsequently treating the material with the necessary reagent (AcCl , BzCl). F. R. E.

Regeneration of cooking liquor.—See VII. **Insulating tape.**—See XI.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Modern bleaching of cotton fabrics. W. H. ADAMS (Melliand Text. Month., 1933, 4, 663—665, 718—720).—A general discussion of kiering processes, with particular reference to the peroxide bleaching method. A. J. H.

Effect of metallic catalysts in the bleaching of knitted woollen goods with hydrogen peroxide. S. R. TROTMAN and G. N. GEE (J. Soc. Dyers and Col., 1932, 48, 229—232).—The presence of metals in bleaching results in loss of available O in the bleach liquor and discoloration and tendering of the bleached wool. E.g., 0.001 g. of Fe, Cu, or Mn in aq. 2-vol. solutions of H_2O_2 (I) made just alkaline to phenol-red by addition of NH_3 (A) or Na_2SiO_3 (B) produced losses of 8.2, 32.2, and 95.0%, and 1.0, 6.0, and 55.0% of H_2O_2 , respectively, during keeping for 4 hr. at room temp.; under similar conditions solutions containing no metal lost 6.0 and 1.0% of H_2O_2 , respectively. In bleaching wool with (I) adjusted as above to $p_{\text{H}} 8.5\text{--}9.0$ and containing 0.001% Cu, Fe, or Mn, discoloration occurred in every case except with Mn in the presence of B; no dissolved

wool could be detected by the biuret test. Wool containing 0.05—1.0% Cu, Fe, or Mn tenders excessively during bleaching, the influence of Cu being especially marked. The tendering produced by Fe, Cu, and Ag in the presence of B, Na_2CO_3 (C), and A (used as neutralising agents) decreases in the order named (of these alkalis); that produced by Mn and Co increases in the same order. Tendering produced by the presence of metals increases with the alkalinity of the H_2O_2 solution. Botany yarn spotted with 0.001% solutions of Fe, Cu, and Mn catalysts and afterwards bleached showed tensile strength losses of $> 50\%$ with Fe and Cu, but of only 15% with Mn. Prechlorination increases the susceptibility of wool to such tendering. Wool should be bleached in H_2O_2 solutions having the highest alkalinity which does not produce undue loss of wt. or structural damage, since the best white is thereby obtained when metals are present; better whites are obtained with B than with A for the same p_{H} . Chlorinated wool should be bleached in liquors of $p_{\text{H}} > 10.0$, but non-chlorinated wool may be satisfactorily bleached in those of $p_{\text{H}} 10.0\text{--}11.0$. A "dead" white is preferably obtained by bleaching at $p_{\text{H}} 8.0\text{--}8.5$ and afterwards stoving with SO_2 . A method for determining the loss of wt. of wool in bleaching is described; attack in bleaching is confined to the cortex of wool fibres. A. J. H.

Comparative tests of absorptive power for substantive dyes of Japanese viscose rayons. U. MIYAOKA and T. TSUBOTA (Shikisen, 1931, 2, 139—143).—With Congo-red extra rich, benzopurpurin 4B, and Diamine fast red F with Na_2SO_4 (for Congo-red, Na_2CO_3) as assistant, the absorption is generally greatest at $50\text{--}70^\circ$. Na_2CO_3 accelerates the absorption at lower temp. and retards it at 50° . CH. ABS.

Comparative studies of absorptive power for substantive dyes of viscose rayon and cotton. U. MIYAOKA and T. TSUBOTA (Shikisen, 1931, 2, 209—214).—Viscose rayon has a lower absorptive power than cotton. In dyeing mixed fabrics an assistant must be added. CH. ABS.

Viscose silk and direct colours; effects of addition of penetrant. K. TATSUKI and S. MINAMI (Shikisen, 1932, 3, 269—284).—Max. lowering of surface tension is produced by 0.1—1.0 g. of agent per litre. Most penetrants increase the absorbing power of silk for dyes with increase in concn., and facilitate the dissolution of dyes. CH. ABS.

Measurement of the colour of dyed textiles. IX. Influence of concentration of dye and time of exposure on fading. P. W. CUNCLIFFE and P. N. LAMBERT (J. Soc. Dyers and Col., 1932, 48, 59—66; cf. B., 1931, 1007).—From numerous test exposures, an equation has been derived showing the relation between the fading and time of exposure; various empirical equations are also presented. Quant. comparison of the fading of light and dark shades confirms that the fractional decrease in the concn. of the surface dye is the same for all vals. of the original concn. (cf. B., 1927, 811). A. J. H.

Fastness of wool dyeings to wet treatments. F. L. GOODALL (J. Soc. Dyers and Col., 1933, 49, 97—102).—Curves showing the degree of bleeding of wool

dyed with Acid Orange GG (I) Erio Fast Orange GS (II), Polar Yellow R conc. (III), and Terra-Cotta A.O.R. (after-chromed) (IV) when immersed in approx. 5% Na phosphate buffer solutions of p_H 7.0—10.5, at 20°, 40°, 60°, and 80° indicate that the p_H of the liquor has a marked effect on the extent of bleeding and that in bleeding tests it is necessary to take this factor into account. Bleeding markedly increases when the liquor attains p_H 9.5. The curves for 40° represent fastness to normal scouring conditions for dyed wool materials and indicate that (I), (II), (IV), and (III) increase in fastness in the order named. The bleeding of wet and slightly alkaline dyed wool increases with the duration of lying and the drying, so that in technical processing rapid drying is desirable. Also, dyed wool should be neutralised before testing its fastness to bleeding. Bleeding increases as the ratio liquor : wool increases, and a straight line is obtained by plotting degree of bleeding against log. of this ratio. Over the range 0.5—3.0% depth of shade, the degree of bleeding is proportional to the depth of shade with (I) and (II). A. J. H.

Applying basic dyes to leather. M. C. LAMB and G. M. ROCKE (J. Soc. Dyers and Col., 1933, 49, 105—106).—Before dyeing with basic dyes, tanned leather is treated for 30 min. with a liquor containing as much $CuSO_4$ as the dye to be afterwards applied, whereby the depth of shade obtained subsequently is 4—5 times that similarly obtained on non-treated leather, whilst exaggerated grain defects and a tendency for the dyed flesh side of the leather to be loose to rubbing (evident in leather not fixed after tanning) are avoided. The Cu treatment colours the tanned leather from a pale yellow to brown, but insufficiently to affect the shade obtained with the basic dye, and enables acid dyes to be satisfactorily replaced by basic dyes. Al and Cr salts may be used instead of $CuSO_4$, but they are only about one half as effective. A. J. H.

Significance of the new cellulose model (molecular structure) for the technical and dyeing properties of the fibre. H. MARK (J. Soc. Dyers and Col., 1932, 48, 53—59).—The micelle theory of cellulose fibre structure is applied to explain the effect of stretching, mercerising, dyeing, etc. on the physical properties of various fibres. A. J. H.

Effect of ageing on sulphur-black-dyed fabrics and of certain well-known after-treatments. B. L. HATHORNE (Melliand Text. Month., 1933, 4, 622).—Cotton yarns (tensile strength 400 g., approx.) dyed with S-black and variously after-treated were exposed simultaneously to an accelerated ageing test and their tensile strengths again determined. Graphs are plotted showing the effects of the various after-treatments, and from these it appears that no appreciable protection of the cotton against tendering was obtained by varying the composition of the dye bath in respect of its content of Na_2S , Na_2CO_3 , NaCl, and NaOH; a "standing" bath yielded dyeings which tendered most rapidly during ageing. It is concluded that certain after-treatments now favoured by dyers (e.g., NaOAc + Turkey-red oil) are worthless and that the only satisfactory after-treatment is that using $Na_2Cr_2O_7 + NaOAc$. A. J. H.

[Printing] Para Red, using a nitrosoamine. MANUF. EMILE ZUNDEL, and C. RÉBERT (Sealed Note No. 1598, 29.1.06. Bull. Soc. Ind. Mulhouse, 1933, 99, 76—79). Report by L. DISERENS (*Ibid.*, 79—80).—Fabric is printed or padded with a liquor containing β - $C_{10}H_7 \cdot OH$, the nitrosoamine prepared from p - $NH_2 \cdot C_6H_4 \cdot NO_2$, and NaOH (for stabilisation), then dried and developed by passage through a liquor containing (per litre) $Na_2Cr_2O_7$ or other oxidant (50 g.) and AcOH (50 g., d 1.05). DISERENS states that the Rapid Fast colours (I.G.), more recently discovered, involve the same principles of application; they consist of mixtures of Naphthol AS and nitrosoamines, but do not require an oxidant for their development. A. J. H.

[Printing a] Chrysoïdine brown shade. M. KLOZENBERG (Sealed Note No. 2102, 7.7.31. Bull. Soc. Ind. Mulhouse, 1933, 99, 81—83). Report by M. BATTEGAY and P. KIENZLÉ (*Ibid.*, 83).—Mercerised cotton-satin fabric is padded with a liquor containing, per litre, Oxychrysoïdine (0.9—1.0 g.), AcOH (5—40 c.c., d 1.055), and 6% aq. gum tragacanth (50 g.), then dried, and developed by passage through 1.4% aq. diazotised p - $NH_2 \cdot C_6H_4 \cdot NO_2$ and allowing to lie for 10—15 min.; the resulting shade is intermediate Para Brown R and G, is deeper than the shade similarly produced with Chrysoïdine or Vesuvine (15 g. per litre), is fast to washing, light and acids, fairly fast to Cl_2 , and is more easily dischargeable with Rongalite than is the brown shade obtained using Chrysoïdine instead of Oxychrysoïdine. BATTEGAY and KIENZLÉ confirm the novelty of the process. A. J. H.

Byways of [fabric] printing. W. F. A. ERMEN (J. Soc. Dyers and Col., 1933, 49, 39—42).—A lecture dealing chiefly with methods of obtaining colour effects by the "conversion" style of printing, the printing of vat dyes, and the production of photographic images on fabrics. A. J. H.

Modern wetting-out and scouring agents and their application to textiles. E. SWINDELLS (J. Soc. Dyers and Col., 1932, 48, 86—90).—The uses of a no. of proprietary agents are described. A. J. H.

Dry-cleaning solvents. W. BROWN (J. Soc. Dyers and Col., 1933, 49, 42—45).—The properties of several solvents, including "Stoddard solvent," benzene, white spirit, aromatic hydrocarbons, CCl_4 , and $CHCl_3$, are compared with those of a theoretically ideal solvent. A. J. H.

Influence of moisture in the fixation of aluminium mordants [on fibres]. F. DRIESSEN (Bull. Soc. Ind. Mulhouse, 1933, 99, 65—66).—By exposing overnight to dry and moist air patterns of cotton, wool, and silk spotted with aq. $(HCO_2)_3Al$ and then dyeing with alizarin, it is shown that $Al(OH)_3$ is fixed in cotton only in the presence of H_2O , whilst its fixation in silk is favoured by H_2O but quite independent of H_2O in the case of wool. A. J. H.

Non-shrink finish [for fabrics] by "sanforising" process. A. BODMER (Textilber., 1932, 1B, 657—660).—Machinery previously referred to (B.P. 370,814 and 378,230; B., 1932, 504, 883) is described with illustrations. A. J. H.

p_H control by colorimetric methods. J. MUIR (J. Soc. Dyers and Col., 1932, 48, 225—229).—A review of the development and practice of p_H measurement by indicator methods and their application in industry, especially the textile industry. A. J. H.

Garment dyeing—an aspect of union dyeing. A. J. CROCKATT (J. Soc. Dyers and Col., 1932, 48, 83—85).

Moth-proofing agents.—See V. p_H equipment. —See XI.

PATENTS.

Treatment of liquor employed in kiers and the like. ROESSLER & HASSLACHER CHEM. CO., and T. D. AINSIE (B.P. 389,138, 11.9.31).—The ordinary type of kier having an external heater is provided, when peroxide liquors are employed, with a gas trap in connexion with the heater so that any liberated O₂ may be removed from the liquor-circulating system. A. J. H.

[Shrinking machine for] cloth finishing. CLUETT, PEABODY & Co., INC., Assees. of S. L. CLUETT (B.P. 389,686, 8.6.32. U.S., 22.6.31).

Asphaltic emulsion.—See II. Treatment of cellular materials.—See XIX.

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

Solutions of colloidal silica and their use in industry. R. GRIESSBACH (Chem.-Ztg., 1933, 57, 253—256, 274—275).—A review of the literature. C. I.

Ammonia-soda plant for a modernised Solvay system. F. SCHUCH (Chem.-Ztg., 1933, 57, 261—262).—The modernisation of existing NH₃-soda plants is advocated. Suitable units are of capacity 250 down to 50 tons of Na₂CO₃ per 24 hr., but in favourable circumstances a 10-ton unit can be designed to produce Na₂CO₃ at 49.5 RM. per ton, including capital charges. Building costs are given. C. I.

Proposed manufacture of monopotassium phosphate at Green River, Wyo. III. Manufacture of potash from leach solutions. IV. Manufacture of monopotassium phosphate. R. D. PIKE (Ind. Eng. Chem., 1933, 25, 374—376, 376—378; cf. B., 1933, 345).—III. Details are given of a proposed process for the manufacture of KCl from wyomingite and either Great Salt Lake salt or Green River soda-brine. The latter would be the more economical, Na₂CO₃.H₂O and K₂CO₃-brine being obtained as by-products.

IV. KH₂PO₄ containing 5.8% Na₂O may be produced from the K₂CO₃-brine by adding H₃PO₄ to give p_H 4.4—6.0, and evaporating to dryness. Purer KH₂PO₄ may be obtained by heating KCl with H₃PO₄ and H₂SO₄, adding coal, leaching out, and treating with H₃PO₄ as before. D. R. D.

Material and heat balance in manufacture of copper sulphate from [copper] granules. M. MOLDENHAUER (Chem.-Ztg., 1933, 57, 281—283).—Optimum conditions for dissolution of Cu are (1) max. surface, which is given by the Cu being in the form of thin, hollow spheres; (2) acid concn. of 130—160 g. H₂SO₄ per litre; (3) sufficient agitation. Yields of 99%

(calc. on the Cu) and 93% (on the H₂SO₄) should be obtained; 3 times the theoretical vol. of air is required, and 2.5 times the vol. of H₂O (as steam). A heat balance shows a thermal efficiency of about 60%. 30% of the heat input is derived from the reaction. The growth of cryst. CuSO₄ is greatly hindered by the presence of Fe, As, or excess H₂SO₄. Only small crystals are formed during cooling from 80° to 40°. C. I.

Catalysts for production of hydrogen by means of the water-gas reaction. IX. Reduction of ferric oxide catalyst during catalysis. X. Activity of triferric tetroxide catalyst. R. YOSHIMURA (J. Soc. Chem. Ind., Japan, 1933, 36, 48—49 B, 49—50 B; cf. A., 1933, 234).—IX. A Fe₂O₃ catalyst is reduced to Fe₃O₄ and FeO during the reaction, as predicted theoretically.

X. An active Fe₃O₄ catalyst can be obtained by reducing Fe₂O₃ with a mixture 7H₂:3H₂O at 350°. The product is closely similar in catalytic properties to the original Fe₂O₃, shrinking, loss of activity, etc. occurring at the same temp. D. R. D.

Absorption of sulphur dioxide in water. F. W. ADAMS (Ind. Eng. Chem., 1933, 25, 424—428).—The resistance to the absorption of SO₂ by H₂O in a spiral-tile packed tower is reduced by increasing liquor velocity (*L*), temp., and gas velocity. *L* has the most influence, the over-all resistance, being inversely proportional to *L*^{0.89}. Gas velocity is unimportant, except when *L* is high. The theory of gas absorption is considered in some detail. D. R. D.

S from flue gas.—See I. H₂ as fuel.—See II. Aq. NH₃ as pulping agent. Size for paper.—See V. Re and Ga compounds.—See X. Pb chromes. Pigment testing etc.—See XIII. Fertilisers. Flo-tation S.—See XVI. Potash from molasses.—See XVII.

PATENTS.

Concentration of nitric acid. APPAREILS ET EVAPORATEURS KESTNER (B.P. 390,066, 16.9.32. Ger., 18.9.31).—Dil. HNO₃ vapour is passed up a tower in which it is scrubbed by a descending stream of H₂SO₄; the residual dil. H₂SO₄ is partly concn. in a vac. separator and part is returned to the middle of the tower and the remainder, after further concn., is returned to the top of the tower. L. A. C.

Preparation of concentrated nitric acid by the catalytic combustion of ammonia with oxygen or gases rich in oxygen. I. W. CEDERBERG, Assr. to OXYAMMON A.-G. (U.S.P. 1,859,863, 24.5.32. Appl., 15.2.29. Ger., 15.2.28).—The gases, e.g., a 1:3 (vol.) mixture of NH₃ and O₂, are passed through capillary tubes into a contact chamber (*A*) maintained under raised pressure and thence into a superposed supply of dil. HNO₃ which acts as absorbent. The acid is prevented from entering *A* by a fine wire gauze and is cooled by circulation through external coolers. L. A. C.

Apparatus for production of hydrocyanic acid. P. T. DOLLEY, Assr. to AIR REDUCTION Co., INC. (U.S.P. 1,862,179, 7.6.32. Appl., 13.1.30).—Finely-divided alkali or alkaline-earth cyanides are injected by dry,

preferably superheated, steam (mixed, if desired, with CO_2 or SO_2) tangentially into the lower end of an annular space between the outer wall and a co-axial baffle of a downwardly tapering conical reaction chamber; the mixture then passes down the inner cone, depositing the coarser particles of solid, and escapes through a conical outlet leading through the top of the vessel to a cyclone separator for removing the finer particles. L. A. C.

Clarifying and recovering caustic soda content of deteriorated alkaline solutions [from bottle-washing]. J. H. BUCHANAN and J. H. TOULOUSE, Assrs. to AMER. BOTTLEERS OF CARBONATED BEVERAGES (U.S.P. 1,861,950, 7.6.32. Appl., 6.9.28).—The solution, heated to 82° by jets of steam, is treated with $\text{Ca}(\text{OH})_2$ and heating is continued almost to the boil; after sedimentation and removal of the ppt., the solution is ready for re-use. L. A. C.

Regeneration of spent alkaline liquor [from decomposition of cellulose material] to fresh acid cooking liquor. G. A. RICHTER, Assr. to BROWN CO. (U.S.P. 1,859,888, 24.5.32. Appl., 2.2.27).—The spent liquor is treated with H_2SO_4 or NaHSO_4 (nitre cake) and, after removal of coagulated material, the solution is acidulated with SO_2 and used in the acid digestion of cellulose material. L. A. C.

Treatment of [removal of ammonia from] brine. G. N. TERZIEV, Assr. to SOLVAY PROCESS CO. (U.S.P. 1,861,763, 7.6.32. Appl., 13.5.31).—The brine is treated with, e.g., Cl_2 or NaOBr , and N_2 and its compounds are expelled by heat and/or aëration. L. A. C.

Preparation of solid or half-solid solutions of alkali hypochlorites. P. SHESTAKOFF (U.S.P. 1,868,151, 19.7.32. Appl., 20.6.31. Fr., 27.6.30).—Soap is dissolved in aq. alkali solution by heat and the liquid saturated with Cl_2 . Salt or H_2O may be added to cause incipient solidification at room temp. B. M. V.

Preparation of calcined trialkali phosphates. CHEM. FABR. BUDENHEIM A.-G. (B.P. 390,089, 19.10.32. Ger., 21.10.31).—Dil. aq. Na_3PO_4 is dried to $> 5\%$ of H_2O on a rotating drum heated at $100\text{--}140^\circ$; Cl_2 or other bleaching agent is added to the solution if necessary. L. A. C.

Manufacture of microcosmic salt and other fertilising material. F. MITTEAU, Assr. to SOC. D'ETUDES SCIENTIF. ET D'ENTREPRISES INDUSTRI. (U.S.P. 1,859,835, 24.5.32. Appl., 8.3.30. Ger., 9.3.29).—Solutions containing NaCl and KCl are treated with NH_3 and H_3PO_4 or, e.g., $(\text{NH}_4)_2\text{HPO}_4$ ($\text{NaCl}:\text{NH}_3:\text{H}_3\text{PO}_4 = 1:2:1$). The microcosmic salt which crystallises on cooling is removed and the liquor, after addition of sylvinite, is cooled to ppt. "potazote" ($\text{KCl} + \text{NH}_4\text{Cl}$); the liquor, after removal of the ppt., is used again. L. A. C.

Manufacture of dithiophosphates and compositions containing same. G. H. BUCHANAN, Assr. to AMER. CYANAMID CO. (U.S.P. 1,868,192, 19.7.32. Appl., 18.2.30).—Dialkyldithiophosphoric acids are mixed with > 3 times the amount of Na_2CO_3 for complete neutralisation. B. M. V.

[Production of] hydrated silica. S. S. SVENDSEN, Assr. to CLAY REDUCTION CO. (U.S.P. 1,859,998, 24.5.32. Appl., 23.12.27).— SiO_2 or other siliceous material,

which has been heated to redness and suddenly cooled, is treated with NH_4F and the product is heated above 300° to expel NH_3 and volatilise a mixture of SiF_4 , $\text{SiF}_4(\text{NH}_3)_2$ (I), and $(\text{NH}_4)_2\text{SiF}_6$ (II); the mixture is treated with NH_3 and H_2O under conditions such that the SiF_4 is converted into (I) which is later decomposed to (II) together with opaque hydrated SiO_2 , and (II) is converted into transparent hydrated SiO_2 and NH_4F for re-use in the process. L. A. C.

Production of silicon carbide and calcium carbide. H. E. WHITE, Assr. to SWANN RESEARCH, INC. (U.S.P. 1,859,856, 24.5.32. Appl., 9.1.28).—A mixture of C and CaSiO_3 slag containing approx. 89% of combined CaO and SiO_2 is smelted in an electric furnace to yield a mixture of cryst. SiC and CaC_2 ; the product is treated with H_2O to obtain C_2H_2 , and the residue treated with acid to remove the $\text{Ca}(\text{OH})_2$. L. A. C.

Manufacture of calcium carbide cake. J. G. DAVIDSON and H. F. ROBERTSON, Assrs. to CARBIDE & CARBON CHEMICALS CORP. (U.S.P. 1,867,965, 19.7.32. Appl., 24.1.30).—Polymerised vinyl esters (e.g., a 4:1 mixture of the chloride and acetate) are used as the binding agent. B. M. V.

Manufacture of by-product whiting. J. W. CHURCH and H. G. ELLEDGE, Assrs. to PURE CALCIUM PRODUCTS CO. (U.S.P. 1,862,176, 7.6.32. Appl., 12.6.29).— CaCO_3 slurry, formed by the double decomp. of $\text{Ca}(\text{OH})_2$ and Na_2CO_3 and subsequent removal of the NaOH liquor, is treated with CO_2 to convert residual NaOH into Na_2CO_3 and then with CaCl_2 to convert the Na_2CO_3 into NaCl, which is washed from the product. L. A. C.

Manufacture of aluminium chloride. B. E. CARL (U.S.P. 1,862,298, 7.6.32. Appl., 2.5.25. Renewed 3.2.31).— Cl_2 and a mixture of Al_2O_3 and C, the Cl_2 at no time in excess of that required for the production of AlCl_3 , are introduced into the opposite ends of a rotating cylinder constructed of fused SiO_2 , e.g., "Vitrosil," heated externally by a resistance coil; the AlCl_3 vapour passes into a condenser. L. A. C.

Manufacture of aluminium chloride. A. McD. McAFEE, Assr. to GULF REFINING CO. (U.S.P. 1,867,672, 19.7.32. Appl., 30.9.27).—A mixture of C and bauxite is burned in a stream of Cl_2 containing enough O_2 to maintain the temp. (1100° near jet) by combustion and enough N_2 to steady the reaction. The ratio of the gases may be 67:20:13. B. M. V.

Preparation of stable [active] selenium sulphide. B. W. NORDLANDER, Assr. to GEN. ELECTRIC CO. (U.S.P. 1,860,154 and 1,860,336, 24.5.32. Appl., [A] 28.3.29, [B] 20.3.30).—(A) H_2SeO_3 is added to an aq. solution containing excess H_2S and AlCl_3 as coagulant; the SeS_2 pptd. is removed, washed, and dried. (B) A 1:2-mol. mixture of Se and S is heated at 225° and the product activated by heating for about $\frac{1}{2}$ hr. at $80\text{--}90^\circ$. L. A. C.

Electrolyte for manufacture of hydrogen peroxide. A. KRATKY, Assr. to J. BENE & SONS, INC. (U.S.P. 1,861,573, 7.6.32. Appl., 12.6.28).—A solution yielding $\text{K}_2\text{S}_2\text{O}_8$ on electrolysis and H_2O_2 on subsequent distillation contains H_2O 150, K_2SO_4 10–60, H_2SO_4 5–40,

$(\text{NH}_4)_2\text{SO}_4$ 5—70; $\text{K}_2\text{Cr}_2\text{O}_7$ 0.5—10, and $\text{Co}_2(\text{SO}_4)_3$ 0.5—10 pts. by wt. L. A. C.

Production of thionyl chloride. W. S. BEAN-BLOSSOM, Assr. to HOOKER ELECTROCHEM. CO. (U.S.P. 1,861,900, 7.6.32. Appl., 10.4.30).— SOCl_2 and Cl_2 are added at $< 30^\circ$ to H_2SO_4 containing a heavy-metal chloride (HgCl_2 , SbCl_3) as catalyst, the mixture is heated at 50—70° under reflux until homogeneous, and SOCl_2 is recovered by distillation. L. A. C.

Extraction of those constituents of air [e.g., krypton and xenon] which have a higher SO_2 than oxygen. GES. F. LINDE'S EISMASCHINEN A.-G. (B.P. 390,069, 26.9.32. Ger., 14.11.31).—Gaseous O_2 containing, e.g., Kr and Xe, obtained in the low-temp. fractionation of the air, passes up a column (I) cooled, e.g., by liquid N_2 , so that at the top a portion of the O_2 liquefies and as it flows down (I) extracts Kr etc. from the ascending gas. The residual liquid is worked up to Kr etc. by the usual process. L. A. C.

H_3BO_3 and K H tartrate.—See XX.

VIII.—GLASS; CERAMICS.

Glass as a structural and stress-resisting material. F. W. PRESTON (J. Amer. Ceram. Soc., 1933, 16, 163—186).—The mechanics of structures is summarised in general and with special reference to crushing strength (including the theory of grinding), bursting strength, vibration, wind pressure, and the effect of annealing (theory of "toughened" glass). The failure of glass is always due ultimately to tension. J. A. S.

Effect of gases on the properties of glass. I—III. Gas evolution and absorption by glass. K. NAKANISHI (J. Soc. Chem. Ind., Japan, 1933, 36, 76—78 B).—Na glass evolves gas when heated at a temp. below the softening point, but at the latter temp. it absorbs gases from the air. Absorption occurs at a lower temp. in an atm. of O_2 , but less readily in N_2 or CO_2 . Previous annealing diminishes the quantity of gas evolved on heating. Absorption of gas is even more pronounced with K glass, and is the greater the higher is the % of alkali in the glass. CaO and SiO_2 do not absorb gas under these conditions. D. R. D.

Enamels of standard colours for vitreous china sanitary ware at cone 6. K. M. KAUTZ (J. Amer. Ceram. Soc., 1933, 16, 192—198).—The composition and prep. of easily reproducible green, orchid, ivory, blue, brown, and black enamels are given. J. A. S.

Fusion study of the high-felspar area in the felspar-kaolin-quartz system. M. H. WALDSCHMIDT (J. Amer. Ceram. Soc., 1933, 16, 199—203).—The standard pyrometric cone equivs. (stages of initial and final collapse being noted) of the mixtures were determined in a muffle kiln. The deformation eutectics contained: felspar 92.5, kaolin 5.0, quartz 2.5%; felspar 92.0, kaolin 8.0%; felspar 95.0, quartz 5.0%. J. A. S.

Heat-insulation.—See I.

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Colourless glass. G. JAECKEL, Assr. to SENDLINGER OPTISCHE GLASWERKE G.M.B.H. (U.S.P. 1,868,065,

19.7.32. Appl., 20.11.30. Ger., 22.11.29).—The material of the crucible has incorporated in it materials, e.g., MnO_2 , Co_2O_3 , NiO , ZnSe , capable of neutralising the colour produced by corrosion of the crucible, the glass batch having its own decoloriser for its own impurities. (Cf. B., 1931, 295.) B. M. V.

Protective refractory glaze and method of applying it to refractory bodies containing silicon carbide. S. F. WALTON, Assr. to EXOLON CO. (U.S.P. 1,868,451, 19.7.32. Appl., 23.4.28).—The glaze (composed of Al silicate) must have the same coeff. of expansion as the bond for the SiC and preferably the same composition. It is used as a finely-pulverised mixture of prefused (always in excess) and raw glaze, e.g., 70:30, with a little dextrin. It is painted on as a warm slurry and then fused. B. M. V.

Ceramic kiln. F. W. BROOKE, Assr. to W. SWINDELL & BROS. (U.S.P. 1,868,091, 19.7.32. Appl., 7.1.29).—Suspended carriers for use in a ceramic decorating kiln of the continuous type are derived. B. M. V.

SiC.—See VII. [Resistors for] electric furnaces. Insulating masses.—See XI.

IX.—BUILDING MATERIALS.

Settling velocities of gravel, sand, and silt particles. W. W. RUBEY (Amer. J. Sci., 1933, [v], 25, 325—338).—A general equation combining Stokes' law and the impact formula is derived and tested.

C. W. G.

Concrete strength increased by spray irrigation. E. H. BURROWS (Eng. News-Rec., 1933, 110, 401—402).—Sprinkling of concrete during curing greatly increases the strength. The relative strengths of test cylinders (a) dried in the open (no rain), (b) wetted 4 times per day, and (c) continuously sprayed were 100, 106, 131 after 28 days; 100, 106, 123 after 60 days, and 100, 107, 127 after 90 days. C. A. K.

Determination of the granular composition of Portland cement, using sedimentation apparatus. I, II. K. KOYANAGI and J. SATO (J. Soc. Chem. Ind., Japan, 1933, 36, 72—75 B).—An apparatus is described for the determination of grain size by measurement of the time of sedimentation in EtOH. Stokes' law is found to apply accurately. The data indicate the unreliability of the standard sieve test. D. R. D.

Cement chemistry. H. BRINTZINGER and W. BUBAM (Kolloid-Z., 1933, 63, 87—93).—Apparatus for determining the changes of viscosity during the swelling and contraction of cement pastes in H_2O is described. With increasing CO_2 content the swelling is less and the max. swelling occurs earlier. The same effect is produced by rise of temp., and by the addition of sugars. On the other hand, addition of Na_2SiO_3 increases the swelling, but this is not due to the presence of NaOH, in which cement does not swell. Addition of 0.1—0.15% of SiO_2 (as Na_2SiO_3) increases the tensile strength and corrosion-resistance of cement. E. S. H.

Use of sucrose in sand-lime brick. W. A. HAMOR, G. J. COX, J. METSCHL, and J. W. VAN BRUNT (J. Amer. Ceram. Soc., 1933, 16, 187—191).—Addition of 1.3% of sucrose to the mix increases the transverse

strength of the brick (up to 30%) and, to a smaller extent, the compressive strength. Glucose is also effective, but dextrin lowers the strength. The H_2O adsorption was unaltered (approx. 13.5%) and only a slight brown stain was observed in the efflorescence test. J. A. S.

Identification of woods and [wood] charcoals. J. C. MABY (Analyst, 1933, 58, 219—222; cf. B., 1932, 229).—Photomicrographs of woods of *Acer pseudoplatanus* (English sycamore), *Fagus sylvatica* (beech), *Pyrus malus* (apple), and *Corylus avellana* (hazel) are given, and the identity of the "sycamore" of the ancients is discussed. E. L.

Wood-destroying fungi: biological study of dry rot (*Merulius lacrymans*). (MISS) J. MAC TAVISH (J. Roy. Tech. Coll., 1933, 3, 191—199).

Coke ovens. Road-making asphalts. Timber refuse.—See II. **NH_3 -soda plant.**—See VII. **Glass as structural material.**—See VIII.

PATENTS.

Cement size. W. P. D. MOROSS, ASSR. to AMER. CEMENT PAINT Co. (U.S.P. 1,861,317, 31.5.32. Appl., 22.3.29).—The size contains 10 pts. of amorphous SiO_2 , 6 pts. of china clay, 5 pts. of talc, 0.8 pt. of pigment, and the reaction product from Portland cement 48, $CaCO_3$ 10, alum 4.7, lactic casein 5.5, sulphuric casein 5.5, borax 1.8, and $Ca(OH)_2$ 3.5 pts. L. A. C.

Manufacture of [slag] brick. G. WITTY, ASSR. to R. T. HARTE (U.S.P. 1,867,641, 19.7.32. Appl., 22.11.29).—The brick is composed of granulated blast-furnace slag 200—300, cement 50—100, pulverised $CaCl_2$ 3—8, $Pb_3(BO_3)_2$ 1—6, and pigment 5—10 pts. It is moistened and pressed. B. M. V.

Preparation of coloured granular [clay] material. J. V. FREEMAN (U.S.P. 1,867,661, 19.7.32. Appl., 24.10.28).—Clay granules are soaked in an Fe solution and roasted to between 343° and 565° ; products of different colours may be removed, e.g., from successive hearths of a multi-hearthed furnace. B. M. V.

Heat-resisting composition.—See I. **Tar for roads.**—See II.

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

Water-cooling of blast furnaces. B. VON SOTHEN (Stahl u. Eisen, 1933, 53, 85—91, 121—125).—From the answers received to a questionnaire sent to numerous German steelworks it appears that the H_2O used in cooling the blast furnaces varies from 0.2 to 1.8 cu. m. per hr. per sq. m. of surface cooled, i.e., from 10 to 45 cu. m. per ton of pig Fe produced. The heat removed by the H_2O varies from 2000 to 15,000 kg.-cal. per hr. per sq. m., i.e., 0.1 — 0.46×10^6 kg.-cal. per ton of pig Fe, and the temp. of the H_2O is raised by 6— 14° . The reasons for these variations are discussed and recommendations made for effecting more efficient cooling. A. R. P.

Addition of coke-oven gas in producer gas-fired open-hearth furnaces. F. WESEMANN (Stahl u. Eisen, 1933, 53, 185—189).—From information collected from steelworks using chiefly scrap Fe in the open-

hearth furnace it is concluded that addition of coke-oven gas to the producer gas used in firing the furnaces is of advantage only when there is an insufficient supply of producer gas; it generally results, however, in a higher heat consumption and in less efficient running, owing to the reduction it causes in the speed and energy of the gas and the heating power of the flame. If $> 50\%$ of the gas used is coke-oven gas it is recommended to inject it at high speed with relatively little preheating into the head of the gas burners through H_2O -cooled jets. A. R. P.

Removal of phosphorus from cast iron in a basic converter. F. BICHEROUX (Rev. Mét., 1932, 29, 531—541).—More efficient removal of P from Fe in the Thomas converter can be effected by adding the necessary CaO in two stages. In the first stage, sufficient lump CaO is added to produce with the MnO and SiO_2 produced by the blast a slag containing 23—30% CaO, 20—29% MnO, and 57—41% SiO_2 , which is liquid at 1250° and remains suspended in the molten Fe. At the end of this stage the flame due to combustion of the C appears; when this occurs the second portion of the CaO is fed into the converter as a fine powder suspended in the air blast. This powder is trapped by the suspended slag from which it ppt. the MnO, forming first $7CaO, 5SiO_2$, then $11CaO, 4SiO_2$, which melt at 1375° and retain the MnO in suspension. These two slags have no chemical action on the $Ca_3P_2O_8$ formed in this stage, but they dissolve it unchanged, forming a product rich in citric acid-sol. P_2O_5 . The gradual addition of CaO in this process results in a more complete removal of P with a lower loss of Fe and in a shorter time with a lower consumption of CaO. A. R. P.

Scale formation on dynamo sheets [of iron] with a high silicon content. H. FROMM (Stahl u. Eisen, 1933, 53, 326—328).—When dynamo sheets of soft Fe with 1.8% Si are annealed they become covered with a yellowish-green to dark brown film of scale consisting chiefly of SiO_2 . Cooling in producer gas does not prevent scale formation, but annealing in H_2 reduces the amount of scale considerably and pickling in dil. H_2SO_4 for 15 min. prior to box-annealing almost completely prevents scaling, indicating that the nuclei of the scale are introduced into the Fe during some stage in the prior heat or mechanical treatment. A. R. P.

Case-hardening of iron and steel. S. KAWAGUCHI (Suiyokai-shi, 1932, 7, 156—164).— Na_2CO_3 (40%) + C gave a deeper carburised layer than $K_4Fe(CN)_6$ (10%) + C at 950 — 1100° . Quenching at 950° and then at 850° gave a martensitic case and fine-grained core with neither cementite nor troostite. CH. ABS.

Tensile properties and carbon content of low-carbon steel. I. ADACHI (Suiyokai-shi, 1932, 7, 194—197).—For $< 0.2\%$ C, tensile strength = $0.7C + 30$, where C = $100 \times \% C$. With $< 0.15\%$ C the finishing temp. of hot-rolling has little effect on tensile strength and elongation. CH. ABS.

Structure of quenched carbon steel. H. ESSER and E. ENGELHARDT (Arch. Eisenhüttenw., 1932—3, 6, 395—398).—From the structure of rapidly quenched, plain C steels with 0.06—0.88% C it is concluded that there are no phases present with widely different C

content. From this and from the work of other investigators it follows that their assumption that martensite is a solid solution of at. C in distorted tetragonal α -Fe is incorrect. It is shown to be more probable that martensite consists of a heterogeneous mixture of finely-divided Fe_3C and tetragonally stressed α -Fe, and is thus only an intermediate stage in the transformation of austenite into cementite, differing from the other intermediate structures, troostite, sorbite, and pearlite, only in the size of the ferrite and cementite particles. The increased hardness of quenched steels is thus to be attributed, not to lattice stresses, but to the blocking of slip planes. A. R. P.

Hardening diagram of iron-carbon alloys. H. ESSER, W. EILENDER, and E. SPENLÉ (Arch. Eisenhüttenw., 1932—3, 6, 389—393).—An apparatus is described and illustrated for automatically recording the cooling and magnetic curves of small steel specimens cooled very rapidly in a stream of compressed air. Experiments on plain steels made from carbonyl Fe show that with increased rate of cooling the austenite transformation (I) is progressively displaced to lower temp., the Ar1 field restricted, and the Ar2 field enlarged. With low C contents the Ar1 and Ar2 changes occur at the same temp. at high rates of cooling. The rate of cooling necessary to suppress the Ar1 change decreases with increase of C up to 0.9% and increases again with further increase in C. At this crit. rate of cooling the commencement of (I) falls steadily from 650° with 0% C to 75° with 1.8% C; in no case is the transformation complete at room temp., but it appears to complete itself when the convergence temp. is very close to abs. zero. A. R. P.

Drill steels for mining purposes. W. H. HATFIELD (Bull. Inst. Min. Met., 1933, No. 343. Advance copy, 38 pp.).—The characteristics of sufficient hardness and toughness required for hollow drills are met reasonably by a straight-C tool steel containing 0.7—0.9% C, 0.15—0.18% Si, 0.30—0.35% Mn, and low P and S. The most suitable method of heat treatment depends on the nature of the work required, but in every case smoothness of the inner wall is desirable; a rustless steel has been used with advantage for the tube. The design and treatment of the bit is discussed. An extensive bibliography (with abstracts) is appended. C. A. K.

Influence of hydrogen on transformer steel. W. S. MESSKIN and J. M. MARGOLIN (Arch. Eisenhüttenw., 1932—3, 6, 399—405).—The effect on the magnetic properties of steel with 0.1% C and 4% Si of heating in H_2 at temp. up to 450° under 1—615 atm. pressure has been determined. The removal of C and the reduction of dissolved and occluded oxides by the H_2 increases the coercivity and reduces the watt losses, but the adsorption of H_2 by the steel has the opposite effect. Part of the H_2 disappears slowly from the steel at room temp., but rapidly by heating at 100—150°; the remainder, however, can be removed only by heating at 800° for 4—6 hr., preferably in vac. Only after removal of the H_2 do its beneficial effects on the magnetic properties appear, but the steel then becomes very brittle owing to the small fissures produced by the escape of H_2O , CH_4 , etc. after the H_2 treatment; these

fissures reduce the permeability and electrical conductivity. Excellent magnetic properties without deterioration of the mechanical properties are produced by treating the molten steel with a blast of H_2 , which removes all O, S, P, and C, and allowing the metal to cool slowly so that the excess of H_2 escapes without producing pores. Such metal, owing to its coarsely cryst. structure, must be forged at 1180° and subsequently annealed for 6 hr. at 825°; it then shows a coercivity of 0.33 Oersted with a watt loss of 1.01 W/kg. A. R. P.

Potentiometric determination of iron and vanadium in ferrovanadium, and of iron and chromium in ferrocromium. P. DICKENS and G. THANHEISER (Arch. Eisenhüttenw., 1932—3, 6, 379—387).—In the analysis of ferrovanadium by potentiometric titration, reduction of the Fe and V is best effected with Zn when the alloy has been dissolved in HCl or H_2SO_4 ; a Jones reductor or the SO_2 method should be used when HNO_3 is used in the dissolution. KMnO_4 is better than $\text{Ce}(\text{SO}_4)_2$ for the titration as the potential jumps are sharper. Reductometric titration is less satisfactory than oxidometric. For the simultaneous determination of Fe and Cr in ferrocromium the solution of the sample in HNO_3 is evaporated with H_2SO_4 and oxidised with $(\text{NH}_4)_2\text{S}_2\text{O}_8$ in the presence of Ag_2SO_4 ; after boiling and cooling, the solution is titrated with TiCl_3 to the second potential jump. A. R. P.

Nitriding of metals. D. SAITO and H. OKAWA (Suiyokai-shi, 1932, 7, 23—49).—Powdered Fe, Mn, and Cr were easily nitrided at 500—700° for 5 hr. in NH_3 , but the nitrides were decomposed at higher temp.; Al was less readily nitrided. Co and Ni were difficult to nitride, and the nitrides were unstable. CH. ABS.

Nitriding of nitralloy. M. ISHIZAWA (Suiyokai-shi, 1932, 7, 165—170).—Nitralloy containing C 0.42, A 1.38, Cr 1.47, and Mo 0.25%, previously quenched at 875° and tempered at 700°, was heated at 450—700° in NH_3 and the nitrided layer examined. The nitrided layer suitable for industrial use (obtained at $\geq 550^\circ$) consists chiefly of α - and γ '-phases, and contains no η -phase. CH. ABS.

Composition of copper matte. K. K. AVETISYAN (Eng. Min. J., 1932, 133, 627—629; 1933, 134, 27—28).—Cu, CuO, CuS, and Cu_2O , but not CuFeS_2 or $\text{CuO}\cdot\text{Fe}_2\text{O}_3$, are sol. in 7% aq. KCN in H_2 at room temp.; Fe, FeS_2 , and Fe_2O_3 are insol. The only stable compound formed from Cu_2S and FeS is $\text{FeS}\cdot 2\text{Cu}_2\text{S}$, sol. in KCN, and all Cu matte contains this compound. Cooling the matte causes pptn. of Cu and formation of insol. sulphides. When matte and sulphides are treated with KCN, S dissolves as sulphide and thiocyanate. Hampe's method for determining O by reduction with H_2 gives high results owing to the presence of Zn, Sb, and As. CH. ABS.

Comparative properties of oxygen-free, high-conductivity, phosphorised, and tough-pitch coppers. W. R. WEBSTER, J. L. CHRISTIE, and R. S. PRATT (Amer. Inst. Min. Met. Eng., Inst. Met. Div., Preprint, 1933).—Differences relating to cold-working, scaling, rate of softening on annealing, and rate of grain growth are reported. CH. ABS.

Fabrication and properties of seamless phosphorised arsenical copper tubing. G. L. CRAIG and O. Z. KLOPSCH (Amer. Inst. Min. Met. Eng., Inst. Met. Div., 1933).—Properties are discussed. As increases the strength of cold-drawn, but not of annealed, tubing. Ductility is unaffected by 0.20% As. CH. ABS.

Rapid determination of copper in brass, aluminium alloys, etc. M. V. CHURAKOV (Vestn. Metalloprom., 1932, 12, No. 2, 84—85).—The Al alloy (1 g.) or brass (0.3 g.) is dissolved in HNO_3 (d 1.2, 10 c.c.), N oxides are removed, H_2SO_4 (1 : 4, 50 c.c.) is added, and the mixture is heated for 15 min.; KCN is added, the solution is cooled, then KI is added, and the solution titrated with 0.1N- $\text{Na}_2\text{S}_2\text{O}_3$. CH. ABS.

Precipitation of α - from β -brass. O. T. MARZKE (Amer. Inst. Min. Met. Eng., Inst. Met. Div., Preprint, 1933).—Four alloys which ppt. the α -phase from the β - of the Cu-Zn system were heat-treated in various ways to produce different forms of the segregate. Pptn. at low temp. usually gives plates, and at high temp. needles, the latter tending to coalesce into plate-like structures. CH. ABS.

Colouring brass with solutions. G. GROSS (Metallwaren-Ind., 1932, 30, 455—456).—Rolled brass strips (63% Cu) were treated for various times and at various temp. with $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$ (124 g.) and $\text{Pb}(\text{OAc})_2 \cdot 3\text{H}_2\text{O}$ (38 g.) in H_2O (1 litre). CH. ABS.

Corrosion of nickel and monel metal by sulphured grape juice. E. M. MRAK and W. V. CRUESS (Ind. Eng. Chem., 1933, 25, 367—369).—Ni is more readily corroded than monel metal when sprayed with grape juice, especially if the juice has been treated with SO_2 . D. R. D.

Mercury for dental amalgams. A. ISAACS (J. Amer. Dental Assoc., 1932, 19, 54—57).—Presence of 0.001% of Cu, Zn, Sn, Pb, Bi, Cd, or Sb, but not of Au or Ag ($\geq 0.1\%$), causes film formation and tailing. The solubility of As in Hg is much $< 0.001\%$. Dental Hg should not film nor tail, and the residue non-volatile at red heat should be $\geq 0.02\%$. CH. ABS.

Rôle of the platinum metals in dental alloys.
III. Influence of platinum and palladium and heat treatment on the microstructure and constitution of basic alloys. E. M. WISE and J. T. EASH (Amer. Inst. Min. Met. Eng., Inst. Met. Div., Preprint, 1933).—A study is made of the relation of the liquidus and solidus of the Pt and Pd alloys to composition, the reduction of grain growth by Pt and Pd, the excess phase present in one of the high-Pt alloys, the domain of the phases responsible for the hardening of the Pd alloys, the Widmanstätten type of microstructure exhibited by the hardened Au and Pd alloys and the troostitic appearance of the Pt alloys, and the method of age-hardening as indicated by X-ray diffraction. CH. ABS.

Technical recovery of rhenium and gallium and some of their compounds. W. FEIT (Angew. Chem., 1933, 46, 216—218).—Re is recovered from the Mo residues obtained in the treatment of the Mansfeld Cu schist (A) by the process described previously (A., 1931, 924, 1254); A contains 1 pt. of Re in 5×10^6 and the Mo residues 1 pt. in 20,000. The KReO_4 obtained in the

process is converted into Re powder by heating it, admixed with NaCl, in H_2 at a dull red heat and leaching out the sol. salts. The metal can be converted into HReO_4 by treating it with Cl_2 and H_2O , or with H_2O_2 , and evaporating the solution to dryness. Ga is obtained from the AlPO_4 residues derived from A; these residues are digested with aq. NaOH and the insol. material is removed, the solution is treated with H_2SO_4 to ppt. phosphates and basic sulphates of Ga, Al, and Sn, the ppt. is dissolved in the min. of 4N- H_2SO_4 , and the solution diluted progressively with H_2O to effect fractional pptn. of the Ga which accumulates in the first fractions. To avoid the necessity for working in very dil. solutions Na_2SO_3 is added, whereby a ppt. of $7(\text{GaAl})_2\text{O}_3 \cdot 2\text{SO}_3 \cdot 8\text{P}_2\text{O}_5 \cdot 60\text{H}_2\text{O}$ is obtained. The Ga-rich ppts. are dissolved in H_2SO_4 , the Mo and Sn removed with H_2S under pressure, the solution is made strongly alkaline with NaOH, and the Ga recovered by electrolysis. Ga may be used in place of Hg in dental amalgams. A. R. P.

Aluminium-silicon alloys. W. BRONIEWSKI and SMIALOWSKI (Rev. Mét., 1932, 29, 542—546, 601—604).—The eutectic is placed at 11.1% Si and 575° and occurs in all alloys with 0.9—90.9% Si. The electrical conductivity falls with increasing Si content in a smooth curve which becomes almost parallel with the composition axis at 50—100% Si, the temp. coeff. of electrical resistance falls slowly up to 75% Si and afterwards very rapidly, the thermo-electric force against Pb remains almost const. up to 60% Si and then rises sharply, and the dissolution potential falls very slowly up to 85% Si and then very rapidly. The mechanical properties of alloys with up to 16% Si are shown graphically for alloys modified by melting under a NaF-NaCl flux and by treatment with TiCl_4 . The former treatment gives a finer eutectic and smaller grain-size in the hypereutectic Si particles and hence the better mechanical properties. A. R. P.

Use of aluminium alloys for construction of stills and rectifying apparatus for alcohol. F. BENDIX (Z. Spiritusind., 1933, 56, 46—47).—The Al-Si alloy, silumin, is recommended. It is much stronger than pure Al, forms good castings, can be repaired by welding, and is satisfactorily resistant to corrosion by spirit mashes. Strips having 133 sq. cm. of area, fixed inside a mash column still of Fe, and not insulated from the latter, lost in 170 days only 1.1 g. in wt., equiv. to a layer of metal 0.03 mm. thick. J. H. L.

Theories of addition agent action [in electro-deposition of metals]. R. TAFT (Trans. Electrochem. Soc., 1933, 63, 53—60).—The interference theory of Hunt (A., 1932, 1192; B., 1932, 645) is discussed, and attention is drawn to addition agents which do not become included in the deposited metal. Where such addition agent (e.g., NH_4NO_3 in the deposition of Cu from the acid bath) is capable of being cathodically reduced, its beneficial action may be due to its keeping down the polarisation. H. J. T. E.

Cyanide-free bath for deposition of copper on steel. C. G. FINK and C. Y. WONG (Trans. Electrochem. Soc., 1933, 63, 83—90).—For producing an initial coating of Cu on steel prior to plating from the acid Cu bath,

the usual cyanide bath may be replaced by a bath containing 20 g. of $\text{Na}_2[\text{Cu}(\text{C}_2\text{O}_4)_2(\text{H}_2\text{O})_2]$, 15 g. of Na_2SO_4 , and 20 g. of H_3BO_3 per litre, operated at 1.1 amp./sq. dm. for about 1 min. With higher c.d. or longer period of deposition the deposit tends to blacken at the edges.

H. J. T. E.

Free cyanide in copper electroplating. L. C. PAN (Metal Clean. Finish., 1932, 4, 585—588, 651—654, 658).—The resistance of a cyanide Cu solution decreases rapidly with increasing amounts of free NaCN or Na_2CO_3 . In the absence of Na_2CO_3 , the anode polarisation is practically inversely proportional to the free NaCN content. With 40 g. Na_2CO_3 per litre the Na_2CO_3 acts as anode depolariser. The cathode polarisation is practically unaffected by any change in the free NaCN content in presence or absence of Na_2CO_3 . In absence of Na_2CO_3 the bath voltage decreases hyperbolically with increase in free NaCN; in presence of Na_2CO_3 the effect of free NaCN is negligible. The throwing power is max. at the mol. ratio, free NaCN : Cu = 0.27; the val. is 65% higher in presence than in absence of Na_2CO_3 . The anode efficiency approaches 100% at a mol. ratio, free NaCN : Cu = 2.5. The efficiency is generally higher in absence of Na_2CO_3 . At a ratio 0—0.7 the cathode efficiency is decreased to 50%, and at 2.3 to 0. When the free NaCN is \leq 14 g. per litre no anode film is visible. In presence of Na_2CO_3 the deposit is brighter.

CH. ABS.

Potentiometric determination of chromic anhydride in chromium-plating baths. N. I. CHLOPIN (Vestn. Metalloprom., 1932, 12, No. 3, 74).—The sample (20 c.c.) is diluted to 500 c.c.; 25 c.c. are diluted to 200 c.c., H_3PO_4 (*d* 1.1, 10 c.c.) is added, and the solution is titrated potentiometrically with a solution of $\text{Fe}(\text{NH}_4)_2(\text{SO}_4)_2$ standardised against $\text{K}_2\text{Cr}_2\text{O}_7$, using a Pt-W electrode.

CH. ABS.

Heat-insulation.—See I.

PATENTS.

Carburising furnace. H. W. FLETCHER, Assr. to HUGHES TOOL Co. (U.S.P. 1,867,737, 19.7.32. Appl., 11.7.30).—The furnace is electrically heated, the charge supported on a skeleton, and the door provided with an inlet for gas through which conduit the shaft of an interior circulating fan extends.

B. M. V.

Manufacture of a steel [pressure] vessel. F. NEUHAUS (U.S.P. 1,860,292, 24.5.32. Appl., 5.7.28. Ger., 19.9.25).—Hot-rolled sheets of steel containing 0.1—0.3 (0.2)% V, 0.3—0.7% Mn, and 0.1—0.25 (0.2)% C are hammer-welded by the use of water-gas to form the vessel.

A. R. P.

Manufacture of silicon-iron castings. F. S. HODSON (U.S.P. 1,861,568, 7.6.32. Appl., 10.5.29).—The alloy contains Fe with 8—20% Si, 0.25—2.5% Mn, 0—0.15% S, 0—0.2% P, 0.2—3.5% C, and 0.0003125—0.1% Sb. The Sb refines the grain structure and prevents slag inclusions.

A. R. P.

Production of magnetic alloys. V. B. BROWNE (U.S.P. 1,867,804, 19.7.32. Appl., 20.2.30).—Fe containing \geq 0.03% C is made and cast, cooled, rolled, cut up, and remelted with suitable additions of Si alloy.

B. M. V.

(A) **Manufacture of ductile iron-chromium alloys having a cold-rolled finish.** (B) **Removing oxide coatings from metals.** (C) **Finished iron-chromium alloy article and its manufacture.** (D) **Cleaning metal articles.** H. S. GEORGE, Assr. to ELECTRO METALLURG. Co. (U.S.P. 1,859,698 and 1,859,734—6, 24.5.32. Appl., [A] 30.3.32, [B, C] 21.12.28, [D] 19.6.29. Renewed [C] 23.11.31).—(A) Alloys with 8—40% Cr free from surface oxide are subjected to the following steps: (a) annealing at 600—800° in a slightly reducing atm., (b) immersing in 15—30% aq. NaOH which has previously been saturated with Cl_2 at 70°, and (c) pickling in 3% HNO_3 + 1% HCl. (B) Step (b) is specifically claimed and broader claims are made for the other steps. (C) In step (a) the metal is box-annealed at 800—1000°, wood charcoal out of contact with the metal being placed in the box; in step (b) the solution contains 20% NaOH and in step (c) 50 g. HNO_3 + 10 g. HCl per litre. (D) In step (c) the solution claimed in (c) is used at 70°.

A. R. P.

Ferrous alloys [manganese-chromium steel]. H. L. COLES, Assr. to GUARDIAN METALS Co. (U.S.P. 1,860,852, 31.5.32. Appl., 22.3.30).—Claim is made for a hard alloy, for the manufacture of safes, containing Fe with 14—18% Mn, 7—9.03% Cr, and 2—4% C. Sp. examples contain (a) 16.5% Mn, 9.03% Cr, 2.19% C and (b) 18% Mn, 7.45% Cr, 2.76% C.

A. R. P.

Manufacture of lead and zinc alloys. J. O. BETTERTON, Assr. to AMER. SMELTING & REFINING Co. (U.S.P. 1,860,524, 31.5.32. Appl., 1.11.30).—Alloys of Pb or Zn with Mg or the alkaline-earth metals are obtained by addition of CaCl_2 to a flux containing MgCl_2 or the desired alkaline-earth chloride, with or without NaCl to increase the fusibility, the flux floating on a bath of molten Pb or Zn.

A. R. P.

Non-corrosive [tin-antimony] alloy and articles made therefrom. F. NICODEMO, Assr. to INDESTRUCTIBLE ALLOY Co., Inc. (U.S.P. 1,859,749, 24.5.32. Appl., 9.12.29).—A 50 : 50 alloy of Sn and Sb is treated at 240° with an intimate 1 : 1 mixture of AgNO_3 and CuSO_4 and the resulting alloy is cast into parts for electrolytic apparatus.

A. R. P.

Composition for use in sealing cracks in metal structures. J. F. CUMMING and W. P. EKLUND (U.S.P. 1,868,195, 19.7.32. Appl., 25.8.30).—A composition for adding to the cooling- H_2O of an internal-combustion engine consists of 95% of K or Na silicate, 4.5% of petroleum C black, and $\frac{1}{2}$ % of bergamot oil.

B. M. V.

Cementing tungsten carbide to other metals. W. R. CHAPIN (U.S.P. 1,860,275, 24.5.32. Appl., 16.11.29).—The WC tip is let into a recess in the steel shank which has previously been lined with a cementing material, e.g., powdered Cu; the whole is then covered with $\text{Na}_2\text{B}_4\text{O}_7$, heated to 1100—1200°, squeezed in a vice to expel excess Cu, and allowed to cool slowly in CaO or Si-O-Cel.

A. R. P.

Anti-fermentive soldering flux. E. F. BOWERS, Assr. to D. W. BOWERS and C. T. ASBURY (U.S.P. 1,859,651, 24.5.32. Appl., 4.9.30).—A mixture of equal wts. of salicylic acid, rosin, and glycerin or an oily glyceride is claimed.

A. R. P.

Alloy [for silverware]. J. K. SMITH, Assr. to BERYLLIUM DEVELOPMENT CORP. (U.S.P. 1,859,413, 24.5.32. Appl., 21.1.31).—The alloy consists of Be 29, Al 38, and Ag 33 wt.-%, approx. H. R. D.

Manufacture of magnesium. (A) R. M. HUNTER and (A, B) S. B. HEATH, Assrs. to DOW CHEM. CO. (U.S.P. 1,861,798 and 1,863,221, [A] 7.6.32, [B] 14.6.32. Appl., [A] 27.5.29, [B] 25.5.28.—(A) In the electrolysis of baths of molten $MgCl_2$, the bath is continuously regenerated by feeding $MgCl_2$ containing some H_2O or basic chloride at various points around the anode. (B) The $MgCl_2$ contains about 5% $Mg(OH)Cl$. A. R. P.

Casting of easily oxidisable metals. R. T. WOOD, Assr. to MAGNESIUM DEVELOPMENT CORP. (U.S.P. 1,868,453—7, 19.7.32. Appl., 23.10.29).—Moulding sand for Mg or the like is tempered with a no. of substances having fair binding qualities and progressive volatilising temp., so as to produce a protective coating of vapour when casting. H_3BO_3 or an org. borate, aq. solution of ethylene glycols, aq. polyhydric alcohols, $C_{10}H_8$, S or K_2S , NH_4HSO_4 , and $(NH_4)_3PO_4$ are claimed in various combinations. B. M. V.

Manufacture of an aluminium alloy casting. A. PACZ, Assr. to ALUMINUM CO. OF AMERICA and METALLGES. A.-G. (U.S.P. 1,860,947, 31.5.32. Appl., 24.2.28. Ger., 22.3.27. Renewed 25.3.32).—An alloy of Al with 3—5.5% Cu is treated with 0.05—0.5% Ti under a flux containing an alkali fluoride. The castings are annealed at 510—520°, quenched, and aged either at room temp. or at 100—150°. A. R. P.

Production of rare metals [e.g., uranium] by electrolysis. F. H. DRIGGS and W. C. LILLIENDAHL, Assrs. to WESTINGHOUSE LAMP CO. (U.S.P. 1,861,625, 7.6.32. Appl., 30.3.29).—A fused 1:1 mixture of NaCl and $CaCl_2$ with 5—25 (6%) KUF_5 is electrolysed in a graphite crucible (anode) using a Mo sheet cathode and 150 amp. per sq. dm. at 6—7 volts. Th may be prepared in a similar way from K_2ThF_6 , and Cr from $KCrCl_4$. A. R. P.

Preparation of [metal] surfaces for coating. E. M. JONES, Assr. to PARKER RUST PROOF CO. (U.S.P. 1,860,505, 31.5.32. Appl., 2.11.28).—The article is plated with a thin film of Fe from a bath containing $Fe(NH_4)_2(SO_4)_2$, Na_2SO_4 , K_2SO_4 , KCl, NaCl, and $MgSO_4$, this film is converted into phosphate by treatment in any of the usual phosphatising baths, and finally a coat of paint or other plastic rust-resisting material is applied. A. R. P.

Decorating base metals or alloys of base metals. J. C. McFARLAND, Assr. to WADSWORTH WATCH CASE CO. (U.S.P. 1,862,231, 7.6.32. Appl., 22.6.28).—The surface is provided with a resist design (A) by photographic means, the exposed parts are plated with Cr, A is removed, and the freshly exposed surface etched with $FeCl_3$ and plated with a precious metal which does not deposit on the Cr surface. A. R. P.

Slag brick.—See IX.

XI.—ELECTROTECHNICS.

Potentiometers and hydrogen electrode. P. GOW (Rep. Assoc. Hawaiian Sugar Tech., XI Ann. Mtg., 1932, 179—182).—The portable potentiometer is recommended

for H electrode work in plantation laboratories; for quinhydrone electrode work the Leeds and Northrup p_H indicator (with salt bridge of KCl-agar) is recommended. The determination of the p_H of soils and sugar-house products is described. CH. ABS.

Care and use of p_H equipment. H. A. COOK (Rep. Assoc. Hawaiian Sugar Tech., XI Ann. Mtg., 1932, 175—178).—Colorimetric and potentiometric equipment is considered. CH. ABS.

A decade of applied X-ray research. G. L. CLARK (Chem. & Ind., 1933, 52, 317—325, 336—346).—A lecture, dealing with the application of X-rays to the examination of metals, particularly steel, and the effects thereon of working, strain, and heat-treatment; accumulator plates, ceramics, and minerals; ppts. and colloidal particles, especially from the viewpoint of the determination of particle size; paraffin waxes (including the study of wax formation within oil-impregnated high-tension cables under stress); surface films; the mol. forms present in solutions of substances such as Nile blue; and complex substances such as balata, gutta-percha, rubber, cellulose, protein fibres, and insulin. H. F. G.

Dust elimination from gases.—See I. H_2 as fuel. —See II. Determining S dyes.—See IV. Dynamo sheet-Fe. Transformer steel. Analysis of Fe-V and -Cr. Ga. Al-Si alloys. Electrodeposition. Cu-plated steel. Cu-plate. Cr-plating baths.—See X. Electrodialysis of soils.—See XVI. Determining ash in sugar-beet products.—See XVII.

PATENTS.

Electric furnace and method of operating the same. R. C. BENNER, G. J. EASTER, and C. E. HAWKE, Assrs. to CARBORUNDUM CO. (U.S.P. 1,867,646, 19.7.32. Appl., 2.10.30. Can., 20.3.29).—To produce a non-metallic resistance for temp. > 1100° that will operate without external ballast resistance, SiC is treated with H_2SO_4 and NaOH and washed; the product has a positive temp. coeff. of resistance above about 750°. B. M. V.

Induction electric furnace. H. NEUHAUSS, Assr. to AJAX METAL CO. (U.S.P. 1,859,680, 24.5.32. Appl., 19.9.28).—The graphite inductive heating element is covered on all sides by finely-divided carbonaceous material to prevent oxidation. J. S. G. T.

[Cooling the windings of an] electric induction furnace. D. WILLCOX (U.S.P. 1,859,419, 24.5.32. Appl., 26.3.30).—A flat-wound, flattened, H_2O -cooled tube is thermally connected with all the edge-wound solid conductors of the inductor. J. S. G. T.

Temperature-controlling and -measuring apparatus. L. R. KOLLER, Assr. to GEN. ELECTRIC CO. (U.S.P. 1,860,187, 24.5.32. Appl., 24.4.29).—Thermionic emission from a cathode, coated with Cs and arranged with a co-operating anode in an evacuated vessel, is employed for controlling temp. when the device is at 80—150°. J. S. G. T.

Making storage battery plates. J. H. CALBECK (U.S.P. 1,859,581, 24.5.32. Appl., 28.4.27).—Pb sulphide, prepared by concentrating Pb sulphide ores, is partly oxidised, mixed with pasting solution, and applied to a grid. J. S. G. T.

"Forming" battery plates. D. PEPPER (U.S.P. 1,860,051, 24.5.32. Appl., 12.6.29).—Finely-divided Pb and/or Pb compounds, *e.g.*, PbO, suspended in an electrolyte, *e.g.*, aq. $(\text{NH}_4)_2\text{SO}_4$, is deposited electrolytically upon a support. J. S. G. T.

Discharge tube. A. LEDERER, Assr. to W. T. P. HOLLINGSWORTH (U.S.P. 1,860,149, 24.5.32. Appl., 3.1.27. Austr., 27.9.26).—A mixture of an alkali oxide, *e.g.*, K_2O , and a reducing metal, *e.g.*, Mg, is heated in the tube to release alkali-metal vapour, which is deposited within the tube. J. S. G. T.

Manufacture of incandescent cathodes for thermionic tubes. E. WINTER, Assr. to N. V. SPLENDOR GLOEILAMPENFABRIEK SPLENDOR LAMPWORKS (U.S.P. 1,867,959, 19.7.32. Appl., 28.8.29. Holl., 28.8.28).—The filament is plated with Cu and treated with vapour of a metalloid (6 are mentioned; Se is preferred), then coated with an alkaline-earth metal (Ba preferred) with some oxide if desired, and baked in a non-oxidising atm. B. M. V.

Treatment of electrodes. R. M. HUNTER, L. C. STEWART, H. E. HOUSER, and L. D. PREE, Assrs. to DOW CHEM. CO. (U.S.P. 1,861,415, 31.5.32. Appl., 28.5.31).—C or graphite electrodes are impregnated with tung oil, steamed, and treated with dil. HCl containing FeCl_3 (*etc.*), in order to chlorinate and polymerise the oil. J. S. G. T.

Liquid [electro-osmotic] purification. R. H. KEAN, Assr. to GEN. ZEOLITE CO. (U.S.P. 1,860,676, 31.5.32. Appl., 25.10.28).—Electro-osmotic apparatus comprising a series of cells each having a treating compartment (A) and electrode compartments (B) separated therefrom by permeable diaphragms, means for removing the greater part of the liquid directly from A, and means for causing the lesser part of the liquid to flow, under gravity, from A to B is claimed. J. S. G. T.

Gas-analysis apparatus. (A) W. O. HEBLER, (B) R. H. KRUEGER and J. H. OETJEN, Assrs. to C. ENGELHARD, INC. (U.S.P. 1,860,541 and 1,860,544, 31.5.32. Appl., [A] 8.11.29, [B] 26.7.30).—(A) In apparatus of the katharometer type, a single thermal-conductivity cell comprising a chamber surrounding a quartz tube carrying a heating element, and a resistance embedded in the wall of the tube, is used in place of the standard and test cells commonly used. In (B) the standard cell is filled with a liquid or solid, *e.g.*, turpentine, cotton, or beeswax, instead of a gas. (Cf. B.P. 380,278; B., 1932, 1039.) J. S. G. T.

Electric insulating materials [tape *etc.*]. BRIT. THOMSON-HOUSTON CO., LTD., Asses. of F. M. CLARK and R. A. RUSCETTA (B.P. 389,816, 17.9.31. U.S., 18.9.30).—Tape is treated at about 165° with a composition containing 40–50 wt.-% of a wax (montan, carnauba, *etc.*), 32–40% of rosin, and 28–10% of castor oil or other non-drying oil. J. S. G. T.

Moulded insulating masses for electrical purposes. INTERNAT. GEN. ELECTRIC CO., INC. Asses. of ALLGEM. ELEKTRICITÄTS GES. (B.P. 389,892, 12.10.31. Ger., 13.10.30).—A mixture of quartz and glass is compressed (500–800 kg./sq. cm.) at 600–700°. J. S. G. T.

Portable photoelectric photometers. GEN. ELECTRIC CO., LTD., E. G. VILLIERS, and G. T. WINCH (B.P. 389,599, 4.1.32).

Resistance element for hydrocarbons.—See II. Carbides. H_2O_2 —See VII. Carburising furnace. Magnetic alloys. Sn–Sb alloy. Mg. Rare metals. Preparing metal surfaces. Decorating base metals.—See X. Conducting coatings.—See XIII.

XII.—FATS; OILS; WAXES.

Report of Sub-Committee on determination of unsaponifiable matter in oils and fats and of unsaponified fat in soaps to the Standing Committee on Uniformity of Analytical Methods. I. Determination of unsaponifiable matter in oils and fats. (Analyst, 1933, 58, 203–211).—A standardised procedure, which is suitable for the majority of oils and fats, is detailed; a shortened method, applicable in many cases, and special modifications thereof, to be applied in the case of rosin, shea-nut oil, and oils containing large amounts of wax esters, are also given. The reasons for the particular manipulations and solvents adopted are discussed in detail. E. L.

Examination of a proposed method for identification and estimation of oils and fats. J. R. STUBBS and A. LEES (Analyst, 1933, 58, 211–219).—The oxidation test of Chowdhury and Das-Gupta (B., 1931, 1105) has been examined, both with and without certain modifications of the procedure; the results therein claimed are found to be non-reproducible. The CO_2 vals. now obtained were only $\frac{1}{10}$ to $\frac{1}{2}$ of those originally reported, but could be increased by using 10 times the prescribed amount of KMnO_4 or by raising the temp. of reaction. An appreciable CO_2 val. was obtained in blank tests on the mixed reagents without the oil (? from the oxidation of $\text{C}_5\text{H}_5\text{N}$). E. L.

Iodometric acid values of fats. J. M. CLAVERA and M. O. LÓPEZ (Anal. Fís. Quím., 1932, 30, 971–974).—Ruziczka's method (cf. B., 1930, 1118) is modified in the case of higher fatty acids by prolonging reaction for 24 hr. Rancid oils give false vals. Iodometric acid vals. of 9.8–10.2 for olive oil and 8–8.5 for arachis oil are recorded. R. K. C.

Oil content of nine varieties of soya beans and the characteristics of the extracted oils. G. S. JAMIESON, W. F. BAUGHMAN, and R. S. MCKINNEY (J. Agric. Res., 1933, 46, 57–58).—Relevant analytical data are recorded. The oil content of the seed varieties varied considerably, but the proportion of saturated to unsaturated acids showed only small variations. Notable variations occurred in the I and CNS vals. These are associated with varying proportions of oleic, linoleic, and linolenic acids. A. G. P.

Determination of gossypol in cottonseed meal. J. O. HALVERSON and F. H. SMITH (Ind. Eng. Chem. [Anal.], 1933, 5, 29–33; cf. B., 1924, 22).—The ground meal is extracted first with light petroleum (I), to remove part of the oil, then the gossypol is extracted from the air-dried meal by means of Et_2O and removal of the Et_2O from the extract by vac. The residual extract is diluted with (I) and set aside overnight. The material

insol. in (I) ppts. and is filtered off. NH_2Ph and ethylene glycol are added to the filtrate, the latter aiding the pptn. on the steam-bath of dianiline-gossypol. This ppt. is washed and dried to const. wt., and the gossypol content obtained therefrom by multiplying by 0.775. T. McL.

Chemico-technical investigations of the oil obtained from grape seeds from various wine-growing districts in Rumania. C. OTIN and M. DIMA (Allgem. Oel- u. Fett-Ztg., 1933, 30, 71—77, 135—144).—40 samples of seed from different varieties and districts have been examined. The oil content (12.7—20%; average from dry seed 17%) is $>$ that of seed from, e.g., France. For a given variety of grape, the oil content varies with the richness of the soil and the climate. About half the oil is recoverable by expression. Seeds that have been distilled, or sterilised by boiling in H_2O (2 hr.) and drying at 100° , store well and furnish paler oils of very low acidity; the I val. of such oil is only very slightly $<$, and \bar{d} slightly $>$, that from the fresh seeds. The (semi-drying, edible) oils examined had: d^{20} 0.9214—0.9309, f.p. -18° to -21° , n^{20} 1.4750—1.4775, acid val. 0.4—1.5 (good extracted oils) and 2.8 (expressed oil), sap. val. 186.4—192.4 (mostly 189—190; expressed oils, and oils from press-cake had rather lower vals.), I val. (Hanus) 124.8—142.2 (mostly 132—139); OH val. 40 (approx.) and occasionally 50—60. For a given variety the OH val. varies with the district of cultivation (soil). The defatted seed-cake (meal) can be used as fertiliser or fuel, or (expressed cake) as cattle-feed. Full analyses of the seed (H_2O 9.0, total N 1.56, tannin 5.0, protein 8.4%, etc.) press- and extraction residues are quoted. E. L.

High-pressure hydrogenation of fatty oils. III. Production of active catalysts by reduction of mixed hydroxides of nickel and copper in liquid medium. Y. TANAKA and R. KOBAYASHI (J. Soc. Chem. Ind., Japan, 1933, 36, 32—33 B; cf. B., 1933, 274).—The velocity of reduction of $\text{Ni}(\text{OH})_2\text{-Cu}(\text{OH})_2$ mixtures, suspended in liquid paraffin, by H_2 at 50 atm. has been studied. A 1 : 3 mixture is most easily reduced, reduction being rapid at $132\text{--}134^\circ$. This mixture also yields the most active catalyst for the hydrogenation of fatty oils. If the mixed hydroxides are suspended in the oil and H_2 is passed under high pressure at $130\text{--}135^\circ$, reduction of the hydroxides and hydrogenation of the oil occur very rapidly. D. R. D.

Simple methods for refining [fatty] oils. A. K. MENON and O. S. MENON (Dept. Ind., Madras, Bull. 36, 1932, 14 pp.).—Methods, suitable for use by unskilled villagers, for the determination of free acidity of oils, for deacidifying vegetable oils, and for the manufacture of soap from the soap-stock are described. Hardened fats should prove acceptable as ghee substitutes. E. L.

Occurrence of lauric acid in fish oils. H. G. REES (Analyst, 1933, 58, 222—223).—A small amount of lauric acid was identified in the fatty acids obtained from a solvent-extracted (filtered, washed), sea-bream body oil having d^{15} 0.9335, n^{20} 1.4762, acid val. 16.37, sap. val. 160.3, I val. (Wijs) 177.3, unsaponifiable matter 0.35%. No lauric acid could be separated from dog-fish oil. E. L.

[Modified Margosches method for] determination of iodine values [of fatty oils]. H. JELINCK (Farbe u. Lack, 1933, 173; cf. B., 1932, 515).—The oil (0.09—0.11 g.) is gently shaken in a 500-c.c. glass-stoppered bottle with a mixture (10 c.c.) of Et_2O and COMe_2 (1 : 2) or of amyl alcohol and EtOH (1 : 4), 0.2N-alcoholic I (25 c.c.), and H_2O (200 c.c.), and excess I is titrated with 0.1N- $\text{Na}_2\text{S}_2\text{O}_3$ exactly 5 min. after addition of the H_2O . The end-point is sharpened by addition of CCl_4 (2—3 c.c.) towards the end of the titration. S. M.

Simple devices for determination of the specific gravity of salve-like and solid fats, oils, and waxes. M. A. RAKUSIN (Petroleum, 1932, 28, No. 8; Asphalt u. Strassenbau, 3—4).—The Gintl-Rakusin pyknometer and an apparatus (measuring cylinder containing EtOH) for the determination of \bar{d} of solid fats and waxes are described. E. D.

Viscosity of oils. Transformer oils.—See II. **Raped oilcake as fertiliser.**—See XVI. **Maize oil.**—See XVII. **Irradiation of baked products. Cream churning. Solvent extraction of fish. Fish-meal fat. Examination of feeding-stuffs.**—See XIX.

PATENTS.

Extraction of oil. P. R. HORN BROOK (U.S.P. 1,860,388, 31.5.32. Appl., 10.9.26).—Comminuted seed etc. is fed continuously through an annular space surrounding a rotating perforated drum (covered with filter-cloth) the diam. of which is increased stepwise in order progressively to reduce the thickness of the material and increase the surface exposed to the solvent, which is introduced on the countercurrent principle. In the last stage the thinnest ring of extracted meal is treated with steam in order to remove the solvent and dry the material. E. L.

Polishes.—See XIII.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Influence of metallic driers on paints and varnishes. PHILADELPHIA PAINT CLUB (Paint Manuf., 1933, 3, 18—20, 28, 48—52, 62).—From measurements of the effect of 0.4% of PbO on the rates of oxidation of raw and refined linseed oil (curves given), it is concluded that the usual induction period is due to the presence of natural anti-oxidants, which may not, however, be entirely destroyed by the driers. Since oxidation of synthetic trilinolenic glyceride (A) was also accelerated by PbO , it follows that the drier may function independently of the anti-oxidant. Pb stearate was pptd. from the heated refined oil but not from the raw oil, because Pb soaps and mucilage act as mutually protective colloids; since the filtered refined oil showed a decreased induction period, it appears that the anti-oxidants are destroyed by chemical action and not removed by absorption. Addition of a drier to A caused the induction period to be eliminated and the film to set dry at a lower increase in O content; the drier therefore promotes gelation of the oxidised compounds. The variations in the O and peroxide contents and I vals. during the drying of thin films made from Pb and Co linoleates, raw linseed oil, and linseed oil containing Pb and Co were also measured. The peroxide content in each case

reached a max. and then decreased; the max. was obtained most rapidly with linseed oil containing Pb. Drying tests with $\text{Co}(\text{O} \cdot \text{C}_6\text{H}_4)_2$ (I), $\text{Co}(\text{O} \cdot \text{C}_6\text{H}_4\text{Me})_2$ (II), $\text{Pb}(\text{O} \cdot \text{C}_6\text{H}_4)_2$ (III), $\text{Pb}(\text{O} \cdot \text{C}_6\text{H}_4\text{Ph})_2$ (IV), CoCl_2 (V), $\text{Fe}(\text{CO})_5$ (VI), and PbEt_4 showed that (I), (II), (V), and (VI) are effective and that a drier must be dispersible in the oil; the acid radical is of importance only in so far as it affects dispersibility. (II) and (III) lost their drying action when the metal had been previously combined in glyceride mols. at the double linkings; hence the metal must be free and must also be capable of existing in 2 stages of oxidation. S. M.

Livering and settling of enamels. F. SCHMID (Farbe u. Lack, 1933, 172—173, 185—186).—Livering may be caused by swelling of the substrate, e.g., $\text{Al}(\text{OH})_3$, or of the interaction products of basic pigments and free acids in the oil or resins. It is reduced by using mucilage-free oil which has been well cooked at 280—300°; rapidly polymerised oil favours livering and may also induce settling because it is less sol. in the usual thinners. Sedimentation is retarded by thorough wetting of the pigment particles with oil or by addition of metallic soaps, e.g., Zn linoleate, voluminous oil-absorbents, e.g., asbestine, or, in some cases, H_2O or EtOH. Paints made from carefully washed blanc fixe and linseed oil of low acid val. did not display thixotropy. S. M.

Action of poster adhesive on oil films. VAN WÜLLEN-SCHOLTEN (Farbe u. Lack, 1933, 151).—Failure of dry but fresh oil films containing Pb_3O_4 and white-lead was traced to the hydrolytic action of a potato-starch paste which was faintly alkaline. Oil films should be exposed for at least 4 weeks before such a prep. is applied. S. M.

Mechanism of development of pigment value in zinc sulphide. I. Theory of development of pigment value and methods of test. L. T. WORK and I. H. ODELL (Ind. Eng. Chem., 1933, 25, 411—416).—The bearing of pptn. conditions and the calcination process on pigment properties, e.g., opacity, of pigments of the lithopone type was studied, ZnS being used for simplicity. The changes involved have been ascribed to loss of H_2O , growth of crystals, variation in chemical composition and n_D . The methods used in testing the products for equilibrium sorption of H_2O vapour, oil absorption, obscuring power, tinting strength, microscopical structure, X-ray patterns, n_D , etc. are detailed. S. S. W.

Influence of water used in precipitation of lead chromes. K. BERG (Farbe u. Lack, 1933, 139—140, 148).—The possible effects on the composition and tone of Pb chromes produced by the gases and solids in various natural waters are discussed. S. M.

Manufacture of printing ink. W. F. HARRISON (Ind. Eng. Chem., 1933, 25, 378—381).—The processes of typographic, lithographic, and intaglio printing are briefly indicated, and the composition, prep., and properties of the appropriate printing inks are described. S. S. W.

Solvents for combined oil-cellulose lacquers. K. NAPEL (Farbe u. Lack, 1933, 149—150, 163—164).—Tables are given which show the solubility of nitro- and

acetyl-cellulose, resins, and oils in 56 solvents and 10 diluents as well as their b.p., d , flash point, evaporation rate, comparative odour, and poisonous action. The commonest are discussed and typical recipes given. S. M.

Dissolution of resins in alkali. IV. Dissolution of artificial resins, shellac, and palmitic acid in sodium hydroxide. WO. OSTWALD and W. GAMM (Kolloid-Z., 1933, 63, 93—98; cf. B., 1933, 355).—The amount of Albertol, Bakelite, shellac, or palmitic acid peptised by aq. NaOH varies with the amount of the solid phase present. E. S. H.

Pressing artificial resins.—See X. Determining unsaponifiable matter [in rosin].—See XII.

PATENTS.

Meat-stamping ink. I. S. PADDOCK, Assr. to SWIFT & Co. (U.S.P. 1,868,071, 19.7.32. Appl., 8.6.29).—Me-violet base (1 pt.) partly dissolved in oleic acid (1 pt.), yellow AB (9 pts.), EtOH (900 pts.), and Et_2O (100 pts.) is claimed. B. M. V.

Coating or polishing compositions. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 388,369, 10.8.31).—Mono- and poly-hydric alcohol mixtures above C_8 , containing both odd and even nos. of C atoms, e.g., the C_{14} — C_{30} alcohols obtained by destructive air oxidation of hard or soft paraffin wax or ceresin at 150—160°, are compounded with suitable solvents etc., e.g., with ozokerite and turpentine for a lustrous varnish, or with these and nigrosin for a shoe-polishing cream. C. H.

[Vinyl] coating compositions and the like. F. H. REICHEL (B.P. 389,914, 1.12.31. U.S., 15.12.30).—A lacquer which gives flexible, gas-impervious coatings is obtained by dissolving in a suitable solvent mixture (e.g., EtOAc, BuOAc, and PhMe): (a) the sol. polymerisation product of 5—30 pts. of a vinyl compound of an org. acid and 95—70 pts. of a vinyl chloride, (b) 5—30% of a plasticiser (preferably a phthalate), (c) 0.5—2% of wax, e.g., paraffin. Nitrocellulose (0.5—2%) may also be added. S. M.

Electrically-conducting coatings. F. H. BAGGALEY (B.P. 389,822, 21.9.31).—A finely-divided metal, e.g., Cu, is suspended in a nitrocellulose or other lacquer which contains a resin and sufficient free inorg. or org. acid to render the film a conductor. S. M.

Manufacture of resinous condensation products from aromatic amines and formaldehyde. Soc. CHEM. IND. IN BASLE (B.P. 390,000, 21.4.32. Switz., 23.4.31).—To obtain a uniform, bubble-free resin, the amine is condensed in an acid medium with 1 equiv. of CH_2O and the fusible product cooled and then treated with more CH_2O . S. M.

Production of plastic substances. DEUTS. GASGLÜHLICHT AUER GES.M.B.H. (B.P. 389,852, 23.9.31. Ger., 23.10.30. Cf. B.P. 356,738; B., 1931, 1062).—The acid intermediate products from the condensation of a polyhydric alcohol, e.g., glycerol, and a polybasic acid, e.g., adipic acid, are neutralised with gaseous or conc. aq. NH_3 and polymerisation is continued by heat treatment. [Stat. ref.] S. M.

Making proteinoplasts [with mother-of-pearl appearance]. INTERNAT. GALALITH-GES. HOFF & CO. (B.P. 390,007, 3.5.32. Ger., 6.8.31).—Small quantities of white, H_2O -insol., non-cryst. substances, e.g., hydrated Bi_2O_3 (particle size $< 10 \mu$), are added to the protein base. The effect is increased by adding also a silver coloured metal, e.g., Bi, Al. S. M.

Making of moulded [plastic] articles bearing surface designs. BAKELITE GES.M.B.H., Assees. of O. SINGLE (B.P. 390,212, 2.10.31. Ger., 6.10.30).

Coating metal surfaces.—See X.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Nature of action of organic accelerators for rubber vulcanisation. IV. Detection and analysis of organic accelerators. I. Systematic identification of organic accelerators. K. SHIMADA (J. Soc. Chem. Ind., Japan, 1933, 36, 82—85 B).—The majority of org. accelerators give colour reactions in C_6H_6 or C_6H_6 -EtOH solution with Co oleate. Of those which give no such reaction, thiocarbanilide can be recognised by treatment with I, giving some mercaptobenzthiazole, whilst tetramethylthiuram disulphide and benzthiazyl disulphide can be reduced to the respective thiol compounds; these products can then be detected by the Co oleate test. A systematic (incomplete) scheme of identification for org. accelerators generally, based on these lines, is indicated. D. F. T.

PATENTS.

Manufacture of rubber compositions. DUNLOP RUBBER Co., LTD., D. F. TWISS, and F. A. JONES (B.P. 389,637, 18.2.32).—The product of the condensation of an aliphatic polyhydroxy- NH_2 -compound, such as di- or tri-ethanolamine, with a compound containing an NH group, e.g., α - $C_{10}H_7$ -NHPH or $C_6H_4(NH \cdot C_{10}H_7)_2$, or the derivative obtained by further treatment of this product with an org. carbimide or thiocarbimide, e.g., PhNCS, is incorporated as a preservative agent in rubber. D. F. T.

Production of soft rubber and soft rubber goods. HANSEATISCHE MÜHLENWERKE A.-G. (B.P. 389,480 and Addn. B.P. 389,485, 14.9.31. Ger., [A] 20.11.30, [B] 16.3.31).—(A) A small proportion of phosphatide or material(s) of similar character, especially the P-containing by-products from the manufacture of soya-bean oil, accelerates vulcanisation and imparts extensibility and flexibility to the product. (B) By incorporating other ingredients such as S, C black, etc. in an intimate mixture of the P compound and H_2O before introduction of the paste into the rubber, the formation of agglomerates of powder is avoided. D. F. T.

Ornamentation of rubber articles. MAGYAR RUGGYANTAÁRUGYÁR RÉSZVÉNYTÁRSASÁG (B.P. 389,770, 31.10.32. Hung., 26.11.31).—Coloured intaglio patterns are formed by attaching a shaped paper stencil by means of a coloured cementing layer, preferably containing rubber or consisting of thin rubber sheet, to the surface of the unfinished article and removing the paper stencil after vulcanisation. D. F. T.

XV.—LEATHER; GLUE.

Evaluation of bating materials by means of collagen hide fibres. J. JOVANOVIĆ (Collegium, 1932, 761—771).—Fibres 0.04—0.06 mm. diam. and 2 cm. long are selected from the butt portion of fresh or soaked wet-salted hides, air-dried, soaked in H_2O for 5 min., then suspended in an infusion of the bating material and kept taut by means of a steel clip 0.3 g. in wt. The concn. of the infusion is noted at which the clip falls in 10 min. owing to the weakening of the fibre by the bating action, and this concn. is compared with that of a standard product. D. W.

Chemistry of liming [of raw hides and skins]. V. Action of calcium hydroxide suspensions on steer hide. E. K. MOORE and R. KOPPENHOEFER (J. Amer. Leather Chem. Assoc., 1933, 28, 64—77).—Neither cystine nor cysteine, free or combined, was present in a $Ca(OH)_2$ suspension in which hides had been immersed for 5 days with or without exclusion of air. Only 30—44% of the total S determined in such suspensions was accounted for by CaS , $Ca(SH)_2$, CaS_5 , $Ca(SO_3)_2$, and $CaSO_4$. D. W.

Some tanning processes in the light of the "zwitterion" conception of proteins. K. H. GUSTAVSON (Collegium, 1932, 775—793).—Owing to combination with H^+ , there are no free NH_2 groups in the protein glyoxaline and guanidine radicals except in the p_H range 9—12, so that below p_H 8 or 9 the quinone tannage cannot be effected, because it requires such groups. 38% of the NH_2 groups in collagen are free at the isoelectric point. CH_2O combines with the hide in different ways; thus, the NH_2 groups are converted into $\cdot CH_2 \cdot N \cdot$ groups, the peptide groups into $CH_2 \cdot OH$ groups, and residual valencies probably appear in the combined CH_2O . The conversion of combined H_2O -sol. matter in vegetable-tanned leather into combined tannin by treatment with H_2SO_4 is thus made clear by this conception of proteins. Also the greater stability of leather tanned with vegetable tannins in the alkaline range is easily explained by this theory. By chroming pelt, the NH_2 groups are converted into NH_3 groups and the no. of these is greater in normal chrome-tanned leather than in pelt, which explains the greater amount of vegetable tannin fixed by chromed pelt than by the unchromed pelt. References are also made to the fat-liquoring and dyeing operations. D. W.

The fat-liquoring process. IV. Behaviour of soap and soap-fat mixtures in fat-liquoring chrome-[tanned] leather. V. Behaviour of egg yolk and egg yolk-fat mixtures in chrome-leather fat-liquoring. F. STATHER and R. LAUFFMANN (Collegium, 1933, 129—137, 138—141; cf. B., 1933, 160).—IV. When unneutralised chromed hide powder was fat-liquored with pure soap solutions, under certain conditions, a portion of the absorbed fat was non-extractable by petrol, EtOH, and H_2O , which was $<$ the combined fat present in such powder fat-liquored with sulphonated oils. The total fat, the fat extractable with light petroleum and EtOH, and the combined fat in chrome leathers treated with soap solutions were approx. proportional to the amount of soap used, and were independent

of the Cr content of the hide powder and the vol. of the soap solution used. The amount of fat sol. in light petroleum was slightly diminished by increasing the p_H of the soap solution, the temp., or the degree of neutralisation. The EtOH-sol. and combined fats were unaffected by the p_H of the soap solution and increased by raising the temp. at which the fat-liquored powder was allowed to remain or the degree of neutralisation. The total absorbed fat was unaffected by additions of castor, fish, neatsfoot, or mineral oil to the soap solutions, but the fat sol. in light petroleum was increased by increasing the proportion of added oil.

V. Comparatively little fat was absorbed by unneutralised chromed hide powder from pure egg-yolk fat-liquors; it was all extractable with light petroleum and EtOH, and was increased as the amount of egg yolk used and the Cr content of the powder were increased, but was unaffected by the degree of neutralisation of the powder. The total fat absorbed and the petroleum extract were greatly increased by additions of castor or mineral oil to the fat liquor, and the fat extractable by EtOH was correspondingly diminished. D. W.

Fish skins: a new raw material for leather substitute. Skins of cod (*Gadus cillarlis*), wolf fish (*Anarchechus minor* and *A. latifrons*), and *G. aeglefinus*. M. A. REIMAN, B. I. RUBIN, and O. P. CHUDINOV. **Histological structure of the [above] skins.** A. A. BRAUN, M. F. IVANOV, A. A. RYABININ, and R. N. ORLOV. **Treating fish skins with vegetable and mineral tanning substances.** N. GUREVICH and D. ZILBERMAN. **Topography of the skins from the wolf fish and cod.** A. GUBAREV and E. GORYUNOVA (Tzent. Nauch.-Issledov. Inst. Khoz. Prom., 1932, 3—86, 87—103, 104—112, 113—152).—Methods of prep. and treatment are described. Cod skin, d 1.10, thickness 0.52—0.68 mm., contains H_2O 67.60, dry residue and epidermis 25.10, scale 7.00, and fat 0.3%; wolf-fish skin, d 1.2, thickness 0.78—1.07 mm., contains H_2O 72.4—78.6, fat 0.32—0.35, and dry substance 27.28—21.05%. CH. ABS.

Elastometer for determination of glue strength and modulus of elasticity. E. GOEBEL (Chem. Fabr., 1933, 6, 156—157).—The apparatus measures the immersion of a disc of 10 mm. diam. beneath a glue surface under a known load, the wt. of the disc and friction being compensated. Within the elastic limits the immersion is proportional to the load, and from a series of readings the modulus of elasticity is calc. As results are greatly affected by the temp. of gelatinisation, this operation must be performed in a thermostatic device, which is described. The same apparatus can also be adapted to measure the thickness of membranes etc.

C. I.

Dyeing leather.—See VI.

PATENTS.

Cement size.—See IX. **Treatment of cellular materials.**—See XIX.

XVI.—AGRICULTURE.

Electrodialysis of adsorbed bases in soil. S. OOSUGI and S. AOKI (J. Sci. Soil Manure, Japan, 1932, 6, 261—282).—Temp. changes (21—61°) had no effect.

Crushing considerably increased the amounts of electro-dialysed MgO , K_2O , Fe_2O_3 , and Al_2O_3 in comparison with CaO and Na_2O . Rates of electro-dialysis were in the order: $Ca > Mg$, K , $Na > Al$, Fe . CH. ABS.

Effect of repeated applications of potash on soil reaction and the solubility of the phosphoric acid present in soil. A. FREY (Ernähr. Pflanze, 1933, 29, 71—74).—Prolonged treatment with K manures may change soil reaction in either direction according to soil type. K_2SO_4 and kainit had more marked effects than 40% K salts or KCl. Applications of K tended to produce in soils a transition of PO_4''' sol. in 10% HCl into citric- and citrate-sol. PO_4''' and to increase the ratio of PO_4''' sol. in 10% HCl to total PO_4''' . In this respect KCl was more active than were other K manures examined. A. G. P.

Lead in arable soil. G. BERTRAND and Y. OKADA (Compt. rend., 1933, 196, 826—828).—Five samples of soil from the garden of the Pasteur Institute, Paris, contained 0.207—0.261 g. Pb per kg. C. A. S.

Biological decomposition of peat. R. M. SNYDER and Z. N. WYANT (Mich. Agric. Exp. Sta. Tech. Bull., 1932, No. 129, 63 pp.).—Changes in a mixture of peat, rock phosphate, solid and liquid manure composted for 1 year in a pit are recorded. The citric-sol. PO_4''' increased considerably. The nos. of aerobic and anaerobic cellulose-decomposing organisms, nitrifying bacteria, and nitrite-producing organisms decreased with the age of the compost. SO_4''' -reducing bacteria persisted for a considerable period, especially in the lower layers. Increased fertility resulting from the treatment of raw peat with compost was apparent over a no. of years. A. G. P.

"Humic acid weathering" in the light of recent soil research. E. BLANCK (Ernähr. Pflanze, 1933, 29, 41—43).—The humus of forest soils and peat- H_2O contains much H_2SO_4 . This is ascribed to the decomp. of plant cystine to give S and H_2S which are subsequently oxidised. Acid thus formed is the active agent in the "humus decomp." of rocks. A. G. P.

Determination of the water supply, nutrient condition, and fertiliser requirement of mineral soils by the method of the Lichterfeld Experimental Station. F. ALTEN (Landw. Versuchs-Stat., 1933, 115, 305—332).—Details are recorded of the methods for determining the requisite physical and chemical data. Their use in calculating nutrient vals. is explained. A. G. P.

Report of [German] committee on the examination of fertilisers. POPP (Landw. Versuchs-Stat., 1933, 115, 20—35).—For the determination of K in mixed fertilisers the sample (10 g., passing 0.5-mm. sieve) is heated for 15 min. with 20 c.c. of H_2O and 10 c.c. of conc. HCl. A min. of $BaCl_2$ is added to ppt. SO_4''' . The liquid is diluted to 500 c.c. and filtered. 50 c.c. are evaporated to dryness and ignited carefully to remove NH_4 salts. The residue is dissolved in dil. HCl and K determined by the $HClO_4$ method. All PO_4''' remains in solution, provided the liquid is not evaporated completely to dryness after the addition of $HClO_4$.

Titration methods are essential for the evaluation of liming materials. Limestones rich in Mg dissolve rather

slowly in HCl. Boiling with 0.5*N*-HCl for 5 min. leads to no loss of HCl. The presence of easily decomposable silicates does not vitiate results since these are as effective as is the oxide in their basic action.

In the customary prep. of NH_4 citrates for $\text{PO}_4^{''}$ extraction care is necessary to avoid loss of NH_3 . Citric acid is added slowly by means of a tap funnel to the requisite amount of aq. NH_3 in a rubber-stoppered flask, air displaced from the flask passing out through the funnel. In the citrate extract $\text{PO}_4^{''}$ is determined by the Lorenz method, the ppt. being washed with COMe_2 and dried in a vac. desiccator or over 1:1 aq. H_2SO_4 . The availability of $\text{PO}_4^{''}$ in Ca NH_4 phosphate is discussed.

A. G. P.

Commercial nitrogenous fertilisers. J. W. TIDMORE and J. T. WILLIAMSON (Alabama Agric. Exp. Sta. Bull., 1932, No. 238, 60 pp.).—On a no. of soils examined, the average efficiency of N fertilisers for cotton was: NaNO_3 100, $(\text{NH}_4)_2\text{SO}_4$ 89, urea 86, Ammo-Phos A + NaNO_3 82, Leuna-saltpetre 82, cottonseed meal 57. Continued use of acid fertilisers increased soil acidity sufficiently to lower crop yields. The relative effects of fertilisers in increasing soil acidity were: $(\text{NH}_4)_2\text{SO}_4$ 100, NH_4 phosphate 100, Leuna-saltpetre 75, urea 50, NH_4NO_3 50. The availability of soil-P decreased and that of K increased after repeated applications of physiologically acid fertilisers. Physiologically alkaline fertilisers produced the reverse effects. NH_3 -N was absorbed by cotton seedlings more readily than NO_3 -N. Effects of various combinations of fertilisers are recorded.

A. G. P.

Different fertiliser values of rapeseed oilcakes produced in Japan and China. I. K. YOSHIMURA, H. MURATA, and Y. TAKASE (J. Sci. Soil Manure, Japan, 1932, 6, 283—300).—No relation was observed between the N and fat contents and the degree of decomp. of N compounds in the soil. The decomp. of N compounds was retarded when the seeds had been roasted.

CH. ABS.

Microbiology of organic manures. II. Decomposition of soya-bean cakes by various stock cultures. A. ITANO and S. ARAKAWA (J. Sci. Soil Manure, Japan, 1932, 6, 301—311; cf. B., 1932, 695).—In flooded soil ammonification, and in dry soil nitrification and ammonification, were observed. Decomp. was effected respectively by bacteria and by *Actinomyces*.

CH. ABS.

[Titrimetric] determination of nitrogen in [ammonium sulphate] fertilisers. H. A. J. PIETERS and M. J. MANNENS (Chem. Weekblad, 1933, 30, 263).— $(\text{NH}_4)_2\text{SO}_4$ (1.4 g.) in 50 c.c. of H_2O are added to 10 c.c. of neutralised formalin. After $\frac{1}{2}$ hr. 22 c.c. of *N*-NaOH are added and the excess is titrated with *N*- H_2SO_4 (phenolphthalein). The results are as accurate as those obtained by distillation.

S. C.

Physiological basis of potash salt manuring. T. REMY and A. DHEIN (Landw. Jahrb., 1932, 76, 953—1019).—Crop yields following applications of KCl and of K_2SO_4 under normal conditions were similar and indicated no anionic effects. Ash constituents of the crops were, however, markedly affected. The relative intake of K', Cl', and $\text{SO}_4^{''}$ from KCl and K_2SO_4 de-

creased in the order named, but the increase in % Cl' in the ash after KCl treatment was > that of K. The ratio K'/anion in the ash differed considerably in various crops examined. Cl' tended to facilitate, and $\text{SO}_4^{''}$ to restrict, the intake of bases by the plants, but no corresponding differences in the reaction of the cell saps were observed. K manuring accelerated the intake of other nutrients although the actual % Mg and Ca in the ash declined and, in general, the ratio anions/cations increased. In this respect KCl exerted a greater action than did K_2SO_4 . The plant-protecting action of K against insect damage was greater for KCl than for K_2SO_4 . During growth the ratio K'/ $\text{SO}_4^{''}$ in plants receiving K_2SO_4 remained unchanged, but in plants receiving KCl the ratio K'/Cl' tended to decrease. In the early growth of potatoes the K taken up from K salts accumulated mainly in the tubers and Cl' and $\text{SO}_4^{''}$ in the leaves. The latter was partly transferred to tubers at a later period. The effect of K on the translocation of nutrients within the plant tissues is examined. The K content of sugar-beet leaves was increased by applications of 40% K salts and of K_2SO_4 , but not by kainit. In beet supplied with KCl, the K' and Cl' were stored principally in the leaf ribs, but with K_2SO_4 the K was distributed between ribs and blades, and $\text{SO}_4^{''}$ accumulated chiefly in the blades. The reduction in Ca content of leaves following K manuring was much more marked with kainit than with 40% K salts or K_2SO_4 . The increased H_2O content of K-manured plants varied with the nature of the crop and the form in which K was applied. The transpiration rate of plants was increased by manuring with K salts, irrespective of their character. The evaporation of H_2O from soil is reduced to a greater extent by KCl than by K_2SO_4 . Plants receiving KCl reach the wilting point earlier than those supplied with K_2SO_4 .

A. G. P.

Base-exchange modifications of a Leonardtown silt loam under fertiliser and crop control. R. S. HOLMES (J. Agric. Res., 1933, 46, 161—168).—Fertiliser treatment increased the content of available K, Ca, Mg, Mn, and N in this soil, but these factors were of less significance with respect to crop yields than was the increase in available P. 0.05*N*-HCl and NH_4OAc were equally effective in removing exchangeable bases from soils, but their effects on the sesquioxide, phosphate, and SiO_2 of soils were widely different.

A. G. P.

Influence of potassium ions on development of summer barley. H. WEINMANN (Arch. Pflanzenbau, 1932, 9, 525—572).—The K intake of barley increased with successively increasing K supplies, the effect being more apparent in the composition of the straw than in that of the grain. Variations in K nutrition affect the morphological character of the various plant organs to widely different extents, the roots undergoing least change. Detailed examination of the plants is recorded and the effects of sub-optimal and excessive supplies of K are examined.

A. G. P.

Growth of potatoes in acute potash starvation. KÖSTLIN (Ernähr. Pflanze, 1933, 29, 48—50).—Fertiliser trials are recorded emphasising the importance of K in potato culture. Use of N and P fertilisers without

K leads to the appearance of "stripe disease" in the plants. A. G. P.

Effects of fertilisers and rotation on earliness and total yields of tomatoes. C. B. SAYRE (New York State Agric. Exp. Sta. Bull., 1933, No. 619, 50 pp.).—On the soils examined, high- PO_4 fertilisers were the most effective in increasing both the early and total yields. The response to N was smaller and K was least necessary. A. G. P.

Weight of leaves and formation of sugar [in beets]. K. TJEJBBES (Z. Zuckerind. Czechoslov., 1933, 57, 216).—Experiments with 16 races of sugar beet over a no. of years, at the Swedish Sugar Beet Institute, Hilleshög, showed that in comparing the same race in different years there is a general parallelism between wt. of leaves and amount of sugar formed; but in comparing different races in the same year there is no relation between leaf growth and sugar formation. The effects of weather conditions on leaf growth are much the same for different races, but their effects on sugar formation are not so uniform. J. H. L.

Water and nutrient supplies of plants. F. SEKERA (Ernähr. Pflanze, 1933, 29, 61—70; cf. B., 1933, 35).—The "crit. H_2O content" of soils is explained and discussed in relation to the H_2O of hydration of the "swarm" ions associated with the soil colloids. Manuring influences the H_2O -supplying power of soils by affecting ion hydration and the degree of dissociation of the colloidal system. K manuring accelerated the supply of available H_2O on Egyptian Na-soils (irrigated areas), but restricted that of Ca-soils. A. G. P.

Determining the quantity of mineral oil retained by leaf surfaces after spraying. L. H. DAWSEY and A. J. HAAS, JUN. (J. Agric. Res., 1933, 46, 41—49).—Camphor leaves are extracted with Et_2O and the extract is evaporated to dryness without filtration. The residue is dissolved in 1:1 Et_2O -abs. EtOH , cooled to -30° , and the pptd. plant wax removed by filtration in a frozen brine (-20°). The filtrate and washings are transferred to a Babcock skim-milk bottle, which is then placed in hot H_2O and the solvent allowed to evaporate through the capillary. The oily residue is treated (dropwise) with 6 c.c. of HNO_3 (d 1.42) and after the brisk reaction has subsided, the bottle is heated in boiling H_2O until the oil layer is clear. More HNO_3 is then added to fill the bottle, which is centrifuged and the oil column measured directly. Small modifications are introduced for the examination of pecan and Satsuma orange leaves. Data are given showing the amounts of oil retained by leaves sprayed with emulsions prepared with increasing proportions of Na oleate. A. G. P.

Effect of different soaps on lead arsenate in spray mixtures. J. M. GINSBURG (J. Agric. Res., 1933, 46, 179—182).—On apple trees sprayed at 14-day intervals with Pb arsenate-hydrated Fe_2O_3 -soap mixtures, the extent of the injury effected by the use of different soaps was in the order K fish-oil soap (I) > K oleate > triethanolamine soap (II). In admixture with Pb arsenate, soaps of strong bases produced larger amounts of sol. As than those of weak bases. Of the soaps examined, (I) produced the largest and (II) the smallest proportion of sol. As. A. G. P.

Flotation sulphur in agriculture. V. SAUCHELLI (Ind. Eng. Chem., 1933, 25, 363—367).—The manufacture of very finely-divided S from coke-oven gas is described. H_2S is absorbed in alkali and the solution aerated in the presence of a catalyst. S is filtered and purified. The use of flotation S in the control of various plant pests and diseases, and in the amelioration of alkali soils, is described. A. G. P.

Carbon disulphide emulsion for control of the root-knot nematode. E. F. GUBA (Mass. Agric. Exp. Sta. Bull., 1932, No. 292, 16 pp.).—Satisfactory results are obtained by the use of an emulsion containing CS_2 68, H_2O 26, rosin-fish oil soap 6%, which is diluted 1:50 with H_2O and applied to the soil at the rate of 1 gal. per sq. ft. CH_2O may be added to the above for the simultaneous control of fungus pests. A. G. P.

Brown rootrot of tobacco. T. R. SWANBACK and H. G. M. JACOBSON (Science, 1933, 77, 169).—The disease results from insufficient Ca intake by the plant, brought about by lack of available Ca, excess of Mg over Ca, or presence of marked amounts of $\text{NH}_3\text{-N}$ in relation to $\text{NO}_3\text{-N}$. L. S. T.

Potentiometers etc. [for soil tests].—See XI. **Grape-seed [residue as fertiliser].**—See XII.

PATENTS.

Manufacture of agents for combating plant pests. J. Y. JOHNSON. FROM I. G. FARBENIND. A.-G. (B.P. 389,951, 18.1.32).—The agents comprise H_2O , wetting agents (soap, sulphonic acids) or higher fatty acids (oleic acid), and the product obtained by heating at $150\text{--}250^\circ$ a 1:1 mol. mixture of HCO_2NH_4 or $\text{HCO}\cdot\text{NH}_2$ with an aliphatic ketone (COMe_2). L. A. C.

Fertilisers.—See VII.

XVII.—SUGARS; STARCHES; GUMS.

Drying [sugar-beet] pulp with a Büttner dryer. I. I. CHERNOBULSKI and A. F. NITCHENKO (Nauk. Zapiski Tzuk. Prom., 1932, 23, 93—96).—The difficulty of drying sour pulps is described. CH. ABS.

Clarification of syrups and remelt. A. M. PSHENICHNI and B. P. SHUMKOV (Nauk. Zapiski Tzuk. Prom., 1932, 23, 73—88).—Addition of CaO does not darken sulphitated juices, but increases the amount of Ca salt; Na_2CO_3 decreases the latter, but slightly increases the colour. The juice of the first carbonation or remelt, when sulphitated to p_{H} 8—9, becomes darker, and further sulphitation to $p_{\text{H}} > 7$ increases the Ca salt. Juice sulphitated to p_{H} 6 is treated with 0.2% Na_2CO_3 and 0.25—0.5% CaO, carbonated to p_{H} 9.5, reheated, and filtered. The remelt is treated with 1—2% CaO on the wt. of sugar, carbonated to p_{H} 9—9.5, filtered, and sulphitated to p_{H} 7—7.5. Filtered and non-filtered juices sulphitated by the same amount of SO_2 give a lower and a higher p_{H} , respectively. CH. ABS.

Crystallisation of second-strike masseuite in molaxers. A. GIRDA (Nauk. Zapiski Tzuk. Prom., 1932, 23, 67—71).—The time of crystallisation can be

decreased to about 20 hr. Dilution and crystallisation may be controlled by viscosity, measured by the resistance of the mass in molaxers. CH. ABS.

Decomposition of alkaline sugar solutions at high temperatures. III. O. SPENGLER, E. LANDT, and J. OST (*Z. Ver. deut. Zucker-Ind.*, 1932, **82**, 885—897).—Experiments similar to those made with CaO and Na₂CO₃ as alkalisng agents (B., 1931, 509, 1151) were carried out with NaOH, and the results, given in tables and graphs, were of the same character. Discoloration maxima were observed at the neutral point, as with CaO, but not with Na₂CO₃ (*loc. cit.*).

J. H. L.

Potash recovery from molasses. H. S. HARKNESS (*Rep. Assoc. Hawaiian Sugar Tech.*, XI Ann. Mtg., 1932, 198—201).—Plant is described. The ash contains 35% K₂O, the recovery on molasses being 2.5—3%.

CH. ABS.

200 days' sugar manufacture [at the Vozrozhdenie factory] during 1931—1932. I. B. MINTZ, I. Z. KHELEMSKI, I. I. SHOKHET, and V. F. OREL (*Nauk. Zapiski Tzuk. Prom.*, 1932, **23**, 1—42).—The following precautions are necessary in working stored beets: the transport H₂O is kept at a low temp.; the beets are sprayed with CaO—H₂O before slicing; the diffusion battery temp. is $\geq 75^{\circ}$; defecation is effected with 0.25% CaO in measuring tanks and the rest of the CaO is added in the defecators at $\leq 85^{\circ}$, the total CaO being $\geq 3\%$; the normal alkalinity after the first carbonation is kept at 0.07—0.08 and decreased only in case of difficult filtration.

CH. ABS.

Electrometric determination of [soluble] ash in sugar-beet products. M. Z. KHELEMSKI (*Nauk. Zapiski Tzuk. Prom.*, 1932, **23**, 55—65).—Tödt's method is employed.

CH. ABS.

Müller's solution [for determination of invert sugar]. G. BRUHNS (*Z. Ver. deut. Zucker-Ind.*, 1932, **82**, 898—911).—This substitute for Fehling's solution, proposed in 1898, contains 34.6 g. of CuSO₄·5H₂O, 173 g. of Rochelle salt, and 180 g. of Na₂CO₃·10H₂O per litre. After keeping for several days to clarify, it remains stable for months, and ppts. no Cu₂O when boiled alone. It is suitable for determining small quantities of invert sugar alone or in presence of sucrose, *e.g.*, in refinery products, the sucrose correction being only about $\frac{1}{10}$ as much as with Fehling's solution. Examples of its use are given. Fructose is more rapidly oxidised than glucose, and both ppt. more Cu₂O from Müller's solution than from Soxhlet's Fehling solution.

J. H. L.

Glucose for the [viscose] coagulating bath. I. **Manufacture of starch sugar.** Z. KAWATA (*J. Cellulose Inst.*, Tokyo, 1933, **9**, 68—70).—On treatment of starch with H₂SO₄ the rate of conversion into glucose increases with decrease in the concn. of the acid, whilst addition of Na₂SO₄, ZnSO₄, etc. to the saccharification bath has no important effect. On replacement of the glucose in the coagulating bath (I) by dextrin there is little effect on the properties of the threads provided that the replacement is $< 25\%$; hence starch sugar containing $< 25\%$ of dextrin may be used in (I).

B. P. R.

Determination of nitrogen in starch products. G. STEINHOFF (*Z. Spiritusind.*, 1933, **56**, 73—74).—A sample (1—2 g.) is mixed with 25 c.c. of conc. H₂SO₄, 1 g. of CuSO₄, and 10 g. of Na₂SO₄ in a Kjeldahl flask, heated for $\frac{1}{2}$ hr. after the appearance of a green colour, cooled, diluted with 150 c.c. of H₂O, then 100 c.c. of 30% NaOH are added, the NH₃ is distilled off into 0.1N-HCl or H₃BO₃, and excess acid back-titrated (Congo-red). A micro-method, in which a sample is warmed with conc. H₂SO₄ and H₂O₂ and the NH₃ determined titrimetrically with NaOBr, or colorimetrically with Nessler's reagent against a standard for comparison, is also described.

R. H. H.

Maize starch [and oil]. A. E. WILLIAMS (*Ind. Chem.*, 1933, **9**, 129—133).—Details are given of all the processes involved in the prep. of thin- and thick-boiling starches from maize, and their separation from the other constituents. In the manufacture of "crystal" starch it is important that the process of drying the starch blocks should not be too rapid. Thin-boiling starches prepared by treatment with HCl are liable to deteriorate on keeping unless rendered alkaline again with NaOH. The prep. of maize oil suitable for soap manufacture is also described.

P. G. M.

Production of potato starch and its importance for nutrition. B. BLEYER (*Z. Spiritusind.*, 1933, **56**, 45—46).—The manufacture and applications of potato starch (I) are briefly summarised. A glutinous texture in bread, due to excess of unbound moisture, may be avoided by addition of a few % of (I) to the flour, but the ratio of (I) to H₂O used must be carefully adjusted to obtain the best results.

J. H. L.

Potentiometers etc. [for sugar-house products].—See XI. **Sugar-beet culture.**—See XVI. **Maize sugar for condensed milk.** Detecting starch in margarine.—See XIX.

PATENTS.

Centrifuging process for separating the mother-liquor from crystals or crystalline syrup. RAFFINERIE TIRLEMONTAISE SOC. ANON. (B.P. 386,561, 11.7.32. Ger., 9.7.32).—To prevent concn. of adhering syrup on the crystals in the centrifuge, by air which, especially at very high centrifugal speeds, continually passes through the layer of crystals and circulates back to the basket from the outer casing, the temp. and humidity of this air are regulated. *E.g.*, air is withdrawn from the outer casing to a plant from which it is returned saturated at the temp. of the crystal charge. Several types of plant for this purpose are described comprising fan, air heater, air moistener, and H₂O separator.

J. H. L.

Saccharification of amylaceous materials.—See XVIII.

XVIII.—FERMENTATION INDUSTRIES.

Detection of arsenic in wine and [other] fruit beverages. P. BERG and S. SCHMECHEL (*Chem.-Ztg.*, 1933, **57**, 262—263).—The destruction of org. matter with strong acids is inconvenient and involves risk of contamination with As from glass. For wine, Gutzeit's method is better as a qual. test. Foaming is prevented by addition of EtOH, and H₂S is removed with Pb(OAc)₂.

By the use of the Sanger-Black modification of this method the test may be made quant., the coloration of HgBr_2 paper being compared with that given by known As solutions. In most wines the use of SO_2 ensures that As^V is not present; in case of doubt a little Na_2SO_3 may be added. A no. of analyses are given, the highest figure recorded being 2.0 mg. As per litre. C. I.

Clarification of ciders by the centrifuge method.

I. B. T. P. BARKER and O. GROVE (Rep. Long Ashton Res. Sta., 1933, 1—11).—Cider from several varieties of apples was centrifuged at 16,000 r.p.m. (Sharples clarifier) and the resulting fluid compared with that obtained by filtration. It contains more yeast cells than the latter, but fermentation is largely inhibited. The malic acid content depends on some other factor, probably a bacterial one. Sp. gr. on keeping is hardly affected by centrifuging instead of filtration.

P. G. M.

Corrosion of Ni etc. by grape juice. Al alloys for rectifiers.—See X. Grape-seed oil.—See XII.

PATENTS.

Fermentation cabinet. C. H. BAILEY, Assr. to GEN. MILLS, INC. (U.S.P. 1,859,613, 24.5.32. Appl., 28.4.30).—The cabinet consists of several horizontal chambers in communication with upright air-circulation passages. The air may be cooled or heated, circulated at const. temp., and have its humidity controlled. The cabinet is of use in biological operations, e.g., the fermentation of bread dough.

R. H. H.

Liquefaction and saccharification of amylaceous materials in brewing. I. A. EFFRONT and A. R. BOIDIN (B.P. 385,729, 11.12.31. Fr., 29.1.31).—The diastatic action of the malt used is supplemented by adding to the mash, or to the raw grain before this is mixed with the malt mash, a quantity of animal or bacterial amylase, preferably that prepared by means of *B. mesentericus* (B.P. 315,877; B., 1931, 363), diastatically equiv. to 1—5% of the amount of malt used. Complete saccharification of the starch is thus ensured and certain glucosides and gums not attacked by malt amylase are hydrolysed.

J. H. L.

Removal of tartaric acid and tartrates from grape juice, must, and wine. VINEYARDISTS, INC. (B.P. 389,482, 14.9.31. U.S., 20.9.30).—Tartrates etc., which are gradually deposited in a finished wine on keeping, are removed from the juice etc. by stirring in the calc. amount of Ca malate and setting aside for a while. The malic acid produced does not impair the flavour or quality of the wine.

R. H. H.

Treatment of cellular materials.—See XIX.

XIX.—FOODS.

March of acidity in stored flours: determination of flour acidity. A. SCHULERUD (Cereal Chem., 1933, 10, 129—139).—Three rye flours (0—68%, containing about 15% of wheat) and a patent wheat flour were stored under commercial bakery conditions for a year. At intervals the titratable acidity was determined in Et_2O , 67% and 96% EtOH extracts, and fresh and 24- and 48-hr.-old aq. suspensions, together

with the P_2O_5 and acidity in the diluted filtrates from the 48-hr. aq. suspensions. The total increase in acidity is approx. the same, within the same flour, by all the methods. 67% EtOH extracts more acid than does 96% EtOH, and the latter more than Et_2O . The differences between the amounts of acid constituents extracted by the different methods remain practically const., i.e., the fatty acids are alone responsible for the increase in flour acidity. The amount of P_2O_5 and the titre in the filtrates from the 48-hr. suspensions are const. The Greek method (85% EtOH) is comparable with the above EtOH methods, as the rise in acidity is also due to the increase in the amount of fatty acids. The A.O.A.C. acidity is considered to be due to a secondary reaction between insol. fatty acids and phosphates, forming acid phosphates, and to be less correct than the EtOH-extraction methods. A graph illustrates the regular increase in acidity, as determined by the various methods, typical of all the flours.

E. A. F.

Soft winter wheat studies. I. Suitability of the A.A.C.C. basic baking procedure for determination of strength. E. G. BAYFIELD and V. SHIPLE (Cereal Chem., 1933, 10, 140—148).—Analytical and baking tests carried out on experimentally milled flours from soft winter wheat varieties grown in 10 different parts of Ohio in 1931 show that the following modifications of the A.A.C.C. basic baking test are desirable for these soft flours: variation of the H_2O absorption (58% is too high), use of < 3.5 g. of sugar, and use of the bromate differential test.

E. A. F.

Tenderness in pastries made from flours of varying strengths. M. C. DENTON, B. GORDON, and R. SPERRY (Cereal Chem., 1933, 10, 156—160).—Details are given of the test formula, procedure, and breaking strength used for determining the tenderness of pastry flours. The breaking strengths are rather closely correlated with the protein content of the flour. Factors which affect the results are indicated. Room and dough temp. have a profound influence on breaking-strength tests, which decrease in numerical val. as the temp. rises, presumably because the warm fat greases the flour particles so thoroughly that the H_2O absorption of the gluten is affected. The breaking strength of blends of flours of widely different characteristics is approx. equal to the mean of the breaking strengths determined experimentally for each flour.

E. A. F.

Certain effects of ultra-violet irradiation on the chemical and nutritive properties of baked products. J. W. READ and C. H. BAILEY (Cereal Chem., 1933, 10, 99—128).—The development of antirachitic potency in irradiated soda-crackers and shortenings and in crackers made with irradiated shortenings was followed by various tests on rats. Irradiation was carried out by means of a quartz-Hg-vapour lamp (Hanovia, 110 volts, 5 amp.) for varying periods at a distance of 12 in., the total ultra-violet energy emitted at this distance being 94 ergs/sec./sq. mm. 5—10% of the basal rickets-producing diet was substituted by the irradiated product. The irradiated hydrogenated shortening did not lose its antirachitic potency during the fermentation and baking processes. Longer periods

than 10 min. of irradiating the shortening may cause some destruction of the vitamin-D. 3-min. irradiation of lard and hydrogenated shortening spread out in layers 2—3 mm. thick was sufficient to impart distinct antirachitic properties, which were not substantially impaired by continuing the treatment for 10 min. Crackers irradiated for 1 min. effected healing. The results indicate that some lards contain appreciable amounts of vitamin-D. Hydrogenated shortening when irradiated for > 3 min. became rancid, and crackers made from lard and then irradiated became rancid in a few sec. The technique adopted for irradiation of soda-crackers on a commercial scale effected an antirachitic activation by exposure for 10 sec. at the above intensity of irradiation. E. A. F.

Gluten estimation. A. S. CARLOS (Food, 1933, 2, 232).—A simple gluten-washing apparatus consists of an outer glass cylinder (*A*) fitted with an inlet and outlet for H_2O at the bottom and top. *A* is equipped inside with a piston (*B*) carrying a canvas bag into which the flour is filled. The movement of *B* up and down is actuated by a power-driven eccentric overhead. A quantity of flour is filled into a bag and the latter is screwed into position. H_2O is run through *A* and the bag is collapsed and extended bellows-wise by means of the eccentric. The gluten left in the bag is collected and weighed. E. A. F.

Systems of feeding dairy cows; high roughage and low grain versus low roughage and high grain. J. B. LINDSEY and J. G. ARCHIBALD (Mass. Agric. Exp. Sta. Bull., 1932, No. 291, 15 pp.).—With grain-silage-hay rations, cows receiving low proportions of roughage were better in appearance, produced slightly higher live-wt. increases, and gave more milk over a period of $3\frac{1}{2}$ years. A. G. P.

Feeding test with tapioca meal on milch cows. E. BROUWER (Vereen. Exploit. Proefzuivelboerd. Hoorn, Ann. Rept., 1931, 79—111).—General results with tapioca meal plus earth-nut meal to balance protein content were satisfactory. Butter was somewhat firmer with tapioca than with maize.

NUTR. ABS.

Supplementary feeding of milch cows on pasture and the quality of butter produced. E. BROUWER. (Vereen. Exploit. Proefzuivelboerd. Hoorn, Ann. Rept., 1931, 113—156).—Palm-kernel cake at the rate of 2 kg. per head per day reduced the I val. of the butter fat by about 4.5 units and slightly improved the consistency of the butter. Tapioca meal at the same rate reduced the I val. by 2.5 units. Mixtures of oat straw and molassine pulp reduced the figure only by 0.6 to 2 units and hardly affected consistency. In general, high I val. of butter fat was associated with high protein content of pasture. Changes in yield and composition of milk were not great. NUTR. ABS.

Preservation of milk for investigation. II. K. WURSTER (Milch. Forsch., 1933, 14, 538—548).—PhMe, para- CH_2O , β - $C_{10}H_7OH$, and $K_2Cr_2O_7$ were found to be unsatisfactory for the preservation of milk for f.p. determination because of inadequate preservation or too great effect on the f.p. $HgCl_2$, mustard oil, and CH_2O were suitable. E. B. H.

The f.p. and electrical conductivity of milk. J. KRENN (Milch. Forsch., 1933, 14, 513—537).—A formula is given to correct the f.p. obtained with a sour milk to that of the original fresh milk. The mean f.p. for milk from individual cows and from herds was -0.545° . The electrical conductivity (*A*) at 18° was between 38.0×10^{-4} and 68.43×10^{-4} reciprocal ohm; 91.4% of the tests gave vals. between 41×10^{-4} and 50×10^{-4} . No relationship was found between f.p. and *A*. E. B. H.

Use of maize sugar in the manufacture of sweetened condensed skim milk. R. J. RAMSEY, P. H. TRACY, and H. A. RUEHE (J. Dairy Sci., 1933, 16, 17—32).—Maize sugar is rather more effective than sucrose in preserving condensed skim milk and may be substituted for approx. one half of the customary quantity of sucrose without risk of crystallisation. "Thickening" of milk resulting from the use of glucose is probably related to its action on the protein, and is minimised by preheating both milk and sugar before mixing. The brown discoloration of sweetened condensed milk is not due to caramelisation, but results from a form of sugar-protein condensation. A. G. P.

B.-p. elevation of concentrated milk solutions. A. W. SCOTT (J. Roy. Tech. Coll., 1933, 3, 116—120).—The b.-p. elevation (I) of conc. solutions of milk solids, determined under reduced pressure with and without addition of sugar, is approx. proportional to the sugar concn. With the max. concns. used in practice, (I) is $\geq 2^\circ F.$ for unsweetened milk, and $6^\circ \geq F.$ for sweetened milk. R. N. C.

Substances adsorbed on the fat globules of cream and their relation to churning. II. Isolation and identification of adsorbed substances. L. S. PALMER and H. F. WIESE (J. Dairy Sci., 1933, 16, 41—57).—Material closely adsorbed on the surface of the globules consists of a protein, the N, P, and S contents of which differ from those of any other milk protein, and a phospholipin consisting of mono- and di- NH_2 -compounds. The isoelectric point of this membrane material is $p_H 3.9-4.0$; a large proportion is removed during churning but does not appear to be coagulated.

A. G. P.

Magnesium ammonium phosphate in canned salmon. L. H. JAMES (Analyst, 1933, 58, 222).—Well-developed glassy crystals (struvite, 3—5 mm. long) were found in several specimens of canned salmon, which was apparently quite sound and neutral to litmus.

E. L.

Changes occurring during freezing and subsequent thawing of fruits and vegetables. M. A. JOSLYN and G. L. MARSH (Fruit Prod. J., 1933, 12, 203—205, 220).—The effects of ratio of fruit to sugar, kind of sugar used, variety of fruit, and rate of freezing on the loss in wt. of the thawed products are shown. The relation of loss in wt. to texture and the effects of "sugar-curing" on various fruits are discussed.

E. B. H.

Use of sulphurous acid and sulphites in the preparation of fresh and frozen fruit for bakers' use. M. A. JOSLYN and E. M. MRAK (Fruit Prod. J., 1933, 12, 135—140).— Na_2SO_3 (3000—4000 p.p.m. of

SO₂) or an equiv. SO₂ solution, with or without 2% NaCl, is used for 2–5 min., the drained fruit being stored at –12° to –18°. CH. ABS.

Yeasts causing "souring" of dried prunes and dates. P. ESAU and W. V. CRUESS (Fruit Prod. J., 1933, 12, 144–147).—One *Mycoderma* and six *Torula* yeasts were isolated from soured prunes, and one *Torula* and one *S. ellipsoideus* from dates. The prunes should be dried below the H₂O content for yeast growth; for at least one of the yeasts this is 22% H₂O. Dates are preferably pasteurised at 60°. CH. ABS.

Distinction between malt- and barley-coffee. H. BARSCH (Chem.-Ztg., 1933, 57, 242–243).—The unground coffee (5 g.) is added to 100 c.c. of H₂O; malt-coffee gives an immediate brown coloration which reaches a max. in 15 min., whereas barley-coffee produces no colour. The converse is true when EtOH is used instead of H₂O. The tests will detect 10% of either variety in the presence of 90% of the other. A. R. P.

Determination of the "extract" of coffee. H. HAWLEY (Analyst, 1933, 58, 222).—The dry, powdered coffee (2 g.) is refluxed for 20 min. with exactly 100 c.c. of H₂O, 25 c.c. of the filtered and cooled decoction are evaporated to dryness, and the residue is dried in the oven as usual. E. L.

Chemical and biological analyses of [rice-bran] tikitiki extracts. A. J. HERMANO and F. ANIDO (Philippine J. Sci., 1933, 50, 189–195).—Rice polishings (darak), from which the extracts are made, contains protein 13.81, fat 16.96, carbohydrate 38.36%. Extracts from different sources vary greatly in their vitamin-B₁ content, which bears no relation to the N, P, or carbohydrate content. P. G. M.

Spontaneous heating and ignition of hay and other agricultural products. C. A. BROWNE (Science, 1933, 77, 223–229). L. S. T.

Vitamin-B, -C, and -D contents of sorghum silage. S. FOMIN (Arch. Tierernähr. Tierzucht, 1932, 8, 150–158).—Green sorghum contains a sufficiency of vitamin-C, but, to provide normal requirements of vitamin-B, must constitute < 20% of the ration. Ensilage of sorghum markedly reduces its vitamin-B and -C contents; the vitamin-D present is unaffected. A. G. P.

Fish meal as a feeding-stuff. I. Review of the fish-meal industry. J. JUNG. II. Manufacture of fish meal. M. SCHULZE. III. Examination of the valuable constituents, purity, and freshness of fish meal. F. MACH and G. CLAUS. IV. Chemical composition and digestibility of fish meal. F. HONCAMP, M. SACHSSE, E. REINMUTH, and H. C. SCHULZ. V. Vitamin-D content of fish meal. A. SCHEUNERT, J. RESCHKE, BEDI-I-SCHAKIR, and M. SACHSSE. VI. Age of fish-meal fat in regard to fat nutrition. H. SCHMALFUSS [with H. BARTHMEYER and H. WERNER]. VII. Is the feeding of fish meal of high salt content injurious to fattening pigs, and are pigs especially sensitive to salt? V. STANG. VIII. Summary. F. HONCAMP (Landw. Versuchs-Stat., 1933, 115, 139–163, 164–174, 175–196, 197–240, 241–260, 261–274, 275–301, 302–304).—III. Analytical methods

for the chemical, biological, and microscopical examination of fish meals are recorded.

IV. Data for various meals are given. Digestibility trials showed considerable variations in vals. for fish meals from different sources. Air-drying the raw material yields a product of rather high H₂O and mineral contents, but considerable loss of protein takes place in the process. No differences were observed in the digestibility of air- and steam-dried cod-fish meal. In the evaluation of fish meals the protein figure is of prime importance.

V. The vitamin-A content of fish meals varied widely with the method of manufacture and with the inclusion or otherwise of parts of liver in the raw material. The proportion of vitamin-D fluctuated considerably for unexplained reasons. Meal from whole fish was a suitable source of the vitamin for pigs.

VI. Some fish-meal fats tend to become more acid with storage and OH-acids are formed from the unsaturated fatty acids. The suitability of aged fish meals as feeding-stuffs is examined and discussed.

VII. The safety limit of NaCl supplied to pigs in fish meals is approx. 2 g. daily per kg. live-wt. A. G. P.

Cod meal, white fish meal, and feeding caseinogen as protein feed for young pigs. W. STAHL, F. HARING, and E. KÜHLER (Z. Schweinezucht, 1933, 40, 103–106).—The best results were obtained with white fish meal (I); feeding caseinogen with (I) was superior to cod meal. NUTR. ABS.

Report of [German] Committee on the examination of feeding-stuffs. MACH (Landw. Versuchs-Stat., 1933, 115, 35–42).—The most satisfactory method for determining the sand content of feeding-stuffs containing cereal chaffs is that of Lepper (B., 1930, 1129). In crude fibre determinations, filtration is improved by addition of 1 g. of asbestos per 3-g. sample during digestion with H₂SO₄. Asbestos may lose wt. during the final ignition and a blank test is necessary. For the determination of fat in soya-bean meals it is important to use Et₂O free from H₂O and EtOH. A. G. P.

Report of [German] Committee on feeding trials. F. HONCAMP (Landw. Versuchs-Stat., 1933, 115, 42–61).—Cod-fish meal in general and the air-dried Norwegian product in particular is not superior to herring meal as a feeding-stuff. Fish meals containing > 2% of sand and > 0.2% of NH₃ should be classed as fertilisers and not feeding-stuffs, and those having > 30% of Ca₃(PO₄)₂ should be named "fish-bone meal." The composition and nutrient val. of meat meals are discussed. On the basis of live-wt. increase, fish meals were slightly superior to meat meals. Whale meal adversely affected the flavour of pork. A. G. P.

Grape-seed oil.—See XII. Maize and potato starches.—See XVIII. As in fruit beverages.—See XVIII.

PATENTS.

Treatment of organic [animal or vegetable] materials of cellular character with salt solutions, and salt mixtures for use in such treatment. NORDMARK-WERKE GES.M.B.H. (B.P. 388,513, 14.12.31. Ger., 27.12.30).—The loss of cell constituents is prevented

by using in place of NaCl a mixture in suitable proportions of salts of Na, K, Ca, and Mg, *e.g.*, in mol. ratio 100 : 5 : 2.5 : 2.5. Rb may be substituted for K, and Sr or Ba for Ca. The salt mixture is used in the cooking of vegetables, the treatment of textiles, skins, etc., or in the fermentation industries. C. H.

Bottle-washing liquors.—See VII. **Meat-stamping ink.**—See XIII. **Fermentation cabinet.**—See XVIII.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Sterilisation of sodium bicarbonate solutions [for injections]. A. MIHALOVICI (Pharm. Zentr., 1933, 74, 211—212).—NaHCO₃ is washed with EtOH and Et₂O, dried at 30—35°, and dissolved in sterile H₂O; the solution contains no Na₂CO₃. P. G. M.

Mercury oxycyanide pastilles. C. V. BORDEIANU (Arch. Pharm., 1933, 271, 149—170).—The usual methods for the detection and determination of HgO, Hg(CN)₂ (I) and Hg(CN)₂ (II) fail for pastilles containing a variety of other substances. (I) can be detected by formation of a ppt. with Na nitroprusside in dil. HNO₃ (in absence of Cl⁻ and after removal of AcOH), FeCl₃ (or other heavy-metal chlorides), or aq. NH₃, or by decolorisation of Fe(CNS)₃ solution (in absence of chlorides). The last reaction can be used for approx. determination of (I). HgO in these pastilles is best determined by Kolthoff's modification of Votoček's method, and total Hg by oxidation with cold, fuming HNO₃ and solid KMnO₄, followed by destruction of the excess KMnO₄ by H₂O₂ and determination of the Hg by the HCl-Hg(NO₃)₂-Na nitroprusside method; the content of (I) and (II) can then be calc. The solubility of HgO in H₂O is not increased by seignette salt (III), NaOAc, or (II). The solubility of (I) in H₂O is greatly, and of (II) slightly, increased by (III); addition of (II) as well as (III) does not further affect the solubility of (I). Finely-divided (best freshly pptd.) HgO reacts with (II) in solutions of (III), but not in pure H₂O, to give (I). NaOAc and B(OH)₃ have only slight effect on the solubilities in question. Four methods are given for the prep. of these pastilles and one for a solution. The rate of decomp. of 0.1% solutions of (I) is unaffected by B(OH)₃, increased by NaOAc, and decreased by (III). Fe or Fe(OH)₃ decomposes solutions of (I), especially in presence of Cl⁻, unless (III) is present also. R. S. C.

Constitution of theobromine compounds. A. VON SZTANKAY (Pharm. Zentr., 1933, 74, 225—226).—Diuretine (I), theobromose, theocol, uropherine, agurine, thepherine, urocitrol, theolactine, theosaline, and aniso-theobromine are mol. compounds of theobromine, a metallic salt, and a metallic hydroxide of the type C₇H₈N₄O₂·NaOH, C₆H₄(OH)·CO₂Na (I). When (I) is administered the urine becomes strongly alkaline and contains a sediment of triphosphate. S. C.

Titrimetric examination of opial. J. M. A. HEGLAND (Pharm. Weekblad, 1933, 70, 354—356).—5 c.c. of opial solution are titrated with 0.05N-NaOH and the solution is back-titrated with 0.1N-HCl, using bromphenol-blue (I), neutral red (II), and phenolphthalein (III) as indicators. A colour change (blue) is observed with (I) and narceine and thebaine hydro-

chlorides and NaCl, which disappears with codeine hydrochloride. Papaverine and narcotine hydrochlorides give a colour change (orange-yellow) with (II), and morphine hydrochloride a change (red) with (III). S. C.

Essential oil from the wood of *Eremophila Mitchelli* (Bentham). A. E. BRADFELD, A. R. PENFOLD, and J. L. SIMONSEN (J. Proc. Roy. Soc. New South Wales, 1932, 66, 420—433).—Steam-distillation of 10 samples of shavings of *E. Mitchelli* gave 2—3% of oil having d_{15}^{20} 1.0276—1.0418, n_D^{20} 1.5260—1.5384, α_D^{20} —6° and +6° (2 samples), ester val. 42.0—144.6. Three substances form the main constituents of the oil, *viz.*, a ketone, *eremophilone*, C₁₅H₂₂O, m.p. 42—43°, $[\alpha]_D$ —171.6° (in EtOH), $[\alpha]_{5461}$ —207° (in MeOH) (*semicarbazone*, m.p. 202—203°), and 2 hydroxyketones, *2-hydroxyeremophilone*, C₁₅H₂₂O₂, m.p. 66—67°, $[\alpha]_D$ +140.5° (in CHCl₃), $[\alpha]_{5461}$ +153° (in MeOH) (*benzoate*, m.p. 119—120°), and *2-hydroxy-2-dihydroeremophilone*, C₁₅H₂₄O₂, m.p. 102—103°, $[\alpha]_D$ +90.6° (in CHCl₃), $[\alpha]_{5461}$ +94° (in MeOH), are described. Small quantities of a sesquiterpene *hydrocarbon*, b.p. 150—153°/24 mm., d_{25}^{25} 0.9354, n_D^{25} 1.5033, and probably sesquiterpene alcohols are present. E. H. S.

Essential oils of three species of *Geijera* and the occurrence of a new hydrocarbon. II. A. R. PENFOLD and J. L. SIMONSEN (J. Proc. Roy. Soc. New South Wales, 1932, 66, 332—338).—*Geijerene*, the hydrocarbon from *G. parviflora* (cf. B., 1931, 781), has b.p. 85°/17 mm., d_{20}^{20} 0.8720, n_D^{20} 1.4888, and $[\alpha]_D$ ±0°. It has the composition C₁₂H₁₈ and is a colourless oil having a fragrant odour. It may contain a 7-membered ring. *Hexahydrogeijerene*, b.p. 96°/20 mm., d_{25}^{25} 0.8373, n_D^{25} 1.4577, and *tetrahydrogeijerene*, b.p. 95°/20 mm., d_{25}^{25} 0.85058, n_D^{25} 1.4695 (*semicarbazone* produced by oxidation of the *ketone*, m.p. 163—164°), are described. E. H. S.

Tobacco.—See XVI. **Vitamins in fish meal.**—See XIX.

PATENTS.

Manufacture of therapeutically active complex metal compounds. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 388,374, 19.8.31).—H₂O-sol. metal compounds are obtained from non-dyeing benz- or naphth-iminazoles carrying 1 or more salt-forming acid or basic groups but no SH group. The metal compounds of suitably substituted *o*-diamines may be converted into the iminazole metal compounds by condensation with HCO₂H etc. Examples include Au, Cu, Ag, or Hg salts of benziminazoles carrying in 5 position SO₃H, CO₂H, ·O·CH₂·CO₂H (I) (m.p. 296°), ·NH·CH₂·CO₂H (m.p. 261°), ·CH₂·CO₂H (m.p. 253°), AsO₃H₂ (m.p. 280°), or ·CH₂·CH₂·NEt₂ (b.p. 210°/1.5 mm.), or in 2 position ·CH₂·CH₂·CH₂·NEt₂ or 2'-methyl-4'-quinolyl (m.p. 230°), of 5-phenoxy-2-diethylamino-propylbenziminazole (b.p. 249°/1 mm.), and of α -naphthiminazole-6-sulphonic acid. For (I) 3:4-diaminoanisole, b.p. 139°/2.5 mm., is condensed with HCO₂H (m.p. 125°), demethylated (m.p. 212°), and condensed with CH₂Cl·OH. C. H.

Manufacture of sexual hormones. E. P. HÄUSSLER, Assr. to HOFFMANN-LA ROCHE, INC. (U.S.P. 1,860,287,

24.5.32. Appl., 9.5.28. Ger., 16.5.27).—Bile, or the ppt. obtained by addition of dil. acids to a bile salt solution, is extracted with an org. solvent (Et_2O etc.) and the hormone recovered from the extract.

E. H. S.

Preparation of [a urinary acidifier by] chemical combination of boric acid and potassium acid tartrate. A. E. CRAVER, Assr. to WEISS & DOWNS, INC. (U.S.P. 1,859,653, 24.5.32. Appl., 7.1.30).—A solution of, e.g., 1217 pts. of K H tartrate and about 430 pts. of H_3BO_3 in 1750 pts. of H_2O is boiled for about $1\frac{1}{2}$ hr.; after dilution with H_2O and filtration, the liquor is treated with EtOH to ppt. the desired product, which is washed with EtOH and dried.

L. A. C.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

p_{H} value of blue-print sensitising solutions. Effect of addition of certain salts. P. K. WINTER and H. V. MOYER (Ind. Eng. Chem., 1933, 25, 461—462).— $(\text{NH}_4)_2\text{HPO}_4$, NaOAc, and Na_2HPO_4 , when added to the sensitising solution [$\text{K}_3\text{Fe}(\text{CN})_6$ - Fe^{+++} NH_4 citrate], considerably reduce the sensitivity of blue-print paper. NaCl and NH_4Cl have no effect. The effect may be due to the insolubility of FePO_4 and basic Fe^{+++} acetate; it is not related to the change in p_{H} as measured by a glass electrode. The val. of $(\text{NH}_4)_2\text{HPO}_4$ for preserving the white colour of unexposed portions is due to this desensitising action.

D. R. D.

Silk cellophane for lantern slides. F. F. YONKMAN (Science, 1933, 77, 218).

L. S. T.

Fabric printing.—See VI.

PATENTS.

Photographic print. W. R. WHITEHORNE (U.S.P. 1,868,085, 19.7.32. Appl., 21.2.27).—Colouring is effected by localised dyeing with an alizarin dye fixed by ammoniacal differentiation of the gelatin adjacent the image, the metal of the last-named having been bleached by conversion into a salt.

B. M. V.

Decorating base metals etc.—See X.

XXII.—EXPLOSIVES; MATCHES.

Sensitivity of explosives to shock. L. WÖHLER and O. WENZELBERG (Angew. Chem., 1933, 46, 173—176; cf. B., 1917, 570).—By improving the design of the apparatus and correcting for the rebound of the falling wt. reproducible vals. (within 10%) of the sensitivity of explosives have been determined. The sensitivity of the NO_2 -derivatives of C_6H_6 and its homologues increased with the no. of substituents introduced into the ring; their nature (Me, OH, Cl, Br, NO_2 , etc.) and position were of minor importance, but the Me group had less effect than the others. There was little relation between the sensitivity and the explosive power of these compounds.

A. B. M.

Combustion problem of internal ballistics. II. A. D. CROW and W. E. GRIMSHAW (Phil. Mag., 1933, [vii], 15, 729—752; cf. B., 1933, 366).—Theoretical.

H. J. E.

PATENTS.

Production of trimethyleneditramine. DINAMITE NOBEL SOC. ANON. ITAL. (B.P. 388,615, 25.5.32. It., 27.5.31).—Dry $(\text{CH}_2)_6\text{N}_4 \cdot 2\text{HNO}_3$ (A) is added to 7 pts. of conc. HNO_3 at 0—15°, and after the first nitration stage of the temp. is raised to 30° for 1 hr. The product is filtered off at 0° and HNO_3 is distilled in vac. below 40°, more product being separated by cooling the conc. liquor. Finally the liquor is diluted to ppt. the rest of the product and the filtered dil. HNO_3 is used for making more A.

C. H.

Nitrocellulose.—See V.

XXIII.—SANITATION; WATER PURIFICATION.

“Stability test” of sewage and its relation to enzyme activity. W. R. WOOLDRIDGE (Biochem. J., 1933, 27, 193—201).—Reducing power of sewage (I) depends on enzymic activity of suspended matter, which can also activate H donors present. This is destroyed by heating at 100° for 15 min. SH compounds are found only when (I) has been kept anaerobically. A modified “stability test” is described.

H. G. R.

Design of experimental percolating filters. S. H. JENKINS (Biochem. J., 1933, 27, 240—244).—Two sectional filters are described in which the effluent can be sampled from each section.

H. G. R.

Determination of copper and lead in potable water. J. A. WIEGAND (Chem. Weekblad, 1933, 30, 262—263).—The disturbing effect of Fe^{+++} ions in the colorimetric determination of Pb and Cu with Na_2S is not overcome by addition of PO_4^{+++} , but reduction to Fe^{++} gives satisfactory results. 90 c.c. of the sample are boiled with 10 c.c. of a solution containing 20% of NH_4Cl , 2% of AcOH, and 0.25 g. of $\text{N}_2\text{H}_4 \cdot \text{H}_2\text{SO}_4$. The cooled solution is then treated with 2 drops of 10% Na_2S in glycerin and the colour compared with standards.

S. C.

Effluents of pulp mills. W. F. SILVERSPARRE (Finnish Paper and Timber J., 1932, No. 3; Pulp & Paper Canada, 1933, 34, 27—30).—It is shown by absorption experiments that the cellulose detritus occurring in such effluents is responsible for reducing the O_2 content of the receiving H_2O by fermentation, thus endangering fish life. To avoid this, the re-use of as much white- H_2O as possible is advocated; the excess should be allowed to settle in a special basin or a reserved part of the stream before entering the main flow. The effluent from an EtOH-producing by-product plant was neither poisonous nor O_2 -absorbing.

H. A. H.

Waste liquor evaporation.—See V.

PATENTS.

Apparatus for mixing fluids [in sewage purification]. F. V. HAMMERLY, Assr. to G. A. HAMMERLY and C. B. ABBOTT (U.S.P. 1,867,824, 19.7.32. Appl., 18.8.30).—Sewage is circulated in a tank up through an inverted funnel by means of an impeller at the narrow end, which is continued as a Venturi throat in which air is drawn in, then horizontally out, through guides in the upper part of the liquid.

B. M. V.

Treating air with H_2O .—See I.