

BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

JUNE 3, 1927.

I.—GENERAL; PLANT; MACHINERY.

Apparent specific gravity and porosity. Comparison of various methods. G. M. NAVE (J.S.C.I., 1927, 46, 158—159 r).—Seven methods of finding the apparent specific gravity and porosity of porous material such as firebrick or coke are briefly described and criticised. Preference is given to a method the principle of which is to coat the material with just melted paraffin wax. The specific gravity bottle method, with xylene as the liquid, is recommended for the determination of the real specific gravity using material which passes at least a 1/100 in. mesh sieve.

PATENTS.

Impact pulveriser. A. B. WILLOUGHBY (U.S.P. 1,622,695, 29.3.27. Appl., 31.1.25).—The material is entrained in two opposing co-axial jets of superheated high-pressure steam and pulverised by impact of the material against itself. Coarse material is allowed to drop out of the zone of impact on to a bottom wall which is inclined towards an outlet, which is not directly below the jets. Fine material is removed from the pulveriser casing by an ejector. B. M. VENABLES

Pulveriser. H. E. WITZ, Assr. to BABCOCK & WILCOX Co. (U.S.P. 1,621,571, 22.3.27. Appl., 25.5.23. Conv., 26.5.22).—The material passes through a pulveriser proper, an expansion chamber, and an exhaust fan. Oversize is separated out in both the separating chamber and the fan casing, and is returned to be re-ground. B. M. VENABLES.

Granulating dry material. F. L. BRYANT (U.S.P. 1,621,869, 22.3.27. Appl., 12.7.24).—A number of disintegrator discs are mounted on a common vertical shaft and increase in diameter downwards. The material, after suffering impact in one zone, drops to the next larger zone. All the particles are substantially in suspension, and not subjected to attrition with consequent heating. B. M. VENABLES.

Apparatus for evaporating solutions. J. L. TER HALL (G.P. 436,240, 17.5.22. Conv., 2.3.22. Addn. to G.P. 393,408; B., 1924, 698).—In a tubular evaporator, the compartment below the tubes is divided into two sections by a horizontal partition to which are attached narrow tubes discharging into the lower ends of the main tubes. L. A. COLES.

Vacuum evaporator. L. P. DEVAUCELLE (F.P. 612,548, 2.7.25).—In lead-lined iron evaporators, both sides of the lining are under vacuum. L. A. COLES.

Air-cleaning apparatus. F. F. PEASE, Assr. to F. F. PEASE, INC. (U.S.P. 1,620,780, 15.3.27. Appl., 5.4.23. Renewed 29.7.26).—The air to be cleaned is

admitted at one end of a chamber through a port surrounding a rotary atomiser for liquid. Liquid and dirt are collected on a rotary separating screen at the other end of the chamber, and the clean air is removed by a fan. B. M. VENABLES.

Apparatus for separating liquids and gases. Tray. K. W. BARTLETT (U.S.P. 1,620,750—1, 15.3.27. Appl., 6.5.26).—Forms of bubbling trays for rectifiers are described. B. M. VENABLES.

II.—FUEL; GAS; DESTRUCTIVE DISTILLATION; MINERAL OILS.

Mechanism of coking. E. AUDIBERT and L. DELMAS (Fuel, 1927, 6, 131—140, 182—189; Chim. et Ind., 1927, 17, 355—366; cf. B., 1926, 569).—The mechanism of the swelling ("intumescence") of coal has been studied by heating a cylindrical pellet, prepared by compressing coal dust, and observing the changes in length which occur. The temperature at which intumescence occurs is always higher than the temperatures, at the same rate of heating, of initial softening, and of initial evolution of volatile matter by thermal decomposition. The slower the rate of heating the less is the amount of swelling; if the rate is so slow that fusion is incomplete no swelling is observed. All the coals studied were capable of intumescence if the rate of heating was sufficiently rapid. With very rapid heating intumescence begins about 25° lower than with rates of heating in the neighbourhood of 1° per min. Intumescence is caused by bubbles of the gaseous decomposition products, which are imprisoned in the plastic mass, and is therefore only an apparent expansion. It can be prevented by the addition of an infusible powder to the coal, the amount required depending on the nature of the coal, the fineness of the coal and of the added material, the apparent density of the mixture, and the rate of heating. There is no direct relationship between the rate of evolution of volatile matter and swelling; a modification of the rate of heating which causes the suppression of swelling may be accompanied indifferently by an increase or a decrease in the rate of evolution of volatile matter. The swelling of a coal is suppressed by preheating *in vacuo* at 350° for 4½ hrs., or by oxidation in air at 120° for 4 hrs. The structure of the coke produced depends on the rate of heating of the coal over the range 350—500°, the crushing strength passing through a maximum value as the rate of heating is increased. To produce coke of satisfactory strength the filling up of the interspaces between the particles of coal, which takes place in each layer of the charge as it passes through the plastic state, should be sufficiently

nearly complete without exceeding the limit giving maximum compactness. If the obstruction of the inter-spaces becomes too great bubbles are formed, and the resulting coke has a weak and porous structure. The optimum conditions can be attained, not only within the ordinary range of coking coals, but by suitably blending two coals neither of which is itself capable of yielding a good coke.

A. B. MANNING.

Laboratory study of the formation and structure of coke. D. J. W. KREULEN (Fuel, 1927, 6, 171—182).—The transformation of coal into coke (a) during a volatile matter determination, (b) by the sudden heating of a piece of coal, and (c) in the Fischer-Schrader test is described and illustrated by sections of the material at different stages of the process. Varying the rate of heating in the Fischer-Schrader apparatus produces variations in the amount of swelling; beginning with very rapid rates, the swelling shows first an increase as the rate falls, reaches a maximum, and then decreases. The coke made from the largest sized particles of coal is the most porous and fragile. Attempts to transform a semi-coke into a high-temperature coke by subsequently heating to 1100° gave a solid coke with, however, a large number of fissures. With addition of graphite to the coal the crushing strength of the coke passes through a maximum value. The increase of strength is greater the smaller the particle size of the added material, but the maximum increase in all cases is obtained by addition of approximately the same surface area of inert matter per unit of coal. Addition of sand shows the same phenomenon, except that two maxima are obtained. Microscopical examination of the coke indicates that the structures observed are similar to the cenosphere structures described by Newall and Sinnatt (B., 1925, 87; 1926, 905).

A. B. MANNING.

Industrial transformation of bituminous coal into technical products. G. PATART (Fuel, 1927, 6, 160—170; cf. B., 1927, 66).

Influence of an anti-knock compound in a gas-ion oxidation. S. C. LIND and D. C. BARDWELL (Ind. Eng. Chem., 1927, 19, 231—233).—A study was made of the influence of selenium diethyl on the slow oxidation of methane at ordinary temperatures under the ionising influence of radon. A mixture of methane with 2 vols. of oxygen was saturated with selenium diethyl, and samples were diluted to give mixtures 0.001, 0.01, and 0.046 molar with respect to selenium diethyl. These were enclosed in glass reaction spheres of 2 cm. diameter with radon, and the oxidation was measured manometrically and checked chemically. The kinetics were calculated by the general equation $dP/dt = k\mu E_t P$, the rate of pressure change being proportional to two variables, the pressure, P , and amount of emanation, E_t , present at any time, t , and to the constant of ionisation, k , and μ , an efficiency factor for converting ionisation into chemical action. The molecules reacting per pair of ions in the mixture should be six, which was not attained in the mixture without anti-knock, but was slightly exceeded in the 0.01 molar mixture. Thus the presence of anti-knock did not retard the reaction, and ionisation probably plays no important part in explosive reaction or flame propagation. Anti-knock

increases the velocity of flame propagation. It is suggested that non-selective absorption dependent on the absolute density of the gas mixture may affect flame propagation.

H. MOORE.

Comparison of gasolines by analytical and engine tests. D. R. STEVENS and S. P. MARLEY (Ind. Eng. Chem., 1927, 19, 228—231).—The anti-knock properties of 18 samples of gasoline of widely different types were investigated. These were analysed by Egloff and Morrell's method (cf. B., 1926, 570), and the values for naphthenes, unsaturated hydrocarbons, and aromatics reduced to an aromatic equivalent. The gasolines were then tested on a modified Delco lighting 1250-watt engine with adjustable spark timing. In an indicator of the bouncing-pin type the shock of detonation was indicated by a long lever on a scale, a standard fuel being made to give a reading in the middle of the scale, a compression ratio of 5.5:1 being employed. To test the accuracy of the analysis synthetic mixtures were made up, and in the engine trials the standard fuel was blended with enough benzene or kerosene to bring its degree of detonation to correspond with the fuel under trial. Ricardo rates the amounts of olefines, naphthenes, and aromatics to give the same effect in reducing detonation as 5:4:1, but a proportion of 2:2:1 is more nearly correct in the case of methylcyclohexane, hexylene, and toluene. There was wide divergence in many cases between the results of analysis and engine trials. Anti-knock values can only reliably be determined by engine trials.

H. MOORE.

Oxidation of petrol by air. M. FREUND (Z. angew. Chem., 1927, 40, 368—374).—A mixture of petrol vapour with air or nitrogen was passed through a heated iron tube charged with petroleum coke and the exit gases were analysed. It was found that the degree of decomposition increased with the temperature up to 500° and with the proportion of air in the mixture. With four successive passages of a given quantity of petrol vapour through the tube at 400° about 30% was converted into oxidation products, including carboxylic acids, phenols, aromatic and unsaturated and cyclic aliphatic hydrocarbons. Tests with nitrogen in place of air indicated that pyrogenous decomposition also occurs. Water was also produced to the extent of 4—5%, and was found to contain acetic acid in solution. The permanent gases resulting from the process were found to contain 0.8% of carbon dioxide and no oxygen.

C. IRWIN.

Utilisation of acid tar from the purification of illuminating oil and other oils. M. E. SCHMITZ (Sealed note 2038, 28.9.10. Bull. Soc. Ind. Mulhouse, 1927, 92, 693—695).—Acid tars are mixed at 80° with a maximum of 30% of crude xylol, b.p. 130—200°, and after remaining for at least 5 hrs. sulphuric acid, γ about 1.530, is withdrawn, and can be used for treating fresh quantities of oil. The residual tar, after washing with water or dilute alkali, is distilled to recover the solvent and asphalt. Acid tar obtained from illuminating oil is preferably mixed with 2 pts. of the tar from heavier oils before treatment.

L. A. COLES.

Utilisation of acid tars. M. E. SCHMITZ (Sealed note 2049, 11.11.10. Bull. Soc. Ind. Mulhouse, 1927, 92, 695

—698).—Acid tars from which sulphuric acid has been recovered by the process described in the preceding abstract are distilled to coke if not suitable for the production of asphalt. "Black" sulphuric acid obtained by concentrating to 92% strength the recovered acid, by pouring it slowly into boiling acid *d* 1.84, is more efficacious for purifying mineral oils than is pure acid.

L. A. COLES.

Production of asphalt from acid sludge from the purification of mineral oils. M. E. SCHMITZ (Sealed note 2173, 9.5.12. Bull. Soc. Ind. Mulhouse, 1927, 92, 698—702).—Terpenic hydrocarbons of b.p. up to 250°, obtained by distilling with superheated steam the acid resin precipitated by diluting with water the acid tar from the purification of illuminating oil, are suitable for diminishing any loss of solvent incurred in the processes already described (see preceding abstracts). The acid resin need not be previously distilled, but may be added to the acid tar together with the solvent, or, alternatively, its precipitation may be dispensed with by mixing 1 pt. of acid tar from illuminating oil with 2 pts. of tar from heavier oils before addition of solvent.

L. A. COLES.

Report on the processes described by M. E. Schmitz in sealed notes nos. 2038, 2049, and 2173. G. HUGEL (Bull. Soc. Ind. Mulhouse, 1927, 92, 702—706. See preceding abstracts).—Recovery of acid is less complete than that claimed, 2—5% remaining in the tar. The solubility of acid resins in crude xylol may be very low, in which case higher-boiling fractions of b.p. 200—300° can be used as solvent. The cost of the tar-oil fractions is probably too great to render the process of commercial value.

L. A. COLES.

Oil shales of Tasmania. A. MCL. REID (Proc. Roy. Soc. Tasmania, 1926, 42—51).—Tasmanite, which occurs in the North and North-Central districts of Tasmania associated with kerogenite and humic kerogenite coals, was examined. Oil is not originally present in tasmanite, being generated by heat from the contained kerogen. The shale stands weathering well, and ignites and burns readily. Its yield of oil is 40—45 gals./ton. Analysis showed 30.84% of volatile matter and 62.50% of ash. The crude oil contained 79.34% C, 10.41% H, 4.93% O, 0.31% N, and 4.93% S, and had *d* 0.931—0.956. The crude oil yielded on distillation 10% of benzine and 80% of fuel oil, and from the latter 25% of lighting oils and 30% of lubricating oils were obtainable, these being of asphaltic base. The benzine is rich in aromatics, and a good anti-knock motor fuel.

H. MOORE.

PATENTS.

Method of breaking coal. P. G. SEIGLE and G. E. DEAN (U.S.P. 1,620,838, 15.3.27. Appl., 2.1.25).—The production of fines is avoided by breaking the coal under water.

T. S. WHEELER.

Purifying gases from sulphur. F. FISCHER and H. TROPSCH (E.P. 254,288, 3.6.26. Conv., 29.6.25).—Gas containing organic sulphur compounds and hydrogen is passed over a catalyst consisting of finely-divided lead or tin or alloys thereof, deposited upon an inorganic substance (e.g., bases or acid anhydrides) which remains solid at the temperature of reaction, i.e., above the m.p.

of the metallic catalyst. Such a contact material, consisting of equal parts of lead chromate and copper oxide treated with hydrogen at 400°, is able at 300—500° and ordinary pressure to desulphurise gas and maintain its activity for several months.

S. PEXTON.

Destruction of carbon monoxide in the waste gases from internal combustion engines. C. W. WHITE (F.P. 612,282, 6.2.26).—The gases are oxidised by air in the presence of a catalyst.

A. B. MANNING.

Gas producers. T. M. DAVIDSON, and PATENT RETORTS, LTD. (E.P. 263,932, 5.10.25).—A machine comprising a gas producer and carbonising plant is described. The producer consists of two vertical retorts superimposed upon a water-gas generator. Between the two retorts are provided two supplementary vertical retorts which terminate above the generator and have laterally disposed discharge openings. Surrounding all the retorts are combustion flues, in which the "blow gases" from the water-gas generator are burnt, for providing the necessary heat for carbonisation. Coal fed into the producers is completely gasified, whilst the coal fed into the supplementary retorts yields high-grade gas and coke.

S. PEXTON.

Method of producing gas. O. U. BEAN, ASSR. to BEAN PROCESS SYNDICATE, INC. (U.S.P. 1,621,652, 22.3.27. Appl., 24.3.25).—Superheated steam, dissociated into its chemical elements, is mixed with hydrocarbon vapour, and the mixture subjected to alternate expansion and contraction and increase of heat to a temperature at which the hydrocarbons combine with the hydrogen to produce a mixture of gases.

C. O. HARVEY.

Recovery of condensable vapours from gases. H. H. ARMSTRONG (U.S.P. 1,621,821, 22.3.27. Appl., 11.7.23).—A liquid absorbent is atomised by, and passes through an enclosed space in contact with, the gas. Thence the mixture passes into a chamber where it comes into intimate contact with unatomised liquid absorbent which is circulated through the chamber.

C. O. HARVEY.

[Low-temperature] carbonisation by direct internal heating. DEUTSCHE ERDÖL-A.-G. (G.P. 435,517, 24.12.22).—Bituminous material is carbonised by internal heating with a regulated hot mixture of combustion gases and cold combustible gases, so arranged that the carbonisation takes place in parallel with an independent main current of combustible gases, from which the amount required for the carbonisation is withdrawn, and to which after carbonisation the gases are returned, the return being made at a point either before or after the point of withdrawal.

A. B. MANNING.

Retort. G. MCD. JOHNS (U.S.P. 1,621,785, 22.3.27. Appl., 12.11.23).—Finely-divided flowable material (e.g., coal) flows down a vertical narrow space between two parallel walls, one of which is heated and is not perforated; the other is composed of a number of transversely corrugated plates, set obliquely, and overlapping so that spaces are left for the exhaust of distillate, the material being maintained in a thin layer against the heated wall.

B. M. VENABLES.

Conversion [cracking] of oils. J. C. CLANCY (U.S.P. 1,620,075, 8.3.27. Appl., 16.4.24).—A molten

mixture of zinc chloride (80%) and sodium chloride (20%) is passed at 400–600° slowly down a vertical retort filled with nickel packing units. High-boiling oil containing from 5–10% of aluminium chloride in suspension is introduced into the retort through a washer, in which it is met by the mixed vapours of oil and aluminium chloride coming from the retort. The chloride vapours and the higher-boiling oils are here condensed and conveyed back to the retort. Any carbon formed in the cracking process is removed, together with uncracked oil, by the descending stream of molten chloride. To reduce the amount of carbon separating, hydrogen is passed into the retort. The apparatus can also be employed to treat the sludges resulting from the distillation of oils with aluminium chloride.

T. S. WHEELER.

Treatment of hydrocarbon oils. R. C. HOLMES, ASSR. to TEXAS CO. (U.S.P. 1,623,729, 5.4.27. Appl., 17.8.21).—The oil is cracked by passage once only through a tube maintained at 370–480°, and under a pressure of 500 lb. or more, and being thus maintained in continuous liquid phase, coke production is substantially avoided. Separation of the lower- from the higher-boiling fractions is effected in an expansion chamber at substantially reduced pressure connected with a reflux condenser.

C. O. HARVEY.

Fuel oil. F. L. DIETZ (U.S.P. 1,620,635, 15.3.27. Appl., 3.1.22).—A fuel for internal-combustion engines comprises low-temperature tar (35 pts.), tetralin (30 pts.), and alcohol (35 pts.).

T. S. WHEELER.

Apparatus for treating crude oils. H. A. HOPKINS (U.S.P. 1,621,782, 22.3.27. Appl., 16.2.25).—Crude hydrocarbon oils are cleansed and dehydrated in an apparatus consisting of upper and lower oil chambers containing heating pipes and connected by means of a series of open-ended tubes, the oil passing from the lower to the upper chamber and outwardly therefrom.

C. O. HARVEY.

Treatment [cleaning] of hydrocarbon oils. L. E. JACKSON (U.S.P. 1,619,869, 8.3.27. Appl., 4.10.23).—Fouled naphtha from dry-cleaning operations is treated under agitation with a quantity of potassium hydroxide solution (*d* 1.23) exceeding by 10% that required to neutralise the aliphatic acids present, together with activated charcoal and a small quantity of ethyl alcohol. Rapid separation of the impurities present takes place.

T. S. WHEELER.

[Sludge-removal] treatment of oils. E. A. EVANS, and C. C. WAKEFIELD & CO., LTD. (E.P. 267,174, 5.10.25).—The sludging tendencies of transformer oils are reduced by the addition of 0.1–2% of a neutral soap of aluminium, calcium, copper, lead, nickel, tin, or zinc, or of a metallic salt of a fatty acid (*e.g.*, sodium acetate). The soap may or may not be soluble in the oil.

C. O. HARVEY.

Refining mineral oils with liquid sulphur dioxide. A.-G. FÜR CHEM. IND. M.B.H. (E.P. 267,071, 14.5.26. Conv., 5.3.26).—Economies in heat and size of condenser are effected in an apparatus for recovery by evaporation of the liquid sulphur dioxide, by passing the extract through one or more evaporators operating at pressures

higher than the condenser pressure, of which evaporators only that working at the highest pressure is heated externally, the others deriving their heat from the condensation of the sulphur dioxide vaporised in the previous evaporator. The extract is finally heated in a still at condenser pressure. A portion of the vapour from the first evaporator may be branched off and used for heating elsewhere.

C. O. HARVEY.

Apparatus for condensing oils. C. B. BUERGER, ASSR. to GULF REFINING CO. (U.S.P. 1,622,941, 29.3.27. Appl., 18.7.24).—The vapours are delivered into a tower containing a column of water in circulation at a point above the column, and the condensate is withdrawn from the top of the column, means being provided for equalising the pressure below and above the point of introduction of the vapours.

C. O. HARVEY.

Method of dephlegmation. J. D. SEGUY, ASSR. to UNIVERSAL OIL PRODUCTS CO. (U.S.P. 1,623,136, 5.4.27. Appl., 25.3.25).—The capacity of a dephlegmating column is varied at will by withdrawing the reflux condensate and introducing the vapours at predetermined vertically-spaced points, the vapours being introduced at a point above the liquid level in the column.

C. O. HARVEY.

Oil still. J. E. BELL, ASSR. to SINCLAIR REFINING CO. (U.S.P. 1,623,773, 5.4.27. Appl., 10.8.23).—In an apparatus for heating an oil-cracking still a portion of the hot waste heating gases which have previously passed over the heating surfaces of the still is mixed with the products of combustion before again passing them over the heating surfaces, and air, preheated by heat interchange with waste heating gases, is supplied to the firebox.

C. O. HARVEY.

Still. H. M. LASHER, ASSR. to KANSAS CITY GASOLINE CO. (U.S.P. 1,622,452, 29.3.27. Appl., 1.7.20).—A still for cracking petroleum hydrocarbons is fitted with an internal rack the suspensions for which pass through stuffing boxes in the top of the still, and are thus operable from without.

C. O. HARVEY.

Ionising retort (E.P. 267,358).—See XI.

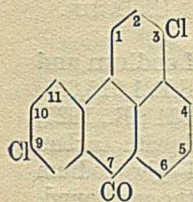
IV.—DYESTUFFS AND INTERMEDIATES.

PATENTS.

Preparation of vat dyes. I. G. FARBENIND. A.-G., Assees. of A. LÜTTRINGHAUS, H. WOLFF, and H. J. EMMER (G.P. 436,887, 12.10.24).—By the action of hypochlorous acid on benzanthrone there are obtained two chlorohydroxybenzanthrones, *m.p.* 356° and 262–263° respectively. These are precipitated by acids from alkaline solution, and are separated by crystallisation from acetic acid. They are not identical with *Bz*-chloro-derivatives of 1-, 2-, or 3-hydroxybenzanthrone. They are methylated by means of methyl toluenesulphonate, and by subsequent fusion with alkali give navy-blue vat dyes.

C. HOLLINS.

Preparation of dyes of anthracene series. I. G. FARBENIND. A.-G., Assees. of A. LÜTTRINGHAUS and H. WOLFF (G.P. 436,533, 1.3.25).—The halogenated compounds of G.P. 193,959 are condensed in the presence



of sodio-arylamines (sodio-aniline) to give violet vat dyes. Calcium, magnesium, and other metals may be substituted for sodium. Chlorobenzanthrone is heated with a solution of sodio-aniline in aniline. 3:9-Dichlorobenzanthrone (annexed formula), m.p. 263–264°, prepared from 9-chlorobenzanthrone and sulphuryl chloride, gives 9:9'-dichloroisodibenzanthrone.

11:3-Dichlorobenzanthrone, m.p. 218–220°, obtained from 11-chlorobenzanthrone, m.p. 174° (from 1-chloro-anthraquinone), and sulphuryl chloride, similarly gives 11:11'-dichloroisodibenzanthrone. C. HOLLINS.

Preparation of vat dyes of the anthraquinone series. I. G. FARBENIND. A.-G., Assees. of F. KAČER (G.P. 436,535, 25.1.25).—Anthraquinonethiazoles are nitrated, and, if desired, the nitro-compounds are reduced and acylated. The nitro- and amino-anthraquinonethiazoles are grey-brown to red-brown vat dyes, the acylaminoanthraquinonethiazoles intense yellow to orange-yellow. C. HOLLINS.

Manufacture of writing inks. A. G. BLOXAM. From I. G. FARBENIND. A.-G. (E.P. 267,633, 23.12.25).—Writing inks fast to water are made by adding alkali (50 c.c. of 2*N*-sodium hydroxide per litre) or formaldehyde, or both, to a solution of a suitable azo dye. The writing becomes fast to water after keeping for a period (1 hr. to several days), which varies according to the dye used and the sizing on the paper. The presence of free amino- or hydroxyl groups in the dye is advantageous. Suitable types of dye are:—(a) [*m*-Diamine + *p*-diamine]₂ → aminonaphtholsulphonic acid. (b) Diaminodiphenylamine → [H-acid + *m*-diamine]₂. (c) *p*-Diamine → amine → aminonaphtholsulphonic acid. C. HOLLINS.

Preparation of pigment dyes. J. P. H. ØRS (Dan. P. 34,077, 25.9.23).—Basic dyes are precipitated by means of aqueous sodium silicate on the calcium silicate, alumina, barium sulphate, calcium carbonate, kaolin, lithopone white, titanium white, or other appropriate substrate. C. HOLLINS.

Manufacture of dyes. R. GANSSEN and G. GÖRZ (G.P. 435,804, 15.3.24).—Humus tars which are otherwise unsuitable for colouring purposes are converted into chestnut-brown products by treatment with chlorine gas or mixtures of liquors capable of liberating chlorine. A. J. HALL.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Viscose. X. G. KITA, R. TOMIHISA, K. SAKURADA, and H. KONO (J. Cellulose Inst., Tokyo, 1927, 3, 27–31).—The influence of the temperature in the preparation and maturing of the alkali-cellulose was studied. The viscose from alkali-cellulose treated at 25° is easily spread on a glass plate, but the film becomes detached in the setting bath, whereas the viscose from alkali-cellulose prepared at 0° is not easily spread. The tenacity and especially the extension of the film are adversely affected by storage of the alkali-cellulose at 25°, whereas they are not affected by storage at 0° and in both cases they increase similarly to a certain

extent during the ripening of the viscose. With alkali-cellulose treated at 8–10° the viscose ripened at 0° is not easily spread, and requires some time in the setting bath, giving a white translucent film, whereas viscose ripened at 20° is readily coagulated giving a semi-transparent film. Ripening at 20° induces spontaneous coagulation of the viscose after 5 days. When the viscose is ripened at 0° the tenacity and extension do not as a rule increase with the time of ripening. Alkali-cellulose aged for 5 days gives the highest results. Ripening the viscose at 20° gives films equal in tenacity and extension to those from viscose ripened at 0°. Alkali-cellulose prepared with 13% caustic soda lye gives inferior films to that prepared with 25% or 30% lye; the viscose does not spread easily, the films are less transparent, and the tenacity and extension are poor. J. F. BRIGGS.

Viscosity of cellulose solutions. C. R. GENUNG (Ind. Eng. Chem., 1927, 19, 476).—A modification in Small's cuprammonium method (B., 1925, 495) for the determination of the viscosity of cellulose solutions is proposed, involving the use of a more positive system for flushing out the apparatus with hydrogen and filling with reagent, and the limitation of the range of copper concentration of the cuprammonium solution to 2.95–3.05%. The method is claimed as more accurate and easier of manipulation than the original. E. HOLMES.

PATENTS.

Degreasing of wool and other textile materials. N. V. ALGEM. CHEM. PRODUCTENHANDEL (G.P. 435,753, 30.3.24. Conv., 26.1.24).—Wool is degreased by treatment with organic solvents, the latter being removed while the wool is continuously led through a closed chamber maintained under diminished pressure so that air or other gas enters the chamber where the wool enters and leaves it. The air saturated with vapour of the solvents is cooled below 0° and led through adsorption chambers for recovery of the solvents. A. J. HALL.

Degreasing wool. N. V. ALGEM. CHEM. PRODUCTENHANDEL (Dutch P. 15,202, 20.9.24).—Thin layers of wool carried on a travelling brattice within a closed chamber are sprayed with an organic solvent. A. J. HALL.

Protecting animal fibres during treatment with alkaline solutions. I. G. FARBENIND. A.-G., Assees. of K. DAIMLER, G. BALLE, and F. JUST (G.P. 434,979, 21.12.23).—Sulphonic or carboxylic acids of resinous products obtained by condensing aromatic hydrocarbons with, e.g., halogenated hydrocarbons, alcohols, or sulphur chloride, are added to alkaline solutions for treating animal fibres. L. A. COLES.

Production of fibres, silk, hair, films, etc. [from viscose]. KÖLN-ROTTWEIL A.-G. (F.P. 612,879, 17.3.26).—The products are prepared from fresh viscose containing unmaturing alkali-cellulose, and to the viscose and/or the precipitation bath is added material having the property of decreasing the rapidity of the action of the spinning bath, such as condensation products prepared from formaldehyde and naphtholsulphonates or naphthalenesulphonates, or sulphonated condensation products from vegetable resins and phenol, or material

such as sulphite-cellulose waste liquor, carbazolesulphonates, sulphonated coumarone-resin, or aromatic sulphonic acids. L. A. COLES.

Production of cellulose ethers. E. TEUPEL (G.P. 435,346, 29.4.22. Addn. to G.P. 408,342; B., 1925, 397).—The earlier process is rendered more rapid and economical by using 25–40% alkali hydroxide solution containing salt. L. A. COLES.

Cellulose composition [containing $\beta\beta'$ -dichloroethyl ether]. W. G. LINDSAY, Assr. to CELLULOID CO. (U.S.P. 1,620,977, 15.3.27. Appl., 2.6.24).— $\beta\beta'$ -Dichloroethyl ether is of value as a solvent for cellulose ethers or esters, and can be used for the manufacture of varnishes, lacquers, and the like. T. S. WHEELER.

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

Manufacture of copper sulphate. II. The system copper sulphate-sulphuric acid-water. G. AGDE and H. BARKHOLT (Z. angew. Chem., 1927, 40, 374–379; cf. B., 1926, 707).—The solubility curves for copper sulphate and sulphuric acid at temperatures from 0.5–80° were determined, and also curves of solutions of varying composition but of similar density. Addition of sulphuric acid always reduces the solubility of copper sulphate. Beyond a limit which varies with the temperature the pentahydrate is converted into the trihydrate. Cooling curves on the solubility diagram show the increase in sulphuric acid content of a saturated acid-copper sulphate solution during crystallisation. In large-scale operation, when fresh acid is added to the mother-liquor for the treatment of cupreous material in a tower, the regulation of temperature and concentration so that the limits of transition from pentahydrate to trihydrate are not overstepped has effected a 40% increase in output from a given plant. The crystals may be freed from acid by washing with saturated copper sulphate solution on the centrifuge. Contrary to general opinion, however, crystals from acid solution do not necessarily effloresce in air, though they may be distinguished by their more fissured appearance. C. IRWIN.

Commercial preparation of aluminium acetate. F. CHEMNITZ (Chem.-Ztg., 1927, 51, 210).—Aluminium sulphate with a maximum content of 0.02% Fe, 70–80% acetic acid free from organic impurities, and finely-divided calcium carbonate are the raw materials used. 360 kg. of aluminium sulphate are dissolved in 300 litres of water with direct steam heating. 450 litres of water are added and 146 kg. of acetic acid calculated as 100%. Then 192 kg. of calcium carbonate are added in small portions with vigorous stirring. After 240 hrs. 680 litres of water are added and the mixture is allowed to remain for 6 days, with at first occasional agitation. The decanted and filtered liquor (*d* not less than 1.048) is freed from heavy metals and iron by the successive addition of barium sulphide and potassium ferrocyanide, the excess of the latter being removed with zinc sulphate, followed by a further addition of barium sulphide. The settled solution is filtered through paper and animal charcoal. Later development of turbidity in the clear colloidal solution is due to the presence of precipitating

salts, especially of iron, which must be carefully removed, as above stated. C. IRWIN.

PATENTS.

Recovery of carbonate compounds of sodium and borax from brines. W. A. KUHNERT (U.S.P. 1,618,835, 22.2.27. Appl., 20.8.25. Cf. U.S.P. 1,618,834; B., 1927, 252).—Brine is concentrated and treated with carbon dioxide at 30–45° until all but 5% of the sodium carbonate present has been precipitated as the compound, $\text{Na}_2\text{CO}_3 \cdot \text{NaHCO}_3$. It is then filtered and cooled at 20°, when 50–75% of the borax present separates. T. S. WHEELER.

Preparation of iron carbonyl. I. G. FARBENIND. A.-G., Assees. of C. MÜLLER and K. HUBERICH (G.P. 436,369, 13.2.25).—Iron carbonyl is prepared by the action of carbon monoxide on iron at ordinary or higher pressures, the product, which is deposited on the iron, being distilled off from time to time under reduced pressure. A. B. MANNING.

Manufacture of iron carbonyl. M. MÜLLER-CUNRADI, Assr. to I. G. FARBENIND. A.-G. (U.S.P. 1,614,625, 18.1.27. Appl., 27.5.26. Conv., 5.1.25).—Carbon monoxide is caused to act upon iron under pressure and at a temperature sufficiently high to promote the formation of iron carbonyl without decomposition of the carbon monoxide. H. ROYAL-DAWSON.

Production of iron carbonyl. I. G. FARBENIND. A.-G. (F.P. 608,415, 28.12.25. Conv., 9.2.25).—Carbon monoxide and iron are brought together, if necessary under raised pressure, in a reaction chamber connected directly with a condensing chamber maintained at a lower temperature. L. A. COLES.

Manufacture of aluminium chloride. E. R. WOLCOTT, Assr. to TEXAS CO. (U.S.P. 1,617,696, 15.2.27. Appl., 22.9.21).—A lining for retorts used in the manufacture of aluminium chloride consists of a mixture of clay and an alkali silicate.

Manufacture of aluminium chloride. G. L. PRICHARD and H. HENDERSON, Assrs. to GULF REFINING CO. (U.S.P. 1,616,549, 8.2.27. Appl., 3.3.22).—Hydrated bauxite is mixed with heavy hydrocarbon material, e.g., asphalt, at a dehydrating temperature, and the mixture is carbonised and exposed to the action of chlorine. H. ROYAL-DAWSON.

Production of sodium aluminate. J. B. BARNITT, Assr. to ALUMINUM CO. OF AMERICA (U.S.P. 1,616,674, 8.2.27. Appl., 21.1.26).—An intimate porous mixture of an aluminous material, soda ash, and fuel is formed, and, while the component parts are in a quiescent condition, the fuel is burned to produce a sintered mass of sodium aluminate. H. ROYAL-DAWSON.

Manufacture of chromates from chromium ores. I. G. FARBENIND. A.-G. (F.P. 608,928, 4.1.26).—Mixtures of chromium ores with calcium hydroxide and sodium carbonate are treated in thin layers with oxidising combustion gases. L. A. COLES.

Production of manganese arsenate. GRASSELLI CHEMICAL CO., Assees. of W. L. TANNER (Can. P. 260,934, 29.7.24).—Intimate mixtures of manganese compounds with arsenious oxide are heated in the presence of an oxidising agent, or, alternatively, arsenious oxide is

treated with manganese compounds having an oxidising action, in the presence of water. L. A. COLES.

Production of a hard body from asbestos. SIEMENS & HALSKE A.-G. (E.P. 241,576, 16.10.25. Conv., 17.10.24).—Asbestos is heated just below its fusing point, and while in this condition is subjected to high pressure between rollers, thus yielding a mass capable of being machined. H. ROYAL-DAWSON.

Making aqueous solutions and the product. A. M. SHOOK, Assr. to AQUAZONE CORP. (U.S.P. 1,616,202, 1.2.27. Appl., 16.10.23. Conv., 9.6.23).—The solvent is freed from gas-forming nuclei, and solutes are introduced into it, *e.g.*, disodium hydrogen phosphate, sodium bicarbonate, sodium sulphate, sodium chloride, and potassium bicarbonate, any gas-forming nucleus being avoided. Oxygen is then introduced, under conditions of temperature and pressure favourable to absorption, to produce supersaturated solutions. H. ROYAL-DAWSON.

Calcining magnesite. MAGNESIT-INDUSTRIE A.-G. (Austr. P. 104,404, 7.3.24).—Magnesite is heated in furnaces, preferably of the rotating tube type, in such a manner that the temperature near the source of heat is higher than that required to calcine the magnesite to the desired extent, and, if necessary, is sufficiently high to dead-burn it. The product is withdrawn from the zone in which it has been calcined sufficiently to give it the desired properties. L. A. COLES.

Recovery of vanadium. K. B. THEWS, Assr. to COLORADO VANADIUM CORP. (U.S.P. 1,621,038, 15.3.27. Appl., 29.10.20. Renewed 9.8.26. Cf. U.S.P. 1,430,864; B., 1922, 901 A).—Crude non-alkaline solutions of soluble vanadates obtained from vanadium ores are treated with sodium chlorate, or other oxidising agent, and with calcium chloride solution. A precipitate of pure calcium vanadate separates. T. S. WHEELER.

Manufacture of lead oxide. J. J. TARDAN (F.P. 611,810, 30.1.26).—Lead sponge, prepared by the action of zinc on acidified solutions of lead salts or by electrolysis of alkaline solutions containing lead salts, is stirred for 24–48 hrs. in wooden or cement vessels whereby it is oxidised by the air practically completely to the monoxide. A. R. POWELL.

Manufacture of oxide of lead. H. WARING, and ASSOCIATED LEAD MANUFRS. LTD. (E.P. 267,191, 12.11.25).—After passing air through molten lead by the usual method, any incompletely oxidised lead is violently agitated and comminuted in a heated oxidising atmosphere by a high-speed impact pulveriser of special construction having a peripheral speed of at least 20,000 ft./min. W. G. CAREY.

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

Specific heat of iron. P. OBERHOFFER and W. GROSSE (Stahl u. Eisen, 1927, 47, 576–582).—From measurements of the specific heat of electrolytic iron between 0° and 1590° the transformation points have been found to be: A2 (α – β), 785°; A3 (β – γ), 906°; and A4 (γ – δ), 1401°; and the m.p. 1528°. The absorption of heat on heating the metal is 6.765 g.-

cal./g. at A3, 2.531 g.-cal./g. at A4, and 64.38 g.-cal./g. at the m.p. The curve showing total heat-temperature is convex to the temperature axis up to the A2 point, and this fact, coupled with the absence of any heat effect at this temperature, shows that the A2 transformation is proceeding regularly throughout the range 0–785°, and is not of an allotropic nature. The total heat-temperature curves for the β - and δ -ranges are portions of the same straight line, showing that the atomic configuration of both forms is the same. The curve for γ has a smaller slope towards the temperature axis than that for β and δ . The mean specific heat of pure iron rises from 0.1107 between 0° and 100° to 0.1628 between 0° and 780°, at which figure it remains constant to 900°, when there is a sharp rise to a maximum of 0.1724 at 0–906°, followed by a slow fall to 0.1632 at 0–1400°. The mean specific heat between 0° and the m.p. is 0.2071. Calorimetric researches with a transformer iron containing 4% Si show that this alloy does not undergo the A3 transformation on heating. The true specific heat rises rapidly from 0.118 at 100° to 0.248 at 750° (A2 point) then falls abruptly to 0.185 between 755° and 1476°. Between 1476° and 1488°, which is the melting range of this alloy, a heat absorption of 62.209 g.-cal./g. takes place; the specific heat of the molten alloy is 0.141.

A. R. POWELL.

Determination in advance of the composition of the flue gases and the blast requirements of cupolas [in the cast-iron foundry]. B. OSANN (Stahl u. Eisen, 1927, 47, 533–537).—It is shown from theoretical considerations and confirmed by experiment that in a properly run cupola melting iron for casting, the correct volume of air required for the blast and the composition of the flue gases are functions of the proportion of coke in the furnace charge, other constituents of the charge being constant. The oxygen content of the flue gases decreases linearly with the coke content of the charge from 1.5% with 11% of coke, to zero with 14% of coke. Using a charge with 6% of limestone and assuming in all cases that 4.7 kg. of coke per 100 kg. of charge are burnt to carbon dioxide, and the remainder to carbon monoxide, then the proportion of the first-named gas in the flue gases decreases linearly from 13.5% with 11% of coke, to 10% with 16% of coke, while the proportion of carbon monoxide increases from 12 to 17% and the hydrogen content remains more or less constant at about 3%. The volume of air required in cubic metres is $k[8.8 + 0.93(b - 4.7)]$, where b is the carbon content of the charge, and $k = 5.0$ for less than 14% of coke and 4.76 for more than this. A. R. POWELL.

Bright dipping of metal [copper and brass]. A. K. GRAHAM (Trans. Amer. Electrochem. Soc., 1927, 51, 219–228).—The application of acid dips to copper and brass, and the acid mixtures frequently recommended are discussed. A study of the chemistry of dips containing sulphuric, hydrochloric, and nitric acids shows that the rate of dissolution of copper varies directly with the nitric acid concentration, whilst the rate of dissolution of zinc varies directly with the concentration of hydrochloric acid. The activity of a dip depends upon the concentration of sulphuric acid and upon the temperature. The rate of dissolution of copper increases up to 50°, but that for zinc decreases; above this tempera-

ture all dips decompose rapidly. Results obtained on copper and zinc separately have been found to apply to both high and low brass. Operating details for bulk dipping of metal are given. Chemical control of dips and mechanical dipping are discussed.

M. E. NOTTAGE.

Manufacture of magnesium. D. B. KEYES (Trans. Amer. Electrochem. Soc., 1927, 51, 159—166).—Attempts have been made to produce magnesium by dissolving magnesium oxide in some suitable electrolyte and then electrolysis. Preliminary experiments carried out with a large number of salts of the alkali and alkaline-earth metals, aluminium, and zinc showed that positive results could be obtained only with those electrolytes which contained either barium or calcium fluoride as one of the constituents. In the process finally adopted, the bath consisted chiefly of magnesium fluoride, together with small quantities of calcium, barium, and sodium fluorides. A specially-designed cell was used in which the electrodes were set at an angle of 45° to the horizontal in a graphite-lined container; by this means the horizontal movement of the electrolysis current was obtained without passing the electrodes through the sides of the furnace. Under suitable electrical conditions there was no indication of the decomposition of either magnesium or calcium fluoride, provided that an excess of magnesium oxide was present. The magnesium obtained was free from undesirable impurities.

M. E. NOTTAGE.

Pure zinc. H. M. CYR (Trans. Amer. Electrochem. Soc., 1927, 51, 169—173).—"Spectroscopically pure" zinc was prepared by a series of fractional distillations *in vacuo* of chemically pure zinc at relatively low temperatures. The product contains less than 0.001% of metallic impurities and shows no impurity lines when examined spectrographically. The metal shows unusual resistance to tarnishing and retains its bright lustre even after exposure to ordinary air for two years. It also shows a great resistance to the action of hydrochloric and sulphuric acids; the purity of the acids is, however, an important factor. The slow rate of dissolution in these acids can be hastened by the use of a platinum couple. Nitric acid attacks "spectroscopically pure" zinc much faster than the commercial grades. Comparison of the resistance to acids of the original crystals with the worked or recast metal shows that most of the resistance is due to its purity rather than to its original shape. The metal, m.p. 419.45°, is unusually soft, has a very low recrystallisation temperature, a tensile strength of 1000 kg./cm.², and possesses the same ductility and elongation as commercial zinc but less temper elasticity. It undergoes no allotropic change between its m.p. and normal atmospheric temperature.

M. E. NOTTAGE.

Preparation of compact and colloidal metallic molybdenum. E. WEDEKIND and O. JOCHEM (Z. angew. Chem., 1927, 40, 434—438).—Metallic molybdenum in lumps weighing up to about 8 g. may be obtained by heating the dioxide or trioxide with calcium in a vacuum. Reduction with zinc yields the metal in the form of a powder, which can be peptised by the method previously described for the peptisation of zirconium (A., 1908, ii, 501). The particles of the resulting hydrosol, which

keeps well if air is excluded, are negatively charged, are immediately coagulated by alkaline electrolytes and more slowly by neutral electrolytes, but are comparatively resistant to hydrogen ions.

R. CUTHILL.

PATENTS.

Steel alloy. J. W. WEITZENKORN, Assr. to MOLYBDENUM CORP. OF AMERICA (U.S.P. 1,622,894, 29.3.27. Appl., 30.3.26).—A steel alloy contains up to 2.50% C, 0.50—1.45% Cr, 0.10—0.50% V, up to 0.48% Mo, and traces of impurities.

M. E. NOTTAGE.

[Iron-chromium] alloy. E. J. SHACKELFORD, W. B. D. PENNIMAN, and J. R. CAIN, Assrs. to RADIAC METALS, LTD. (U.S.P. 1,622,977, 29.3.27. Appl., 16.4.25).—The process consists of adding ferrochromium to a furnace charged with material producing basic slag and molten iron having up to 0.05% C, working the bath until the carbon content is under 0.3%, adding a second charge of ferro-chromium, and repeating this step until the bath has the desired chromium and carbon content.

M. E. NOTTAGE.

Chromium plating. METALS PROTECTION CORP., Assees. of H. C. PIERCE (E.P. 267,080, 23.8.26. Conv., 5.3.26).—Articles of iron, steel, or nickel are cleaned electrolytically in an alkaline bath, and after washing are made the anode in an electrolyte prior to plating in a chromium bath. During plating it is sometimes found beneficial to alternate the polarity of the metal to promote a more even deposition of chromium on the surface of articles in relief.

C. A. KING.

Silver alloys. W. M. GUERTLER (E.P. 267,263, 21.1.26).—An alloy of silver, copper, and/or manganese, aluminium, magnesium, and tin, together with one of the auxiliary hardening metals, zinc, cadmium, tin, antimony, and magnesium.

C. A. KING.

[Iron] mould for casting metals. W. H. SMITH, Assr. to FORD MOTOR CO. (U.S.P. 1,621,472, 15.3.27. Appl., 14.8.25).—A mould for hot metal casting is made of iron containing less than 1% of other elements.

T. S. WHEELER.

Metallising insulating sheets or bands. DUBILIER CONDENSER CO., LTD., Assees. of E. PIFFNER (E.P. 263,728, 26.2.26. Conv., 2.1.26. Addn. to E.P. 243,393).—The material is coated alternately with a metallic salt solution and a reducing agent by spraying the reducing agent, mixed with compressed air or steam, on to the band wetted with the salt solution, and drying or washing the band after spraying before its reintroduction into the salt solution.

W. G. CAREY.

Treatment of minerals, slags, or the like. W. CARPMAEL. From I. G. FARBENIND. A.-G. (E.P. 267,433, 10.11.26).—The metals contained in minerals, which are attacked only with difficulty, may be successively eliminated in a grinding plant either by modifying the temperature of working, or the concentration of the liquid decomposing agent, or by employing different decomposing agents. Any gases evolved during the decomposition may be continuously withdrawn from the reaction chamber.

M. E. NOTTAGE.

[Discharge valve for solids from] mineral concentrating plant. A. FRANCE (U.S.P. 1,616,791, 8.2.27. Appl., 26.9.23. Conv., 14.3.23).—In apparatus

such as upward-current classifiers, the material of highest sp. gr. is discharged by a device comprising a flap valve at the top diverting the material to either of two chambers, the bottom of each of which comprises an outlet flap valve. Each compartment near the top is provided with an inlet for liquid and a vent pipe.

B. M. VENABLES.

[Ore crushing] mill. W. W. GIBSON (U.S.P. 1,621,775, 22.3.27. Appl., 25.8.24).—A rotary shaft carries crushing cylinders evenly spaced around the shaft and equidistant from it, and crushing members are provided in each cylinder. A scoop is secured to the shaft for picking up ore during the rotation, and tubes of equal length each connect the scoop to one of the cylinders.

H. HOLMES.

XI.—ELECTROTECHNICS.

PATENTS.

Methods and apparatus for the electrical purification of gases. SIEMENS-SCHUCKERTWERKE G.M.B.H. (F.P. 609,259; 609,422; 609,426; 609,728; 609,765—6; 609,880—1; 609,932—6; 609,985—7; 609,989; 610,139—610,142; 610,181—5, 13.1.26—26.1.26. Conv., 14.1.25—18.12.25).—(A) Gases containing sticky materials in suspension are treated, prior to their entrance into the purifier, with oils, tetralin, water, steam, etc. in such proportions that the suspended matter is carried down with the precipitating vapour in the form of a liquid. (B) Electrode insulators have the form of hollow cylinders, and are fixed without the use of screws or bolts. (C) The propagation of an explosive wave in an electrical gas purifier is prevented by a device whereby the explosion pressure operates a mechanism which damps out turbulence of the dust in the purifying chamber. (D) Electrodes are spaced so close together that the dust cloud does not overstep the explosive limit. (E) Tubes, gliding planes, etc. are arranged in the gas-way in order to deliver the dust from the electrodes to the collecting chamber. (F) Electrode insulators are fixed at one end and carry the electrodes at the other end, so that the points of support are below the bearing surface of the electrodes. (G) The temperature of the gas to be treated is automatically controlled in the plant by a device inserted in the gas stream. (H) The point of entrance of a high-tension electrode is made conical, a sheet of asbestos etc. being tightly inserted between the electrode and the wall of the opening so that rupture of the insulation may be prevented. (I) In plant designed more especially for the separation of dust from gases derived from the low-temperature distillation of coal, the dust-separating chamber is heated so that no condensation of tar vapours occurs therein. (J) High resistances are inserted in the high-tension conductors in order to produce a uniform distribution of current. (K) The gas stream traverses the purifying chamber, passing across a part of the space between the electrodes, first from above downwards, and then from below upwards. (L) The gas stream flows between electrodes arranged in a shaft, passing normally between the upper opening of the shaft and the roof thereof. (M) A dynamo-electric machine produces directly the direct high-tension current employed.

(N) Gases are cooled to the appropriate temperature by a cooling medium, *e.g.*, water, in tubes. (O) In order to effect uniform distribution of the gas stream between the electrodes, a device is provided to produce turbulence before or in the lower part of this interval. (P) The precipitating surfaces are constructed and disposed in accordance with the pressures in the gas stream. (Q) One or more circuit breakers, each comprising a coil, are placed in the high-tension conductor. (R) In an electrical precipitating plant designed for the treatment of hot gases, especially moist gases, the walls are made double, so that hot air may be passed between the walls. (S) Electric waves, producing interrupted sparks in the treatment chamber, control apparatus indicating the passage of sparks, or reducing the electrode potential. (T) Gas is passed through the purifying chamber before and, if necessary, after the precipitating process, in order to render the precipitation more regular. (U) An object, *e.g.*, an iron plate, is placed above the gas entrance to the treatment chamber, in order to distribute the gas uniformly during its ascent through the chamber. (V) Prior to entering the purifier, gases are brought into intimate contact with metals resting on the floor of the purifier for the removal of ions. (W) Discharge electrodes are arranged on the floor of the purifier, whilst the pendant, insulated, precipitating electrodes are connected with the source of high-tension current. (X) Under each precipitating electrode a "guttiform object" is arranged, which collects dust falling from the respective electrodes and delivers it to a collector. (Y) A precipitating electrode is made in the form of a wooden frame, having active electrode material on both sides separated by a partition, and openings for removal of dust. (Z) A precipitating electrode is made of a hollow wooden frame, the two active parallel surfaces being provided with openings and the edges being arranged so that they can be introduced, either partly or wholly, into the gas stream. Means are provided for transferring precipitated dust into the interior of the frame electrode.

J. S. G. THOMAS.

Insulating compartment in electrical gas purifiers. METALLBANK U. METALLURGISCHE GES. A.-G. (G.P. 434,829, 8.5.25).—The insulators are kept clean by a current of air drawn through the insulator compartment by the heat from the inner compartment of the purifier.

L. A. COLES.

Electric furnace. J. C. WOODSON, Assr. to WESTINGHOUSE ELECTRIC AND MANUF. CO. (U.S.P. 1,622,621—2, 29.3.27. Appl., 23.6.25).—A hanger block forming the sole support for a resistor member extends into and away from the face of a member of substantially overlapping channel section, and is held in proper operative position therein by the resistor. J. S. G. THOMAS.

[Heating resistances for] electric furnaces. INTERNAT. GENERAL ELECTRIC CO., INC., Assees. of ALLGEM. ELEKTRICITÄTS GES. (E.P. 262,796, 9.12.26. Conv., 9.12.25).—Free, self-supporting spirals of chromium-nickel alloy, having an internal diameter not greater than about 8 times that of the wire of which they are made, are hung both horizontally and vertically in the heating chamber.

J. S. G. THOMAS.

Electric accumulator. H. LEITNER (E.P. 267,205,

7.12.25).—Hard cement-porous blocks made of a mixture of a paste of lead oxide and liquids causing the paste to set, *e.g.*, tar products, glucose, etc., are cast in moulds around metallic conductors. Powdered pumice or substances which can subsequently be removed, *e.g.*, sulphates of magnesium, potassium, or sodium, etc., are incorporated in the block in order to make it sufficiently porous to absorb electrolyte within its pores without impairing the conductivity of the mass.

J. S. G. THOMAS.

[Active material for] electric accumulators. H. LEITNER (E.P. 267,588, 14.12.25).—Finely-divided metallic particles of lead are sprayed on to a conductor and treated electrolytically to form a closely adherent, porous layer of lead peroxide. The process is also applicable to the preparation of plates for other accumulators, *e.g.*, nickel-iron-alkali cells. [Reference is directed, in pursuance of Sect. 7, Sub-sect. 4, of the Patents and Designs Acts, 1907 and 1919, to E.P. 24,353 of 1893 and 4431 of 1882.]

J. S. G. THOMAS.

Electrolytic cell. A. A. JAHNKE (U.S.P. 1,623,246, 5.4.27. Appl., 20.8.25).—Anode and cathode electrodes, and a pair of gas-collecting chambers placed one within the other and permitting accumulation of gases and gradual increase of gas pressure, are arranged within a housing.

J. S. G. THOMAS.

Ionising retort [for gasifying hydrocarbons etc]. I. W. HENRY (E.P. 267,358, 28.5.26).—A retort is supplied with means for creating and maintaining in the retort chamber during operation a non-discharging, non-sparking, high-frequency alternating field operating solely by induction, and effecting physico-chemical changes in the material treated. The retort is provided with a valve-controlled inlet and a gas conduit.

J. S. G. THOMAS.

[Electrolytic] method and means for coating materials [*e.g.*, metal wire] with rubber. KODAK, LTD., Assees. of S. E. SHEPPARD and L. W. EBERLIN (E.P. 261,700, 17.5.26. Conv., 20.11.25).—See U.S.P. 1,589,329; B., 1926, 794.

Filter diaphragms for electrolytic purposes. J. BILLITER, and SIEMENS & HALSKE A.-G. (E.P. 245,127 and 262,470, 21.12.25. Conv., 23.12.24).—See F.P. 608,309; B., 1927, 196.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Pitch, turpentine oil, and aqueous distillates during the industrial treatment. P. A. BOBROV (Trans. Viatka Sci. Res. Inst., 1926, 2, 52—67).—The method of distillation of turpentine followed in one of the numerous Viatki factories is described, and figures are given to show how the turpentine oil etc. vary during the process of distillation.

T. H. POPE.

Medicinal creosote and methods of obtaining it. P. A. BOBROV (Trans. Viatka Sci. Res. Inst., 1926, 2, 87—133).—The literature is summarised, and it is shown that when red turpentine is distilled in a current of steam, the distillate furnishes a material suitable for the preparation of medicinal creosote or guaiacol. The distillate is purified by treatment with sodium hydroxide solution, and filtration of the alkaline solution through an absorbent such as charcoal removes the

hydrocarbons and other extraneous substances dissolved along with the phenols.

T. H. POPE.

Characteristics of the process of rosin distillation. P. A. BOBROV (Trans. Viatka Sci. Res. Inst., 1926, 2, 68—81).—This process is regarded as consisting of a number of simultaneous or successive changes, the essential one being the liberation of the galipot, the volatile compounds of which distil as oil of turpentine, whilst the non-volatile components, notably the resin acids, remain in the residual pitch. At the same time the turpentine undergoes pyrogenetic changes, the pinene being converted partially into dipentene, and aliphatic and aromatic hydrocarbons formed. At higher temperatures the levorotatory resin acids are transformed into dextrorotatory isomerides, and these acids are partly converted into esters of phenols and partly decomposed by heat giving mainly hydrocarbons.

T. H. POPE.

Composition of resin. P. A. BOBROV (Trans. Viatka Sci. Res. Inst., 1926, 2, 40—51).—Owing to the inconsistency of the results obtained when pine resin is distilled either by direct heating or in a current of steam, the method of extracting with ether and investigating the ethereal solution has been employed (*cf.* Tschirch, A., 1903, i, 105, 106). In this way the constituents of the resin have been separated into the following groups: free acids; a mixture composed principally of phenols; 37.8—38.1% of substances of indifferent character, such as hydrocarbons, aldehydes, ketones, resins, etc.; 1.7% consisting of phenolic esters; and saponifiable substances. The fixed acids, amounting to 43.4—47.5% of the resin, consisted of 21.7% of aliphatic acids and 73.67% of resin acids, 6.8% being hydroxy-acids. Crystallisation from light petroleum and alcohol yields an acid $C_{20}H_{30}O_2$, m.p. 161—161.5°, $[\alpha]_D + 32^\circ$ (in alcohol). The proportion of non-volatile phenols in the resin was 6—8.17%, and 0.927—0.99% of the resin was insoluble in ether.

T. H. POPE.

Pine resin acids and their behaviour at high temperatures. P. A. BOBROV (Trans. Viatka Sci. Res. Inst., 1926, 2, 29—39).—A summary of the literature.

T. H. POPE.

PATENTS.

Preparation of ethereal non-resinous condensation products from phenol and formaldehyde. A RIEBECK'SCHE MONTANWERKE A.-G. (G.P. 436,445, 15.1.21. Addn. to G.P. 352,003; B., 1922, 728 A).—The initial condensation product of a phenol with formaldehyde in the presence of an acid catalyst is further treated with vinyl or allyl halides in alkaline solution. The vinyl or allyl ethers of dihydroxydiarylmethane thus formed are clear, viscous, transparent liquids solidifying on exposure to the air.

S. S. WOOLF.

Production of higher aldehyde derivatives of reaction products of aldehydes and amines. C. O. NORTH (U.S.P. 1,619,953, 8.3.27. Appl., 5.3.26).—The product obtained by the condensation of acetaldehyde (3 mols.) with aniline (3 mols.) is dehydrated at 105°, heated under reflux for 14 hrs. with about 60% of its weight of acetaldehyde, and then at 105°. A hard resinous product is obtained.

T. S. WHEELER.

Writing inks (E.P. 267,633).—See IV.

Pigment dyes (Dan. P. 34,077).—See IV.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Changes in slab rubber on keeping. W. SPOON (Comm. Netherlands Rubber Testing Stat., Buitenzorg, 1927, No. 9, 67—73; Arch. Rubbercultuur, 1927, 11, [2]).—Matured or slab rubber, if washed and crêped shortly after preparation, shows on storage a marked decrease in rate of vulcanisation, in tensile strength, and in viscosity. If stored in the original slab form the rate of vulcanisation and the tensile strength remain almost unchanged although the viscosity decreases. Considerable alteration, however, is evident in the condition of the surface rubber of the slabs, which becomes soft and finally tacky, and has a lower viscosity than the interior.

D. F. TWISS.

Influence of "uspulun" on the inner properties of rubber. W. SPOON (Comm. Netherlands Rubber Testing Stat., Buitenzorg, 1927, No. 10, 74—78; Arch. Rubbercultuur, 1927, 11, [2]).—Uspulun, a disinfectant containing a mercury compound of chlorophenol, has been recommended for application to the tapping surface of *Hevea* trees. The presence of 0.01% of uspulun in latex slightly retards coagulation, but has no serious effect on the inner properties or on the ageing behaviour of the rubber.

D. F. TWISS.

PATENTS.

Manufacture of vulcanisation accelerators. NAUGATUCK CHEMICAL Co., Assees. of S. M. CADWELL and A. T. MAXIMOFF (E.P. 259,933, 13.9.26. Conv., 15.10.25).—Condensation of aldehydes, e.g., heptaldehyde, with basic nitrogenous compounds, e.g., aniline, is effected at temperatures above 100°, the optimum range being 135—145°. The products are much more active accelerators of vulcanisation than those obtained from the same materials by the earlier process (cf. E.P. 180,978; B., 1923, 899 A), in which the reagents are mixed at the ordinary temperature, and no external heating is applied.

D. F. TWISS.

Vulcanisation of rubber. RUBBER SERVICE LABORATORIES Co., Assees. of C. O. NORTH and C. W. CHRISTENSEN (Can. P. 258,626, 14.5.25).—Vulcanisation of rubber is accelerated by the condensation product of an aromatic amine and an unsaturated aldehyde with conjugated double linkings.

D. F. TWISS.

Vulcanisation of rubber. GOODYEAR TIRE & RUBBER Co., Assees. of C. E. BOORD and E. N. C. COOLIDGE (Can. P. 260,248, 21.12.25).—The reaction product of 2-mercaptobenzthiazole and a guanidine compound, e.g., a diarylguanidine, is applied as an accelerator of vulcanisation.

D. F. TWISS.

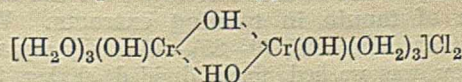
XV.—LEATHER; GLUE.

Swedish Government regulations concerning the weighting of leather and methods of analysing it. E. NORLIN (J. Soc. Leather Trades' Chem., 1926, 10, 443—468).—Treatment of leather usually sold by weight with any substances not requisite for efficient tanning and finishing, or with excess of tanning materials for weighting purposes, is forbidden. Barium, magnesium, lead, tin, or other mineral salts, also glucose, molasses, dextrin, and similar substances are permitted only when used for bleaching or finishing. The water-soluble matter

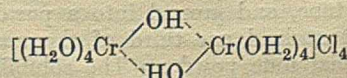
must not exceed 22.5% for butts, sides, etc., and 27.5% for cut bellies, neither must the ash exceed 3% for butts, sides, etc., nor 3.5% for cut bellies, the figures to be calculated in all cases on a basis of 18% moisture. Samples (each 10 × 10 cm.) shall be taken from each parcel of not more than 1000 pieces, selecting 3% of the pieces at random, but not less than 6. Details as to selection and cutting of samples are given. The finely-cut sample, reduced to 120 g. by repeated mixing and dividing, is bottled. *Moisture*.—Weigh 5 g. into a weighing bottle, dry for 3 hrs. at 100—103°, cool, and weigh. *Ash*.—The ash from 5 g. of the leather calcined in a weighed crucible, preferably in a muffle furnace at a dull red heat (550—600°), is cooled and weighed. *Fat*.—Extract 20 g. of leather in a paper thimble, the top of which is covered with filter paper, in a Soxhlet extractor, using light petroleum (b.p. 40—60°) and siphoning every 10 min. for 3 hrs. The solvent is finally distilled into the upper vessel, the contents of the extractor flask are distilled off, and the last traces of solvent are removed by means of a current of air. The residue is dried for 1 hr. at 100—103°, cooled, and weighed. The extracted leather is freed from light petroleum by heating it with hot water in a special distilling apparatus. The fat extraction is complete after 3 hrs. *Water-soluble matter*.—A Koch extractor is used, consisting of an extraction bottle securely closed with a rubber bung through which pass two glass tubes with funnel-shaped ends in the bottle covered with fine silk net. One tube terminates just inside the bung and acts as inlet tube from a flask containing water 1 m. above the extraction bottle. The other tube nearly touches the bottom of the bottle and acts as outlet. The fat-free leather is placed in the extraction bottle, the bung replaced, and the bottle filled with distilled water, shaken, left overnight, then placed in a double-walled water bath at 45°. The water in the flask automatically passes into the extraction bottle as the water extract passes out of the latter into a flask (1000 c.c.) which is filled in 3—3.5 hrs. The extract is cooled, made up to 1 litre, filtered through a Berkefeld filter candle, and 50 c.c. are evaporated to dryness and weighed.

D. WOODROFFE.

Chrome tanning. IV. Properties of basic chromium chloride liquors. E. STIASNY and D. BALÁNYI (Collegium, 1927, 86—106. Cf. B., 1926, 376).—It is immaterial whether green or violet chromium chloride is used since the differences disappear when 33% basic liquors are aged. The addition of alkali to a solution of chromium chloride sufficient to make it 30% basic results in the formation of a precipitate of a hydroxochromium compound of the type



which gradually dissolves again on ageing, heating, or drying owing to the formation of "ol" compounds of the type



which can be made 70% basic before they precipitate.

The increased acidity of the "ol" compounds may be due to their greater hydrolysis, to the splitting off of acid, or to the disturbance of the hydrolysis equilibrium. When sodium hydroxide (1 mol.) is added to chromium chloride (1 mol.), hydroxopenta-aquochromium chloride is formed together with small amounts of the dihydroxo-salt and traces of chromium hydroxide. On being kept, the hydroxo compound and especially the dihydroxo-compound form "ol" compounds which increase the acidity and redissolve the precipitated chromium hydroxide, hence the liquor clears. Chromium complexes in which the "ol" formation has progressed most and which contain fewer hydroxyl groups per atom of chromium have the same basicity as the compounds in which "ol" formation has not taken place, but the basicity can be increased much more before they precipitate. If sodium carbonate solution is added to a chromium chloride solution, carbonato-chromium complexes are formed. Thus, a bluish-violet coloration is produced by adding sodium carbonate solution to blue hexa-aquochromium chloride or to green dichlorotetra-aquochromium chloride. After several weeks the colour changes to a deep green. The further addition of sodium carbonate gives green hydroxo- and "ol" compounds. Freshly tanned chrome leather is more susceptible to the action of acids or alkalis than aged leather. This is due to "ol" formation since tetrahydroxotetra-aquodiol-chromium is insoluble in acetic acid but soluble in hydrochloric acid, whereas polyol chromium is insoluble in both acids. The bluish-violet solution obtained by dissolving cold precipitated chromium hydroxide in hydrochloric acid is due to the formation of hexa-aquochromium trichloride; the hot precipitated compound contains "ol" groups which will not combine with hydrochloric acid; hence they give a green solution of octa-aquodiol-dichromium tetrachloride. The differences between the one- and two-bath chrome tannages are partly due to "ol" formation, which is much greater in the former process, hence a more astringent tannage is produced. One-bath chrome tanning liquors can vary according to chromium content, basicity, p_H value, precipitation figure, degree of masking, neutral salt content, and the degree of "ol" compound formation. As "ol" formation increases, the size of the chromium complexes grows and the pure crystalloid hydroxo-compounds become converted first into semicolloidal basic salts in which there is partial "ol" formation, and then into highly colloidal compounds in which the "ol" formation is complete. Neither the purely crystalloid salts nor the highly molecular compounds are of tanning value.

D. WOODROFFE.

Possibility of use of sinew collagen for the determination of tannin in tanning extracts. W. S. SADIKOV (Collegium, 1927, 76—85).—Carefully separated cattle sinew was washed, finely divided, shaken three times for 6 hrs. each with 0.25% solution of caustic soda, washed with water and coagulated with acetic or carbonic acids, pressed into flakes, dehydrated with alcohol or acetone, and ground into a powdery mass. The product contained one third of the water-soluble matter of official hide powder. The solubility of the tanned sinew collagen was greater than that of the untanned, but practically equal to that of tanned hide

powder. Hide powder was more absorbent than sinew collagen. Treatment with formaldehyde or basic chromium chloride strongly diminished its adsorbent properties. Comparative tannin analyses with hide powder and sinew collagen, respectively, made on several extracts showed close agreement.

D. WOODROFFE.

XVI.—AGRICULTURE.

Action of potash fertilisers containing magnesium. E. HASELHOFF (Landw. Versuchs.-Stat., 1926, 105, 75—104).—Field trials of the effect of various potash fertilisers with and without magnesium salts, on various crops, are described. On wheat and red clover magnesium salts produced an adverse effect on the crop yield, but on oats a somewhat larger crop was obtained. With a number of other crops the effect of magnesium salts was irregular, varying with the nature of potassium and magnesium salts used. Alterations in the composition of crops following the use of potash fertilisers was not great. The magnesium content of the crop varied least, even when magnesium salts were applied to the soil. Dressings of magnesium exerted a definite influence on the potassium content of the crop, but no regularity in its action was apparent. In pot experiments the influence of magnesium salts on the fertilising effect of potassium was variable, but the general tendency was to decrease yields. The sulphate, chloride, and carbonate of magnesium produced exactly similar results. No decided influence of magnesium on the intake of potassium by the plant was observed.

A. G. POLLARD.

Influence of twelve years' continuous potash manuring on the crop yield, and the physics, chemistry, and mycology of the soil. H. NIKLAS, A. STROBEL, and K. SCHARER (Landw. Versuchs.-Stat., 1926, 105, 105—136).—Crops benefitting most by potash manuring were potatoes, roots, and rye. Observed differences between soils continuously manured with potassium salts and unmanured controls continued to increase after twelve years' treatment. No appreciable effect on the reaction of the soil or of the plant sap followed the manuring with potassium salts, and the commonly observed physical properties remained unchanged. Definite but small and unimportant alterations in soil structure could be observed microscopically in the manured soils. Repeated heavy dressings of potassium fertilisers did not markedly reduce bacterial numbers in the soil, except in the case of potassium chloride, where a definite decrease in spores and bacterial numbers resulted. In general, no very unfavourable effects of continuous potash manuring were observed.

A. G. POLLARD.

Significance of the occurrence of manganese, copper, zinc, nickel, and cobalt in Kentucky blue grass. J. S. MCHARGUE (Ind. Eng. Chem., 1927, 19, 274—276).—Kentucky blue grass (*Poa pratensis*, "English spear grass"), collected in the spring, was found to contain considerably more nitrogen, potassium and phosphorus, one-third as much calcium, appreciably more copper, and considerably more manganese and zinc than alfalfa. The association of high manganese and chlorophyll contents is significant, as previous work has shown the necessity of manganese for plant growth and chlorophyll synthesis. The beneficial effect of

manganese has been verified by growth experiments, and copper is also beneficial—a fact which may be associated with the presence of traces of copper in substances (including blue grass) containing the fat-soluble vitamin A, and may be of biological significance. As has been noted with other plants, the seeds of blue grass contain more copper, manganese, and zinc than the blades, these metals being concentrated in the germ and not in the endosperm. It is suggested that these metals are essential to the production of vitamins in plants.

C. O. HARVEY.

Growth of certain micro-organisms in planted and in unplanted soil. J. K. WILSON and T. L. LYON (Cornell Agric. Exp. Sta. Mem., 1926, No. 103, 1–25).—Some crop plants (maize, timothy) produce a condition in the soil surrounding their roots (liberated organic matter) which favours the growth of certain micro-organisms (*Azotobacter*, *Bacillus radicola*, *B. fluorescens*, a “nitrate-reducing organism,” a “guttation organism” from maize, and a “blue organism” from soil) which consume nitrate-nitrogen, thus accounting for the disappearance of nitrate not absorbed by the plants.

CHEMICAL ABSTRACTS.

Comparative biological investigation of stable manure and “super” manure. G. RUSCHMANN (Z. Spiritusind., 1927, 50, 15–16, 24–26, 35–36).—The “super” manure, produced by hot fermentation at 60–65° in a deep layer, is dark-brown to black, crumbly, practically odourless, and only faintly alkaline. It is distinguished from ordinary stable manure by its paucity in germs of every kind. High temperature and exclusion of air, which tend to diminish the growth of germs, are essential factors in its preparation. Although “super” manure produces the greater number of spores, its actual content is low compared with other manures owing to the extensive dying off which occurs. High-temperature fermentation also favours the formation of thermophile flora, and is attended by a loss of combined water and consequent enriching in carbon. The exclusive use of the chemical evaluation of manures is often misleading, and should be supplemented by a biological examination.

F. R. ENNOS.

XVII.—SUGARS; STARCHES; GUMS.

Application of spectrometric measurements in the [beet] sugar industry. H. LUNDÉN (Z. Ver. deut. Zuckerind., 1926, 780–800).—Spectrometric measurements of products at different stages of manufacture or refining are recommended as a means of judging of the effect of clarification, of affining, of treatment with char or carbon, etc. Certain colour shades correspond to certain flavours. *E.g.*, an amethyst shade is generally accompanied by a very unpleasant taste (resembling beet juice), and methods removing this colour also eliminate the taste. A sugar having an amethyst shade develops a much worse flavour on heating, its sweetness being thus almost eliminated.

J. P. OGILVIE.

Adsorption of inorganic ions by “Carboraffin” and “Supra-Norit” in the filtration of thick-juice. J. FIŠER (Z. Zuckerind. Czechoslov., 1926, 51, 49–55, 57–59).—Silica is adsorbed neither by “Carboraffin” nor by “Supra-Norit,” but iron and aluminium of all the inorganic ions are most readily taken up, whilst

“Carboraffin” is the better medium for calcium. On the other hand, with magnesium, “Supra-Norit” has the preference. Alkalis are little taken up by either, and the same holds for sulphate ions. Chlorine is more adsorbed by “Supra-Norit” than by the other carbon.

J. P. OGILVIE.

Boiling-up of thin-juice. V. MAYER (Z. Zuckerind. Czechoslov., 1926, 51, 65–70, 73–80).—If during beet-sugar manufacture the juice is carbonated at ordinary temperature, and re-heated at 75°, no appreciable elimination of calcium carbonate occurs; but if the carbonation is performed at 75°, and if the juice is filtered at that temperature, a juice containing a much lower amount of lime thus results. In general, the boiling of carbonated juice in beet factories is insufficiently prolonged.

J. P. OGILVIE.

Determination of sugar in the beet. V. STANĚK and J. VONDRÁK (Z. Zuckerind. Czechoslov., 1926, 51, 101–108, 113–121).—The volume occupied by the insoluble mark in the hot aqueous digestion method is found to average 1.56 c.c., instead of 0.6 c.c., at present assumed to be the correction for the normal sugar weight. This makes the juice volume to be 21.8, instead of 23.0 c.c.

J. P. OGILVIE.

Influence of filter-paper on the polarisation of sugar solutions. K. VNUK (Z. Zuckerind. Czechoslov., 1927, 51, 125–128, 133–139).—If the paper used for filtering in the polarisation of sugars contains less or more than 7%, the filtrate is concentrated or diluted. Paper containing this amount of water can be obtained by storing it in a desiccator over a saturated aqueous solution of ammonium thiocyanate.

J. P. OGILVIE.

Coloration of sugar products. E. SAILLARD (Compt. rend., 1927, 184, 291–293).—Samples of syrups, brown sugars from tail fractions, and molasses for the years 1921–1926 have been examined colorimetrically against a solution of iodine, the results obtained leading to the following conclusions:—(1) Coloration due to non-sugar organic matter in the syrup varies from year to year, the value sometimes being twice that for the previous year; (2) coloration of the molasses is about 10 times as great as that of the syrup, and 70% of that in the brown sugar.

J. W. BAKER.

XIX.—FOODS.

Detection of minute amounts of naphthalene in flour. A. K. EPSTEIN and B. R. HARRIS (Cereal Chem., 1926, 3, 60–62).—50 g. of flour are treated with 100 c.c. of 10% sulphuric acid and steam distilled, 125 c.c. of distillate being collected. After extraction with 5 c.c. of chloroform, the extract is dried with calcium chloride and tested with anhydrous sublimed aluminium chloride, when the formation of a violet colour shows the presence of naphthalene. In this way 1–1.5 pts. of naphthalene per 100,000 pts. of flour may be detected. The test is more sensitive than that based on odour.

F. R. ENNOS.

Mechanical modification of dough to make it possible to bake bread with only the fermentation in the pan. C. O. SWANSON and E. B. WORKING (Cereal Chem., 1926, 3, 65–83).—A machine is described for mixing dough with a pack-squeeze-pull-tear action. By mixing dough for 7 min. with the machine rotating at

120 r.p.m. a good quality bread may be obtained, without any fermentation other than that occurring during panning. If the mixing is excessive or is combined with the usual period of fermentation, the bread produced is poor in quality. F. R. ENNOS.

Rapid method for determining the gasoline colour value of flour and wheat. D. A. COLEMAN and A. CHRISTIE (Cereal Chem., 1926, 3, 84—89).—5 or 20 g. of flour or ground wheat are mechanically stirred in a closed bottle for 15 or 30 min. After filtering, the colour of the liquid is compared with a standard 0.005% potassium chromate solution in a suitable colorimeter. The colour values obtained are in substantial agreement with those determined by the lengthy A.O.A.C. process. F. R. ENNOS.

Gasoline colour value of several classes of wheat. D. A. COLEMAN and A. CHRISTIE (Cereal Chem., 1926, 3, 188—193).—Gasoline-soluble pigments of wheat and wheat flour vary greatly, and on the average the largest quantities were found in the hard red winter class of wheat, the common white class coming next, and the durum wheats having the least amount. Certain varieties of durum wheats (Acme, Monad, Pentad) have consistently less gasoline-soluble pigments than others (Arnautka, Kubanka, Kahla, and Mindum). No significant relationship was found to exist between colour and protein or ash content. D. G. HEWER.

Effect of monocalcium phosphate upon the viscosity of acidulated flour-in-water suspensions. L. EARLENBAUGH (Cereal Chem., 1926, 3, 102—106).—Addition of monocalcium phosphate to acid suspensions of flour in water diminishes the viscosity, but has no apparent effect on the quality factor. F. R. ENNOS.

Rapid colorimetric determination of hydrogen-concentration of crackers. R. T. BOHN and R. J. MARTZ (Cereal Chem., 1926, 3, 183—187).—The degree of alkalinity of biscuits may be determined by placing several drops of distilled water on the freshly-broken surface of the cracker and several drops of an aqueous or alcoholic solution of phenol red on this, and comparing the colour formed with those of standard tubes for this indicator. If the colour is near the limit of the range of the indicator cresol red is used. D. G. HEWER.

New factor for converting the percentage of nitrogen in wheat into that of protein. D. B. JONES (Cereal Chem., 1926, 3, 194—198).—The protein of the wheat endosperm consists chiefly of gliadin and glutenin containing, respectively, about 17.6% and 17.5% N, which gives a conversion factor of 5.7. The proteins of bran are essentially composed of an albumin (15.4% N), a globulin (17.7% N), and a prolamine (15.3% N), corresponding to a conversion factor of 6.31. The factor for the embryo is 5.8, based on a composition of 10% of albumin, 5% of globulin, and about 3% of proteose. Taking the whole wheat kernel as composed of endosperm 73.3%, bran 22.3%, and embryo 4.4%, the factor for the whole kernel is 5.83, compared with the usually adopted factor of 5.7. D. G. HEWER.

Test-bakes and certain of their chemical and physical aspects. F. L. DUNLAP (Cereal Chem., 1926,

3, 210—215).—The superiority of an actual baking test over analytical results as a measure of the quality of flour is emphasised. A standard technique for baking tests, however, is shown to be difficult to prescribe. Individual flours need characteristic treatment in mixing, kneading, fermenting, etc. in order to produce the best loaf. In the best-conditioned doughs the gluten is soft, pliable, and evenly distributed. Such conditions are favoured by a lower p_H value of the flour than obtains in many natural flours. A lowered p_H value and a short fermentation period tend to produce a well-built loaf, and in such cases the first of the two fermentation periods of the dough should be the shorter one. A. G. POLLARD.

Standardising the experimental baking test. M. J. BLISH (Cereal Chem., 1926, 3, 216—222).—The formulation of a standard baking test is rendered difficult by the different interpretations placed upon the terms "baking quality" and "baking strength." In actual practice the personal element in test-baking is considerable, and means for its elimination or minimising are needed. The question as to how far it is possible or advisable to standardise the details of baking-test technique is discussed. A. G. POLLARD.

Relation of crude protein content of flour to loaf volume. C. H. BAILEY and R. C. SHERWOOD (Cereal Chem., 1926, 3, 393—401).—A positive correlation has been found between the crude protein content of straight-grade flour milled from hard spring wheat and the volume of loaf produced from it. W. O. KERMAK.

Rapid moisture-testing oven for cereal chemistry laboratories. D. A. COLEMAN and H. B. DIXON (Cereal Chem., 1926, 3, 419—426).—A commercial oven for the determination in 15 min. of moisture in samples of flour etc. is described, and details are given of the method. Good agreement is found between the results obtained by it and by the routine method. W. O. KERMAK.

Quality of New Zealand wheats and flours. L. D. FOSTER (Trans. Proc. New Zealand Inst., 1926, 56, 738—743; Chem. Abstr., 1926, 20, 3518).—Relationships exist between the amounts of lime and magnesia and the protein content, the magnesia content and the ratio of wet to dry gluten, and the phosphate content and amount of ash, but not between the lime and magnesia contents and the baking value. A. A. ELDRIDGE.

Relation of kernel texture to the physical characteristics, milling and baking qualities, and chemical composition of wheat. J. H. SHOLLENBERGER and D. A. COLEMAN (U.S. Dep. Agric. Bull., 1926, [1420], 1—16; Chem. Abstr., 1926, 20, 3517).—The hard, mottled, and starchy types of kernels of hard red spring, hard red winter, and durum wheat were examined. The hard kernel was highest in density and flour yield, superior in water absorption, loaf weight, and crude protein content, and slightly higher in ash, crude fibre, and acidity. The starchy type was slightly superior in fat content and bran yield, but was generally inferior in milling and baking qualities. A. A. ELDRIDGE.

Determination of baking value of wheat by measure of specific energy of deformation of dough. M. CHOPIN (Cereal Chem., 1927, 4, 1—13).—

The rate at which dough rises in baking is chiefly dependent on its plastic properties, which may be determined by means of mechanical tests. The dough is mechanically admixed with 2% sodium chloride solution, and moulded into test pieces, which are immediately stretched in an extensimeter provided with a recording pressure gauge. Each piece is pressed into a disc of standard thickness and diameter, and expanded into a bubble by means of air pressure supplied by allowing water to flow into a graduated burette; the pressure within the bubble is recorded by the gauge. From the form of the curve traced by the gauge, and the volume of water admitted before the bubble bursts, the elastic properties can be computed; a suitable value for expressing the baking value is the specific energy of deformation, *W*. Variations in *W* are largely due to variations in the content and elastic properties of the gluten; the function *W* is approximately additive.

S. I. LEVY.

Determination of iron, calcium, magnesium, phosphorus, ash, and protein in hard spring wheat and in the flour streams representing the largest volume of flour produced in its milling. E. P. HARDING and G. DYSTERHEFT (*Cereal Chem.*, 1927, 4, 47–57).—The determinations were made on flours from a mill in Minneapolis, milling hard spring Marquis wheat from N. Dakota, and producing four break streams, four middlings, a straight flour, and a clear flour. All the components determined, except ash, are lower in the middlings than in the break streams, and lower in the straight than in the clear flour. The iron-ash and iron-magnesium ratios are almost constant throughout.

S. I. LEVY.

Determination of amino-acids and proteolytic activity in wheat and flour. H. J. DENHAM and G. W. S. BLAIR (*Cereal Chem.*, 1927, 4, 58–62).—The increase of amino-acids in the extract with the time during which the suspension is kept before centrifuging is not due to a gradual increase in the amount extracted (Swanson and Tague, *B.*, 1916, 649; 1917, 469), but more probably to proteolytic activity in the flour, since it is observed if the suspension be immediately centrifuged, but is inhibited if the flour be first heated to destroy the enzymes.

S. I. LEVY.

Wheat and flour studies. IX. Density of wheat as influenced by freezing, stage of development, and moisture content. P. F. SHARP (*Cereal Chem.*, 1927, 4, 14–46).—The density of wheat grown and dessicated under uniform conditions is approximately constant at about 1.48; it is not affected by light freezing, but is increased by severe freezing before maturity. Moisture content and moisture history affect the density more than other factors, but protein content and protein quality are also of importance.

S. I. LEVY.

Effect of concentration on viscosity of flour suspensions. G. W. S. BLAIR, G. WATTS, and H. J. DENHAM (*Cereal Chem.*, 1927, 4, 63–67).—The results and theoretical considerations put forward by Sharp and Gortner (*B.*, 1924, 29) are discussed. The straight line curve obtained by plotting the logarithm of the viscosity against concentration is suggested as of greater practical

utility than the more complicated function plotted by those authors.

S. I. LEVY.

Increasing the protein content of potato waste. W. EKHARD (*Z. Spiritusind.*, 1927, 50, 23).—A cattlefood with an increased protein content may be made by mixing potato waste with lupin seeds or with whey from cheese making. The composition of a number of such mixtures and their value as feeding stuffs are discussed, particularly in regard to the content of water and protein, and to the extent to which the bitter principle of the constituent lupin seeds has been removed, as is indicated by the modified Beckmann reaction.

F. R. ENNOS.

Composition of flaked maize. H. E. WOODMAN and J. STEWART (*J. Agric. Sci.*, 1927, 17, 60–61; cf. *B.*, 1925, 144).—Data are given for the composition of different commercial brands of flaked maize.

G. W. ROBINSON.

Chemical composition of manioc root. W. EKHARD (*Z. Spiritusind.*, 1927, 50, 23).—A specimen of the whole root contained 13.07% of water, 1.46% of ash, was practically free from iron, and was distinctly alkaline. The water extract showed on analysis 13.24% of ash, 8.97% of protein, and 20.16% of reducing sugars as dextrose. On hydrolysis for 2½ hrs. with dilute sulphuric acid, a further 14.40% of reducing sugar was obtained.

F. R. ENNOS.

Colorimetric determination of nitrogen in food-stuffs etc. W. GOLUB (*Z. anal. Chem.*, 1927, 70, 119–128).—From 0.01 to 0.04 g. of the substance is heated with 2 c.c. of sulphuric acid (*d* 1.84) and a few drops of 33% perhydrol in a small test-tube until a clear, colourless solution is obtained, which, after cooling, is diluted to 100 c.c. 10 c.c. are titrated with sodium hydroxide, using phenolphthalein as indicator, and the same amount of alkali is added to a further 10 c.c., which are pipetted into a 100 c.c. graduated flask. After diluting to the mark, a quantity of the solution is analysed for ammonia by the Nessler colorimetric method. The mean of three tests should be taken. The results agree well with those obtained by the usual Kjeldahl process, but the analysis occupies only 1¼–1½ hrs. and requires no elaborate apparatus. Potassium chlorate may be used in place of perhydrol, but greater care is needed in the heating to avoid explosions.

A. R. POWELL.

Determination of sodium, potassium, and chlorine in foodstuffs. A. D. HUSBAND and W. GODDEN (*Analyst*, 1927, 52, 72–75).—Sodium may be determined by ashing sufficient material to give a final weight of 0.1–10.15 g. of mixed sulphates, extracting the ash twice with hot *N*-hydrochloric acid, washing the residue with hot water, and making up filtrate and washings to 200 c.c. 100 c.c. of this extract are boiled, 5 c.c. of 10% barium chloride solution added, the mixture evaporated to about 25 c.c., made alkaline with ammonia solution, and then cooled. The precipitate is filtered off and washed with 2% ammonia solution, and the filtrate and washings are evaporated to dryness, after which 30–35 c.c. of alcoholic ammonium carbonate solution are added and the solution is made up to 100 c.c., and after 2 hrs. is filtered. 50 c.c. of filtrate

are evaporated to dryness, and the cold residue is treated with 5 c.c. of redistilled sulphuric acid, the excess of acid evaporated off, and the residue heated to dryness, the last traces of acid being removed by adding a little powdered ammonium carbonate before heating. After heating in the muffle the dish is cooled and weighed, and from the weight of mixed sulphates and the percentage of potassium the percentage of sodium can be calculated. Potassium is accurately determined by Green's method (cf. A., 1911, ii, 1135), and for chlorine care must be taken with the preliminary ashing to avoid loss. Various methods for chlorine determination have been examined and compared.

D. G. HEWER.

XX.—ORGANIC PRODUCTS; MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Ethyl phthalate. V. J. A. HANDY and L. F. HOYT (J. Amer. Pharm. Assoc., 1927, 16, 7—17).—Esters of phthalic acid can be detected in essential oils by saponification with alcoholic potash and microscopical examination of the resulting potassium salt. The needle-like crystals of potassium phthalate can be readily distinguished from the potassium salts of other acids the esters of which are likely to occur in essential oils, with the exception of potassium carbonate, which, however, is easily recognised by other tests. The method is suitable for the gravimetric determination of ethyl phthalate, provided that other acids the potassium salts of which are insoluble in alcohol are absent. Saponification is best carried out at a comparatively low temperature (6—24 hrs. at 37°), and, since the crystals are very hygroscopic, they should be washed with absolute alcohol and filtered rapidly. A solubility correction should also be made. The results of analyses indicate that ethyl phthalate added to or present in various essential oils in amounts ranging from 1.38 to 16.5% can be recovered as the potassium salt practically quantitatively.

W. J. POWELL.

Manufacture of sodium salt of 3:3'-diamino-4:4'-dihydroxyarsenobenzene. P. A. KOBER (U.S.P. 1,611,461, 21.12.26. Appl., 12.4.20; cf. E.P. 24,152/1; B., 1915, 1165).—Arsphenamine base (3:3'-diamino-4:4'-dihydroxyarsenobenzene) is purified by precipitation with acid from an alkaline solution, and, after washing, is dissolved in an equivalent quantity of sodium hydroxide solution. On evaporation *in vacuo* at 50—80° the sodium salt of the arsphenamine base is obtained in a pure, stable form.

T. S. WHEELER.

Production of nuclear substituted aromatic cyano-mercury compounds. A. KLAGES (U.S.P. 1,618,095, 15.2.27. Appl., 1.9.21. Conv., 23.2.20).—See E.P. 188,376; B., 1923, 119 A.

PATENTS.

Preparation of hydrogenated polynuclear quinones. A. SKITA (F.P. 594,291, 2.3.25. Conv., 7.5.24 and 30.4.25; cf. A., 1926, 173).—Polynuclear quinones and their derivatives are catalytically hydrogenated, and the resulting nuclear-hydrogenated quinols (glycols) are oxidised.

C. HOLLINS.

Making nitroaryl alkyl ethers. L. S. PRATT, E. H. WELTZ, and W. L. MILLS, Assrs. to E. I. DU PONT

DE NEMOURS & Co. (U.S.P. 1,619,368, 1.3.27. Appl., 18.10.20. Renewed 24.7.26).—In the preparation of nitroaryl alkyl ethers by heating together an alcohol, e.g., ethyl alcohol, an alkaline hydroxide, e.g., sodium hydroxide, and a halogenonitro-aromatic hydrocarbon, e.g., *p*-chloronitrobenzene, side reactions due to the reduction of the nitro-group are inhibited by addition of an oxidising agent, e.g., gaseous oxygen under pressure, or sodium peroxide.

T. S. WHEELER.

Production of a therapeutic substance from *Calotropis procera*. C. H. BOEHRINGER SOHN (G.P. 435,530, 8.4.24).—Aqueous extracts of *Calotropis procera*, with or without the addition of substances such as lead acetate to prevent the formation of emulsions, are treated with solvents, e.g., chloroform, carbon tetrachloride, or trichloroethylene, and, by addition of ether or light petroleum to the solvent extract, a yellowish-white, micro-crystalline powder which has a cardiac action is precipitated.

E. H. SHARLES.

Preparation of barbituric acid derivatives. F. HOFFMANN-LA ROCHE & Co., A.-G. (Swiss P. 113,251, 5.1.25).—Easily soluble alkylamine salts are formed by exposing 5:5-disubstituted barbituric acids in thin layers in a closed vessel containing a dish of anhydrous alkylamine, some arrangement for renewing the surface of the layer of acid being desirable. The *diethylamine* salts of diethyl-, phenylethyl-, ethylbutyl-, and *isopropylbromoallyl*-barbituric acids, and the *dipropylamine* salt of *isopropylallyl*barbituric acid are described.

C. HOLLINS.

Extraction of essential oils from plants without distillation. E. FORAY (Addn. No. 30,574, 16.5.25, to F.P. 587,686).—Material containing essential oils is treated with the vapour of solvents such as ether, and solid material such as salt, sugar, sago, or flour, is added to the condensed vapour.

L. A. COLES.

Decomposition of glucosides [in plants prior to the extraction of perfumes]. E. FORAY (F.P. 609,548, 12.12.24).—Glucosides present in plants such as the iris or jasmine are hydrolysed by electrolytic treatment in the presence of water, prior to extraction of perfumes by the usual process.

L. A. COLES.

Extraction of perfumes from flowers. I. G. FARBENIND. A.-G. (F.P. 610,734, 8.2.26. Conv., 25.3.25).—Hot air or other non-reacting gas is passed successively over the flowers and over absorptive material such as active charcoal or silica gel to absorb the perfume, which is then recovered by extraction or distillation.

L. A. COLES.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Absorption of moisture of the air by anhydrous sodium salts used in photography. A. and L. LUMIÈRE and A. SEYEWETZ (Bull. Soc. Franç. Phot., 1926, [iii], 13, 309—311).—Anhydrous sodium carbonate readily absorbs moisture from the air, tending eventually to a salt containing only 60% of the anhydrous substance, and approximating to the formula $\text{Na}_2\text{CO}_3 \cdot 4\text{H}_2\text{O}$. Anhydrous sodium sulphate does not appreciably absorb moisture from the air. Anhydrous sodium thiosulphate readily absorbs moisture to form the stable salt $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$.

W. CLARK.