

BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

JAN. 1 and 8, 1932.*



I.—GENERAL; PLANT; MACHINERY.

New type of diffusion battery with improved circulation. L. I. SHAPIRO (Nauk. Zapiski Tzuk. Prom., 1931, 11, 247—256).—Instead of using chains, the battery is divided into two, and circulation is assisted by a pump and by siphoning from the last cell.

CHEMICAL ABSTRACTS.

Gas washing. F. SCHUSTER (Gas- u. Wasserfach, 1931, 74, 951—954).—Nomograms are described which give the relation between the partial pressure of a vapour present in a gas, the mean mol. wt. of the vapour, and the vapour content in g./c.c. (normal conditions). The applications of the nomograms are discussed. The relations between washing efficiency, the amount of wash liquid required per cu. m. of gas, the concentration of the extracted substance in the liquid, the vapour content of the gas before absorption, and the amount of wash liquor required per g. of absorbed vapour are also described by nomograms to enable one of the five factors to be determined when the other four are known. The equilibrium partial pressures of C_6H_6 -tetralin mixtures ($0-5^\circ$) are given and the application of these and the nomograms to the extraction of C_6H_6 from gas by tetralin is discussed.

H. E. BLAYDEN.

Eliminating noise in chemical industry. W. F. SCHAPHORST (Ind. Eng. Chem., 1931, 23, 1196—1201).—Noise can be largely reduced by enclosing machinery in noise-proof cases, using cork isolation bases, enclosing gears, and running in lubricant; air or hydraulic pressure should be used in riveting operations.

D. K. MOORE.

Clayware drying.—See VIII. **Solid CO_2 in cold-storage practice.**—See XIX. **Boiler feed-water.**—See XXIII.

PATENTS.

Furnace and method of operation. H. J. KERR, Assr. to BABCOCK & WILCOX Co. (U.S.P. 1,800,689, 14.4.31. Appl., 16.8.27).—A chain-grate or similar stoker is operated under a forced draught of preheated air introduced from the back, and of unheated air from the front; arrangements are made to vary the proportion at any zone, but the general effect is to start the combustion of the fuel with cold air and finish it with hot.

B. M. VENABLES.

Furnaces, crucibles, and like heating appliances. Production of high temperatures by combustion of liquid, gaseous, or pulverulent fuel. DEUTS. GOLD- U. SILBER-SCHNEIDANSTALT VORM. ROESSLER (B.P. 357,668 and 358,507, [A, B] 8.7.30. Ger., 8.7.29).—The working chamber, e.g., a muffle or a built-in or loose crucible, is enclosed by one or more jacketing chambers

(at least two in [A]) in the inner one of which the fuel ignites immediately on leaving the burner, which distributes it in finely-divided condition. The combustion chamber is narrow in one direction and offers a surface of at least 20 sq. dm./litre of vol. and the gases remain in it for not longer than 0.033 sec., preferably only about 0.001 sec. The surface may be augmented to the required extent by the provision of projections or ribs running in the direction of the flow of gases which may be composed of material having high electronic emission.

B. M. VENABLES.

[Heat-treatment etc.] furnaces. F. W. BROOKE, Assr. to W. SWINDELL & BROS. (U.S.P. 1,802,000—1, 21.4.31. Appl., [A] 17.9.28, [B] 16.11.28).—(A) A totally enclosed furnace is provided with a metallic lining which is brought out past the access door, flanged over, and provided with a bolted cover. Any supply of inert or treating gas is admitted to a narrow space between the wall and a false wall of the furnace, and is there preheated before coming in contact with the goods. (B) A furnace for annealing etc., of the type in which the goods are supported on a hearth in the form of a truck, but which is operated discontinuously, is provided with electrical or other heaters on the walls and with transverse flues formed in the roof; half of the flues are connected to a supply of air or other cooling medium along one side, and to an outlet on the other side, and *vice versa* for the other alternate flues.

B. M. VENABLES.

Handling of [fused] residues. F. B. ALLEN (B.P. 358,527, 3.4.30).—A continuous stream of wholly or partly fused ash or slag is struck by a strong jet of water and conveyed in a trough by that and additional water; at the end of the trough the granular material strikes an impact plate and falls, if desired, into another conveyor trough at an angle to the first.

B. M. VENABLES.

Recuperative-furnace control. G. H. ISLEY, Assr. to MORGAN CONSTRUCTION Co. (U.S.P. 1,801,670, 21.4.31. Appl., 3.1.28).—Air under forced draught is supplied partly to an ejector device for withdrawing products of combustion and partly to a zig-zag course outside vertical tubes carrying the latter gases and thence to the combustion zone. The preheater and ejector are conveniently placed in the base of a chimney.

B. M. VENABLES.

Electrically heated devices for controlling temperature. R. H. WHILLOCK, and GRIFFIN & TATLOCK, LTD. (B.P. 359,529, 21.7.30).—A feeble current controlled by a known type of thermostat is passed through a hot-wire device which operates a main Hg switch, gas valve, or other final heat control.

B. M. VENABLES.

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

Indicating the progress of combustion phenomena in furnaces. JUNKERS-THERMO-TECHNIK GES. M.B.H., and C. A. HARTUNG (B.P. 358,578, 11.7.30).—The readings of an indicator connected to a Wheatstone bridge are affected jointly by a pyrometer in the combustion zone and, inversely, by a draught gauge connected to two later points, forming a flow-meter and hence being a measure of the rate of combustion.

B. M. VENABLES.

Heating of liquids. E. R. CASE (U.S.P. 1,802,967, 28.4.31. Appl., 26.7.30).—An electric water heater is described.

B. M. VENABLES.

Heating of fluids. S. P. VAUGHN (U.S.P. 1,800,235, 14.4.31. Appl., 29.12.23).—In a flash boiler or similar apparatus, combustion first takes place within a mantle of refractory material, the gases passing outwards through small holes into contact with the tube coil forming the boiler and then outside the coil to waste. In the surrounding walls may be placed additional tubes forming a low-pressure still for producing pure feed-water. The feed pump for the main boiler may operate at const. speed and a quantity of water is by-passed: (1) if necessary, by an excess-pressure valve; or (2) more or less continuously, by a thermostatic valve operated by the temp. of the outgoing superheated steam. The pressure of the steam regulates the supply of fuel.

B. M. VENABLES.

Utilisation of waste heat from boiler furnaces for heating water, steam, or other fluids. M. S. GIBB (B.P. 359,407, 16.7.30).—A heat exchanger for placing in the smoke-box of a marine boiler is described.

B. M. VENABLES.

Heat-exchange apparatus. D. J. UHLE and J. V. DURBIN (U.S.P. 1,803,081, 28.4.31. Appl., 19.3.28).—Hot, divided solid material, e.g., cement clinker, is caused to progress downwards through a vertical casing containing vertical tubes carrying H_2O which may be allowed to boil. The tubes may be subdivided into sections by horizontal grid-like headers.

B. M. VENABLES.

Method of heating for drying, baking, distilling, etc. A. R. BURNETTE (U.S.P. 1,801,263, 21.4.31. Appl., 40.3.29).—The material is floated on a bath of molten metal which is kept in motion, and mixing is further effected by causing both to descend through a series of lower baths, at the end of which the material is skimmed off and the metal elevated for re-use. Suitable applications are for the cracking of hydrocarbons and the treatment of plastics.

B. M. VENABLES.

(A) Apparatus for, (B) [method of] drying. G. W. O'KEEFFE (U.S.P. 1,803,766—7, 5.5.31. Appl., 8.1.27).—Substances such as the gum-resins used in the manufacture of phonograph records are found to repel moisture when raised to a certain temp. In this invention the material after formation (usually by precipitation from solution) is collected on a rotary drum-filter, removed therefrom on a conveyor band, pushed under a bath of fluid maintained at an appropriate temp., drained on a ramp, delivered to a pair of rolls or other means of agglomeration, and finally passed on a conveyor through a drying chamber.

B. M. VENABLES.

Steam-heating systems for high-temperature drying and other installations. P. GILLI (B.P. 359,099, 12.8.30).—Water as gas, vapour, or liquid, according to its position in the circuit, is circulated continuously through a system comprising a steam generator which is not heated by fire gases, a vapour pump which raises the pressure of all the steam sufficiently to circulate it, a superheater in which the temp. of part of the steam is raised to a high degree, and a heat-exchanger in which the high-temp. steam is utilised, from which it returns to the boiler and effects evaporation. Provision is also made for utilising the other part of the steam in saturated condition.

B. M. VENABLES.

Centrifugal steam purifier. C. G. HAWLEY, ASSR. to CENTRIFIX CORP. (U.S.P. 1,801,044, 14.4.31. Appl., 24.7.26).—A steam dryer of the tuyère type is provided with a concave baffle opposite the axial outlet, to destroy the vortex.

B. M. VENABLES.

Drying apparatus. A. WRIGHT (U.S.P. 1,803,450, 5.5.31. Appl., 12.6.26).—Filter cake attached to a reinforcing band is passed from a rotary drum-filter to another drum surrounded by a hood in which a drying gas is circulated and recirculated.

B. M. VENABLES.

Heat meter in which the quantity of the heat medium flowing through and the temperature difference proportional to its specific energy content are supervised. SIEMENS & HALSKE A.-G. (B.P. 358,503, 5.7.30. Ger., 6.7.29).—The temp. difference between the entering and leaving streams of a current of fluid are measured by known means, and the recorder is constructed so that the distance through which the striking loop moves is proportional to the position of the pointer. The recorder mechanism is driven, not by a clock, but by a flow-meter in one of the streams of fluid; hence the quantity and temp. difference are integrated.

B. M. VENABLES.

Vapour-pressure thermometers and like instruments. W. J. STALLAN, and CAMBRIDGE INSTRUMENT CO., LTD. (B.P. 359,647, 11.9.30).—A radiator thermometer for use in an aeroplane is described.

B. M. VENABLES.

Testing for leaks in refrigerating systems. R. M. MAJOR, ASSR. to SERVEL, INC. (U.S.P. 1,800,693, 14.4.31. Appl., 18.6.30).—To an odourless refrigerant such as $MeCl$ or $EtCl$ a small proportion of acetaldehyde or other aldehyde (producing lachrymating effects) is added which will be self-indicating in the case of large leaks; smaller leaks may be detected by means of test-papers or swabs moistened with a solution of rosaniline hydrochloride and SO_2 , which give a characteristic colour change in the presence of the aldehyde.

B. M. VENABLES.

Hammer mill. Hammer crusher. [A] C. A. JAMISON and [B] G. W. BORTON, ASSRS. to PENNSYLVANIA CRUSHER CO. (U.S.P. 1,801,604 and 1,802,105, [A, B] 21.4.31. Appl., 25.8.28).—Mills of the type in which hammers run upwards between bars forming part of the bottom of a hopper are described. The crusher plate, forming an extension of the opposite wall of the hopper, is provided with projections to delay the fall of material.

B. M. VENABLES.

Crushing mill. W. COOPER (U.S.P. 1,802,197, 21.4.31. Appl., 27.11.28).—The bearing caps of a roller-mill for crushing, *e.g.*, sugar cane are held down by hydraulic plungers converging from two different directions. B. M. VENABLES.

Pan for crushing mills. S. B. STINE (U.S.P. 1,800,705, 14.4.31. Appl., 3.1.28).—The pan is constructed of wrought sheets in several layers, the innermost of which can be easily renewed. B. M. VENABLES.

Grinding of crushing apparatus. T. KETIN (B.P. 358,568, 10.7.30).—The apparatus comprises a rotary tube on the bottom of which rests a heavy roller, and a fixed scraper to remove the material that has been carried round by centrifugal force or adhesion; the scraper as a whole or the parts of it are inclined so as to advance the material longitudinally. B. M. VENABLES.

Hammer crusher. W. A. BATEY, Assr. to PENNSYLVANIA CRUSHER CO. (U.S.P. 1,803,585, 5.5.31. Appl., 21.9.28).—With the object of keeping sticky material in motion, a portion of the crusher plate is caused to swing continuously towards and from the hammer circle. B. M. VENABLES.

Mills for grinding material in a liquid or semi-liquid condition. A. SONSTHAGEN (B.P. 359,484, 17.7.30).—One of the grinding elements of a disc or roller mill is formed as one or more chambers which is or are divided into two parts by the grinding bar or bars; the material is fed to one part and removed from the other. B. M. VENABLES.

Grinding machine. O. SHEPPARD, JUN. (U.S.P. 1,803,148, 28.4.31. Appl., 19.2.29).—The hammers of a disintegrator are pivoted on serrated bars which are in turn pivoted on the hub. B. M. VENABLES.

Construction of grinding elements for roller grinding mills. F. H. ROGERS. From GRINDING MIXING SEPARATING ENG. CO. SOC. ANON. (B.P. 358,600, 15.7.30).—The grinding bar of a roller mill is itself disposed, or a lip attached to it is disposed, to the tangent of the roller at the entering edge at an angle $>90^\circ$. The tapered lip is inserted preferably between the lower edge of a feed hopper and the surface of the roll. B. M. VENABLES.

Pulverisers. ERIE CITY IRON WORKS, Assees. of (A) G. H. KAEMMERLING, (B) R. G. CROWE (B.P. 358,521—2, [A, B] 9.7.30. U.S., 16.7.29).—In a pulveriser of the type described in U.S.P. 1,777,048 (B., 1931, 279), in (A) a form of feed chute having a comparatively large opening is described; in (B), although the casing and cylindrical liners may be split for easy access and renewal, the diaphragms separating the compartments are not split, in order to prevent oversize particles travelling to the outlet. B. M. VENABLES.

Pulveriser. A. J. BRIGGS, Assr. to SYRACUSE PULVERIZER CORP. (U.S.P. 1,801,842, 21.4.31. Appl., 8.8.25).—The hammers are surrounded by a number of concentric cages which are alternately fixed and rotating. B. M. VENABLES.

Separation of pulverulent materials. N. AHL-MANN (B.P. 359,763, 24.11.30).—A current of air is passed upwards through a number of superposed,

perforated, conical trays which guide the oversize towards axial passages down which it passes to centrifugal distributors in the respective compartments next below, the undersize thus being given several opportunities to get free. B. M. VENABLES.

Gaseous treatment of finely-divided material [e.g., ores]. Hearth. F. M. SIMMONDS, Assr. to A. F. HYDE (U.S.P. 1,802,959 and 1,802,960, 28.4.31. Appl., [A] 20.3.29, [B] 22.3.29. Can., [A] 12.3.27).—(A) Ore or other finely-divided material is spread on a hearth, or series of hearths, through which hot inert gas is blown upwardly and forwardly in a series of puffs; the inclination of the passages through the hearth should not exceed 30° above the horizontal, in order to prevent ore flowing down them, and the puffs alone cause the ore to move forward, no rabbles being provided. The puffs are of such frequency that the ore has time to fall back and choke the initial stage of the next puff. If inert gases alone are used the action is one of distillation, but gases which react may be added making the process similar to roasting; the active constituent may vary in quantity and/or composition at different zones, but in no case should sufficient heat be evolved to sinter the ore. A ceiling of filter medium may be placed above the hearth through which the used gases are withdrawn. In (B) a hearth made of louvres for the above purpose is described. B. M. VENABLES.

Spraying of fluid pulps. N. C. CHRISTENSEN (U.S.P. 1,803,792, 5.5.31. Appl., 24.11.26).—The pulp is sprayed by a horizontal roller rapidly rotating in a bath which is also agitated by other means in order to prevent sedimentation. Treating gases may be passed through the up-flung spray. B. M. VENABLES.

Hydraulic coal- and ore-washing and -separating machines. C. F. RICHARDS (B.P. 358,546, 2.7.30).—The coal (or lighter material) is lifted by air emerging from the upper part of a cylindrical rotating screen, the lower part of which is blanked off by a fixed adjustable baffle creating a quiet zone into which the rotating screen drags the heavy material. Some portions of the screen may be unperforated, producing a pulsating effect. B. M. VENABLES.

Separation of liquids and solids. W. L. SPALDING, Assr. to NAT. ANILINE & CHEM. CO., INC. (U.S.P. 1,800,965, 14.4.31. Appl., 17.11.26).—The apparatus is suitable for treatment of pulp containing solids which float either *per se* or because of entrained gases, *e.g.*, indigo. It comprises a number of superposed, shallow settling vessels from the same end of which the float and the lower layer of clear liquid are withdrawn, the former over a weir to the next tray and the latter through an adjustable swan-neck for disposal elsewhere. B. M. VENABLES.

Apparatus for cleaning liquids of suspended matter and the like. E. R. SCHOFIELD and R. KRAMAROFF (U.S.P. 1,801,111, 14.4.31. Appl., 9.11.28).—A grid for removing debris from a penstock or other conduit is formed as an arc of a circle and is kept clean by a vertically rotating rake from which, when it reaches above the top of the screen, the collected debris is pushed over the edge. B. M. VENABLES.

Centrifugal machines. SHARPLES SPECIALTY CO., Assecs. of L. D. JONES (B.P. 358,682, 13.9.30. U.S., 20.9.29).—A boring tool for the removal of solid residue from the basket of a rotating centrifuge is described.

B. M. VENABLES.

Joints between the collecting vessel and frame of centrifugal separators. AKTIEB. SEPARATOR (B.P. 358,408, 27.2.31. Swed., 4.3.30. Addn. to B.P. 347,993 and 351,885; B., 1931, 659, 952).—All or some of the tightenings between the walls of the collecting vessel and the frame can be moved relative to one another.

B. M. VENABLES.

Construction of filter-presses. M. WILDERMAN (B.P. 358,526, 3.4.30).—A twin-plate filter of porous ebonite for use without cloths, as described in B.P. 307,525 (B., 1929, 459), is formed with ribs in the spaces for filtrate to prevent them closing up; methods of forming the plates with non-porous rims are described. [Stat. ref.]

B. M. VENABLES.

Filter-press. A. A. OUSS (U.S.P. 1,801,933, 21.4.31. Appl., 6.3.29).—The plates of the press are provided with a number of resilient insertions which press the cloth away from the surface in the absence of fluid pressure, so that when the press is clamped up the cloths are in a comparatively slack condition and are subsequently subjected to less strain when the filtering pressure is exerted.

B. M. VENABLES.

Filtering material and method of filtering sugar juices. R. C. CAMPBELL, Assr. to OLIVER UNITED FILTERS, INC. (U.S.P. 1,803,380, 5.5.31. Appl., 21.7.25).—Pith removed by filtration from liquor in the later stages of the washing of bagasse is found to be an excellent filter medium for the original sugar syrup. A perforated plate is sufficient support for it.

B. M. VENABLES.

[Rotatable] metallurgical filter. E. R. CRUTCHER, E. WALTMAN, and W. G. WOOLF (U.S.P. 1,801,662, 21.4.31. Appl., 31.8.29).—The interior of a rotary drum filter is fitted with filter bars which when covered with filter cloth form a number of elongated triangular filter compartments, each one independent of the others and from which the clear liquor can be drawn into a common collecting space around the drum. The supporting surfaces for the cloth are channelled. The filter is intended specially for the recovery of Zn solution from ore pulp.

C. A. KING.

[Oil] filters. MOTOR IMPROVEMENTS, INC., Assecs. of R. P. F. LIDDELL (B.P. 358,496, 4.6.30. U.S., 4.6.29).—An edge filter for petrol etc. is formed of a spiral strip of metal wound flat on itself; the spacing may be preserved by projections formed on the metal, and the spiral may be secured by soldering in lines on the outer edges or by clamping.

B. M. VENABLES.

Apparatus for mixing liquids. A. J. SALOMON (B.P. 359,604, 5.8.30).—Apparatus for adding disinfectant to a flush pipe is described. B. M. VENABLES.

Distillation apparatus. F. G. RING, Assr. to PETROLEUM DERIVATIVES, INC. (U.S.P. 1,802,274, 21.4.31. Appl., 19.9.25).—The liquid, *e.g.*, mineral oil, is passed, in order, through a preheater, a separator for lighter fractions, and a main still for lubricating fractions; the

hot gases are passed from a combustion chamber, and then through the main still, the preheater, and the separator. Provision is made to return cool products of combustion back to the combustion chamber just beyond the fire-bridge.

B. M. VENABLES.

Distillation process. S. P. MILLER, Assr. to BARRETT CO. (U.S.P. 1,800,224, 14.4.31. Appl., 12.3.25).—The liquid in the still is agitated by pumping through it part of the vapours from the still. In a still consisting of inclined tubes fitted into headers connected to a horizontal drum, the vapours are pumped into the header at the lower ends of the tubes. D. K. MOORE.

Carrying out distillations under low pressure. N. V. DE BATAAFSCHE PETROLEUM MAATS. (B.P. 358,391, 22.1.31. Holl., 27.2.30).—The material to be distilled is spread in thin layers on warm surfaces that are faced on both sides by cold surfaces, these surfaces in the direction of the point of withdrawal of the gases being further away than those behind, both distances being of the same order as the mean free path of the mols. under the conditions of distillation. B. M. VENABLES.

Boiling of viscous solutions. R. SOLLICH (B.P. 359,634, 1.9.30).—The material (*e.g.*, sugar, marmalade) is first boiled in a jacketed pan at atm. pressure and is then passed in the form of spray into a vac. vessel which is maintained at a temp. above the b.p., at the pressure used, by means of internal and/or external coils. The two vessels are superposed and the spraying valve between the two is operated by a stem passing through the hollow shaft of the stirrer in the upper vessel, which stirrer is shaped so as to wipe the material against the heated surfaces. The twice-evaporated material falls into a pan at the bottom which is held against the rest of the apparatus by suction.

B. M. VENABLES.

Dissolving a deliquescent material. G. A. MAU, Assr. to COAL TREATING EQUIPMENT CO. (U.S.P. 1,800,894, 14.4.31. Appl., 20.1.30).—The material is placed on a screen across a tank in which the solvent is maintained at a level just above the screen. No agitation is required and the screen may be fine enough to retain insol. matter.

B. M. VENABLES.

Plant for treatment of vegetable and animal raw materials with an extraction or lixiviation liquid. J. W. A. ELLING, Assec. of E. MORTERUD (B.P. 358,536, 27.5.30. Norw., 17.6.29).—The solids are placed on diaphragms in two sets of vessels and the solvent is several times removed from one set and injected into the other and back again, entering and leaving through the bottom in each case; the transfer is effected by a single pump and reversing valve which may be reversed hydraulically by the rising pressure in the vessels that are filling. Such apparatus is suitable for the digestion of wood pulp or extraction of oils etc. from whale blubber and the like, or for leaching purposes.

B. M. VENABLES.

Hydrometer for liquids. H. HOWARD, Assr. to GRASSELLI CHEM. CO. (U.S.P. 1,800,532, 14.4.31. Appl., 5.11.26).—A balance beam is pivoted about its centre of gravity and from it are suspended a pair of floats or a float and counterweight. In the former case the floats are in a standard and assay liquid, respectively, the latter being preferably a continuously flowing sample

and forming a jacket for the standard liquid before passing to its own vessel, so that variations in temp. are compensated. When a single float is used it may either be sunk in the assay and a portion of the heavy liquid with which it is filled displaced up the suspension and along the beam with rise in temp., or it may float in standard liquid and be filled with the assay which is permitted to overflow with rise in temp. Calculations for the correct proportions of the apparatus are given.

B. M. VENABLES.

Apparatus for testing the density of liquids in vacuum pans and the like. J. M. McCLATCHIE, Assr. to BORDEN CO. (U.S.P. 1,801,168, 14.4.31. Appl., 29.11.26).—A hydrometer is placed in a vessel covered by a glass dome and is connected to the vac. vessel in the same way as a water-gauge; the liquid is circulated through by means of a pump, which, as an additional precaution against the entry of air to the gauge, is surrounded by a casing which is directly connected to the main vac. vessel.

B. M. VENABLES.

Manufacture of moulded articles. MOULDED PRODUCTS, LTD., and H. W. F. IRELAND (B.P. 358,432, 2.7.30).—A hollow article (*e.g.*, of synthetic resin) is moulded round a core composed of a metal which melts at a temp. slightly above that of moulding, and after the article is formed the temp. is raised and the molten metal run out into an immediately adjacent core-mould, where it is solidified for re-use.

B. M. VENABLES.

Treating and rectifying vapours. P. J. CARLISLE, Assr. to ROESSLER & HASSLACHER CHEM. CO. (U.S.P. 1,801,412, 21.4.31. Appl., 25.11.27).—In the rectification of, *e.g.*, hydrocarbons an alkali metal in suspension in a liquid similar to the reflux liquid is admitted to the tower at a point just below the reflux condenser, the total reflux being maintained in sufficient quantity to keep the metal in suspension and to remove contaminating by-products from its surface. The quantity of alkali metal is adjusted so that its reaction is substantially complete before it reaches the point of entry of the original vapour.

B. M. VENABLES.

Apparatus for the separation of volatile substances from more difficultly volatile substances. J. Y. JOHNSON, From I. G. FARBENIND. A.-G. (B.P. 358,358, 4.12.30).—In processes such as the removal of free acids from mineral, tar, or vegetable oils etc. by distillation with a carrier fluid, the latter is chosen to have a b.p. much below the temp. of the difficultly volatile substances and is introduced (mixed with a reagent if desired) into these substances in the liquid state in a capillary stream having a velocity of < 40 cm./sec. An aq. solution of Na formaldehyde-sulphoxylate is claimed as an example of a carrier fluid.

B. M. VENABLES.

Wet purification of waste industrial gases. G. H. C. CORNER, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 358,487, 7.7.30).—In the scrubbing of boiler flue and other gases, claim is made for the re-use of the water after partial settling and treatment to remove or neutralise dissolved impurities, or, alternatively, the neutralising agent may be present in the water supplied to the sprays. The use of soda ash or chalk to neutralise SO_2 is mentioned.

B. M. VENABLES.

Apparatus for removing dust from gases by washing. N. L. SNOW (B.P. 358,639, 1.8.30).—Irrigated baffles having cross-sections mostly of stream-line form and means for evenly wetting them are described. [Stat. ref.]

B. M. VENABLES.

Smoke-washing apparatus. E. BECHTEL (B.P. 359,739, 4.11.30).—The upper part of a chimney is formed as an inverted frustum of a cone; the interior surface is irrigated by a film of H_2O without splashing, to absorb the impurities without saturating the flue gases. The gases are caused to whirl by means of a device situated on the axis, comprising a pair of co-basal and co-axial cones and helical blades.

B. M. VENABLES.

Automatic regulation of the mixture of gases or liquids [of different sp. gr.]. T. A. MILLS and W. S. B. BOSANQUET (B.P. 358,684, 15.9.30).—A container through which the mixture is passed is suspended from a delicate balance and "weighed" at intervals by suitable gear, any deflexion of the beam through change of wt. in either direction causing one of two electrical contacts to close and initiate readjustment of the incoming constituents. The apparatus is applicable to maintaining blast-furnace gas at a const. composition.

B. M. VENABLES.

Gas-analysis apparatus. W. O. HEBLER, Assr. to C. ENGELHARD, INC. (U.S.P. 1,802,713, 28.4.31. Appl., 1.7.30).—In an apparatus for determining the composition of a gas by comparing its heat conductivity with that of a standard gas, an assay cell and a standard cell are provided with electric heating coils which form two arms of a Wheatstone bridge; to adjust the two cells to equality when first put into service, a metallic element is introduced into one of them to absorb some of the heat and consequently reduce the amount available to escape through the gas. Hg or a stout rod of metal may be inserted to a greater or lesser extent into a quartz tube in the wall of which the heating coil is embedded and outwardly from which the effective portion of the heat flows through the gas sample. (Cf. U.S.P. 1,698,887; B., 1929, 229.)

B. M. VENABLES.

Eudiometric apparatus for measuring firedamp etc. J. G. DALOZ (B.P. 338,410 and Addn. B.P. 357,017, [A] 21.12.29, [B] 28.11.30. Belg., [A] 20.6.29, [B] 29.11.29).—A portable apparatus which may be combined with a miner's lamp is described.

B. M. VENABLES.

Measurement of plasticity of easily deformable materials such as raw rubber "mix." HUNGARIAN RUBBER GOODS FACTORY, LTD. (B.P. 359,211, 22.10.30. Hung., 26.10.29).—A test-piece of the material is drawn between surfaces moving at a const. speed, and the power necessary for the operation is measured; the preferred form of apparatus comprises a pair of rollers and a prism-shaped ram which can be moved towards and between the rollers, the distance between each of the latter and the ram being less than the thickness of the test-piece.

D. F. TWISS.

Pulverisers. ERIE CITY IRON WORKS, Assees. of G. H. KAEMMERLING (B.P. 360,452, 9.7.30. U.S., 16.7.29).—See U.S.P. 1,772,048; B., 1931, 279.

Means for tilting a furnace or other apparatus. G. E. TAYLOR, L. E. THOMPSON, and ELECTRIC FURNACE Co., LTD. (B.P. 360,247, 18.12.30).

[Valved] bags for cement and other commodities. W. A. MERRICK (B.P. 359,723, 28.10.30).

Steam boiler.—See II. **Clutch facing.**—See V. **Tunnel kilns.**—See VIII. **Rotary tube-furnace.**—See IX. **Heater and boiler for liquids.**—See XII.

II.—FUEL; GAS; TAR; MINERAL OILS.

Composition of coal. R. V. WHEELER (J. Inst. Fuel, 1931, 5, 21—29).—A lecture dealing with coal classification, the banded constituents, the behaviour of coal towards solvents and oxidising agents, the effect of heat on coal, and the rational analysis of coal.

A. B. MANNING.

Chemical constitution of coal. W. A. BONE (J. Inst. Fuel, 1931, 5, 30—38).—A lecture on work the results of which have been published previously (cf. B., 1930, 846).

A. B. MANNING.

Coal: smokeless fuel and oil from the national standpoint. W. R. ORMANDY (J. Inst. Fuel, 1931, 5, 56—77).—The present position of the coal and oil industries in Great Britain is surveyed.

A. B. MANNING.

“Artificial” bituminous coals. O. HORN and H. SUSTMANN (Brennstoff-Chem., 1931, 12, 409—412).—A number of “artificial” coals have been prepared by heating cellulose, lignin, peat, decomposed plant products, etc. in an aq. medium, with and without the addition of alkali, for 6 hr. at 350°/170 atm. The behaviour of the products on treatment with HNO₃ and KOH, and on carbonisation, was studied, but none of them could be regarded as equiv. to any naturally occurring bituminous coal.

A. B. MANNING.

Coking of sulphurous coals. B. M. BASOV (J. Chem. Ind., Russia, 1929, 6, 1203—1206).—Bryansk coal (2.2% S) gives coke with 2.6% S; the S is probably not present as sulphide. Concentrations of CO₂ in the gas in the coke ovens are fairly uniform, but with coal high in S, CS₂ at first formed reacts with CO₂ to give CO and SO₂; H₂S is formed at a later stage.

CHEMICAL ABSTRACTS.

Guiding principles for management of a coke-oven plant. E. KÖNIG (Brennstoff-Chem., 1931, 12, 373—377, 391—393, 412—415).—Modern methods of laboratory control are discussed with reference to such problems as the determination of throughput from the wt. of coke discharged, the sampling and evaluation of coking coals, the efficiency of benzol recovery, etc.

A. B. MANNING.

Reactivity of coke. J. G. KING and J. H. JONES (J. Inst. Fuel, 1931, 5, 39—55; cf. B., 1931, 999).—A lecture on work the results of which have been previously published.

A. B. MANNING.

Formula for theoretical recovery of coke. H. E. WILSON (Chem. & Met. Eng., 1931, 38, 601).—The coke (in g.) produced from *W* g. of coal is $W[(1 - M)(1 - V) + R](1 + v)$, in which 100*M* is % moisture in wet coal, 100*V* the % volatile matter in dry coal and 100*v* that in the coke, 100*R* the % redeposited C from breakdown

of volatiles in coal, based on wet coal, and *R* is a const. which must be determined for each individual plant.

D. K. MOORE.

Specification of activated carbons. E. S. SERKIN (Zhur. Sakharn. Prom., 1930, 4, 593—594).—Instructions for acceptance tests of samples of activated carbon are detailed.

CHEMICAL ABSTRACTS.

Continuous production of water-gas from powdered fuels. A. THAU (J. Inst. Fuel, 1931, 5, 1—20).—A water-gas producer, designed by O. Heller, is described; it incorporates the principle of external heating and maintains the powdered fuel in suspension in the water-gas so that the ash leaves the producer with the gas. The results of a week's run with a trial unit erected at the Tegel gasworks of the Berlin Gas Co., using as fuel a non-caking bituminous coal (H₂O 1.3%, ash 12.0%, volatile matter 25.6%), are given in detail. The unit consists of a cylindrical shell supported with its axis horizontal and divided by vertical partitions into five annular cells, forming alternately combustion and reaction chambers. The combustion cells are each surrounded by a pair of distributing flues supplying preheated air and producer gas, respectively, to the cell through nozzles arranged side by side at intervals round the cell. The tops of the combustion cells communicate with a common waste flue. Each reaction cell is provided with steam inlets at intervals round the circumference and with a fuel inlet; the inlets are designed to inject both fuel and steam tangentially into the cell. The reaction cells are connected to a central flue through which the water-gas (and fine ash) pass to a cyclone dust catcher and thence through a Feld washer to storage. The plant includes recuperators for preheating gas, air, and steam. The average 24-hourly results were: throughput 1.7 tons of coal; water-gas produced 161,000 cu. ft., of 304 B.Th.U./cu. ft.; consumption of producer gas 216,000 cu. ft., of 134 B.Th.U./cu. ft.; consumption of steam 3380 lb.; producer efficiency 64.5%; thermal efficiency 61%. To run the plant satisfactorily the fuel used should be non-caking and the m.p. of the ash should be above 1200°, the operating temp. in the reaction chambers. A commercial plant with an output of 520,000 cu. ft. of water-gas per 24 hr. has been designed and is briefly described; it should have a higher efficiency than the trial unit.

A. B. MANNING.

Development of butane-air process of gas manufacture. O. M. SETRUM (Ind. Eng. Chem., 1931, 23, 1190—1196).—The upper and lower explosive limits for mixtures of C₄H₁₀ and air are 8.5% and 1.9% C₄H₁₀, respectively. Liquid C₄H₁₀ obtained from petroleum gas is vaporised and mixed with air to give a gas containing 16.8% C₄H₁₀ with a calorific val. of 540 B.Th.U. per cu. ft. The gas has no appreciable corrosive action on pipe lines. To aid the detection of leaks a powerful-smelling gas is introduced in it, e.g., Et₂S, C₅H₅N, EtSH, in concentrations of 14, 80, and 63 p.p.m., respectively. Because of its burning characteristics burners designed for other gases must be modified.

D. K. MOORE.

Gas as fuel. K. BUNTE (Gas- u. Wasserfach, 1931, 74, 941—947).—A lecture. The advantages of gaseous fuel

and the relation between calorific val. and flame temp. are indicated, and the influence of various factors on the combustion process of a Bunsen burner and in the design of gas heaters is discussed. H. E. BLAYDEN.

Condensation gas analysis and its extension to adsorption in silica gel at low temperatures. G. KUHN (*Z. angew. Chem.*, 1931, **44**, 757—763).—In the analysis of coal gas or natural gas the mixture may be separated into several fractions by removing first the moisture with SiO_2 gel at 0° , then passing the gas through a tube cooled in liquid air to remove CO_2 and hydrocarbons except CH_4 , and finally absorbing the N_2 , CO , and CH_4 in SiO_2 gel in a tube cooled in liquid air, leaving a residual gas composed almost entirely of H_2 with a little O_2 . The order of adsorption by SiO_2 gel of the gases not condensed at -183° is as follows: CH_4 , CO , N_2 , O_2 , H_2 , the last-named being only very slightly adsorbed even after a long time of contact. The gases condensed by liquid air may be separated by fractional distillation at 0.1 mm., C_2H_6 and C_2H_4 being removed at 123° abs., C_2H_2 , C_3H_6 , C_3H_8 , and CO_2 at 153° abs., and C_4H_{10} , C_5H_{12} , C_6H_6 , at 248° abs.; the temp. is measured by means of an Fe-constanstan couple. An apparatus for making the above separations is described with reference to diagrams, and some results obtained by its use are recorded and discussed. A. R. POWELL.

Enriching solid fuel and methods of treating peat tar. V. E. RAKOVSKI and A. A. VINOGRADOV (*J. Chem. Ind., Russia*, 1929, **6**, 1118—1120).—Asphaltenes can be completely recovered from peat tar at 140 — 150° by precipitating with petrol and then with dil. H_2SO_4 (8—10%), HCl , or ZnCl_2 . With H_2SO_4 the asphaltenes and acid resins recovered amount to 20% of the tar. The cooled residual solution affords a product which can be decolorised with air or O_3 . Peat tar yields 20—25% of oils of b.p. 80 — 225° and containing about 25% of benzines, and 30—35% of phenols and carboxylic acids; 20% of asphaltenes and acid resins of m.p. 80 — 90° ; 4—6% of waxes of m.p. 74 — 75° ; 5—7% of fatty acids of mol. wt. 250 — 350° ; 1—1.5% of pyridines; and 40—45% of heavy oils oxidisable to an asphalt-like consistency. CHEMICAL ABSTRACTS.

Cracking and condensation of hydrocarbons. IV. **High-molecular hydrocarbons.** E. BERL and W. FORST (*Z. angew. Chem.*, 1931, **44**, 833—835; cf. B., 1931, 524).—Decomp. of paraffin oil, (b.p. 235 — $280^\circ/12$ mm.), kerosene, and paraffin wax (m.p. 68°) on porcelain surfaces at 800 — 1000° gives saturated and unsaturated gases, C_6H_6 , C_{10}H_8 , $\text{C}_{14}\text{H}_{10}$, and smaller amounts of PhMe, xylene, and unsaturated high-boiling oils. The max. yield of aromatic products is obtained at 900° . These results are interpreted as favouring the view that total decomp. into CH , CH_2 , and CH_3 precedes cyclisation. R. S. CAHN.

Injection, ignition, and combustion in high-speed heavy-oil engines. S. J. DAVIES and E. GRIFPEN (*J. Inst. Fuel*, 1931, **5**, 78—79).—Calculation of the effect of pressure waves on the velocity of emission of oil in the fuel-injection system shows that a lag in the delivery of the oil is produced, which decreases with reduced length of supply pipe. The design of the nozzle is discussed. Information as to the processes occurring

in the cylinder can be derived from a study of the indicator diagrams. It is probable that during the period of delay in ignition surface oxidation of the droplets of oil takes place with the formation and subsequent decomp. of unstable peroxides. Improved efficiency may be attained by reducing the ignition lag, *i.e.*, by the addition of accelerators to the fuel. A. B. MANNING.

Identification of products of oxidation of gas oil by Penniman process. S. SWANN, JUN., W. H. B. HOWARD, and E. E. REID (*Ind. Eng. Chem.*, 1931, **23**, 1277—1279).—In the aq. part of the distillate resulting from the oxidation of gas oil by air at 399° and 300 lb./sq. in. pressure were found: MeCHO , COMe_2 , MeOH , MeOAc , EtOH , EtOAc , AcOH , allyl alcohol, and dimethyl acetal. Methods of identification are given. D. K. MOORE.

Oxidation of paraffin oil. G. ARDITTI (*Compt. rend.*, 1931, **193**, 589—591).—By the method described previously (B., 1931, 661), the comparative catalytic effect of two groups of metals and of S on the oxidation of paraffin oil was examined. Of Cu, Fe, Al, and S, Cu has a strong and Fe a weak favourable action, S has a strong and Al a weaker retarding action. Of Pb, Ni, Zn, and Pt, Ni vigorously, and Pt moderately, favours the reaction, Pt and Zn at first favour the reaction and subsequently retard it, a limit being apparently reached. In the products were recognised peroxides, CO_2 , acids, aldehydes, and unsaturated substances, whilst the viscosity increases. C. A. SILBERRAD.

Peroxides and gum in gasoline. J. A. C. YULE and C. P. WILSON, JUN. (*Ind. Eng. Chem.*, 1931, **23**, 1254—1259).—Peroxides, which are intermediates in the formation of gum, are probably formed by the action, greatly influenced by traces of catalysts, of dissolved O_2 on unsaturated hydrocarbons, except at high temp. when the reaction takes place in the vapour phase. They may be detected by shaking gasoline with aq. FeSO_4 and determining the $\text{Fe}_2(\text{SO}_4)_3$ formed. In reactions in which peroxides are reduced a glycol or a substituted ethylene oxide is formed. Thus a glycol results from the oxidation of H_2S to S, of PbS in alkaline suspension to PbSO_4 , or of alkaline CH_2O to HCO_2H , or a substituted ethylene oxide from the oxidation of SO_2 to SO_3 (to yield a tarry ppt.) or Pb mercaptide to PbO ; other peroxides found in gasoline do not react with Pb mercaptide. The detection of S by the doctor test may be prevented by peroxides. Peroxides are decomposed slowly by aq. NaOH with the formation of an alcohol or fatty acid, rapidly by conc. H_2SO_4 , the acid acquiring a deep reddish colour, and catalytically, possibly with the formation of Hg peroxide, by Hg. SiO_2 gel rapidly removes peroxides from gasoline, but the product is rendered unstable. Peroxides in gasoline are stable at room temp., but at high temp. they react with unsaturated hydrocarbons present. When anti-oxidants are added the gasoline should be free from peroxides. The Norris and Thole test (B., 1930, 447) is the most satisfactory for determining preformed gum. D. K. MOORE.

Miscibility of alcohol and gasoline. O. ROTHE and D. SURERUS (*Rev. brasil. chim.*, 1931, **2**, 287—291).—Mixtures and temp. of stability are tabulated. CHEMICAL ABSTRACTS.

Determination of the hydrocarbon classes in benzene. F. SPAUSTA (Petroleum, 1931, 27, 765—769).—The methods of analysis based on (a) solvent separation with liquid SO_2 , Me_2SO_4 , etc., (b) determination of the crit. solution temp. in NH_3 etc., and (c) differences in chemical behaviour towards H_2SO_4 , Br, etc. are discussed. It is concluded that none is reliable, and the necessity for further study of the properties of the pure hydrocarbons before a satisfactory method can be worked out is emphasised.

A. B. MANNING.

Gas washing.—See I. Adherence of lubricants. —See X. Oil sprays. Mineral etc. oils as fungicides etc.—See XVI.

PATENTS.

Treatment of coal with solvents. KOPPERS Co., Asses. of H. J. ROSE and W. H. HILL (B.P. 358,988, 11.4.30. U.S., 12.4.29).—The solvent action of the oils or tars used in the process of B.P. 268,372 (B., 1928, 882) is increased by dehydrogenating the oil or tar, either prior to or during treatment of the coal, by heating it with S and/or O_2 . A condensing agent, e.g., ZnCl_2 , may be added, if desired, during the treatment of the oil or tar.

A. B. MANNING.

Coking retort oven. E. LEYH, Assr. to KOPPERS Co. (U.S.P. 1,802,518, 28.4.31. Appl., 3.11.28. Ger., 28.11.27).—The space underneath the coking oven is divided into a number of regenerative chambers facing each other on opposite sides of a central wall at right angles to the length of the oven. Air and gas are preheated in adjacent chambers on one side of the wall and pass through ducts into flues, in which combustion takes place, on one side of the coking oven along its length. The hot gases pass through the flues into similar flues on the other side of the oven and downwardly into adjacent chambers on the other side of the central wall from those through which the gas and air entered. After a time the direction of flow is reversed.

D. K. MOORE.

Carbonising apparatus. G. W. WALLACE, Assr. to S.E. Co. (U.S.P. 1,804,073, 5.5.31. Appl., 15.3.27).—An internally-fired, down-draught carbonising chamber consists of an outer shell with an inner lining of refractory material spaced from the outer shell and supported by angle-irons or similar members carried thereby. The lining is preferably arched at the top and increases in diam. towards the bottom. The shale or other material to be carbonised is fed in centrally at the top of the chamber, where also are the inlets for the heating gas and air. An offtake for the gases and vapours formed is provided below the inclined grate at the bottom of the chamber.

A. B. MANNING.

Production of ash-free adsorbent carbon. E. J. MILLER, Assr. to MICHIGAN STATE BOARD OF AGRIC. (U.S.P. 1,803,943, 5.5.31. Appl., 11.11.27).—The finely-powdered C is mixed with HF, heated until most of the acid is driven off, boiled with HCl, and, after diluting the acid with H_2O , is separated therefrom by filtration. The treatment with HCl is repeated and the C then washed with distilled H_2O . The ash content, which should now be only a few tenths of 1%, may be further reduced by igniting the product at 900—1200° in the absence of air.

A. B. MANNING.

Manufacture of lampblack. G. C. LEWIS, Assr. to COLUMBIAN CARBON Co. (U.S.P. 1,801,436, 21.4.31. Appl., 9.4.27).—The products of the incomplete combustion of natural gas are washed with a spray of water in several vessels arranged in series and in parallel. The water vapour leaving the washing vessels is condensed. The C is removed from the slurries obtained by these operations by filter-pressing and the water re-used for washing. After the process has been started sufficient water is produced by the combustion to make up for the losses.

D. K. MOORE.

Activation of carbonaceous materials by gases. SOC. DE RECHERCHES ET D'EXPLOIT. PÉTROLIFÈRES (B.P. 358,940, 11.7.30. Fr., 27.8.29).—The material is subjected alternately to internal heating by combustion gases from a furnace and activation by treatment with steam or other activating gas. Combustible gases produced in the activating process may be burned in the furnace.

A. B. MANNING.

Destructive hydrogenation of solid carbonaceous materials. R. HOLROYD, IMPERIAL CHEM. INDUSTRIES, LTD., and C. COCKRAM (B.P. 359,108, 19.8.30).—The paste or suspension of the solid material which is fed into the reaction vessel is made up with an oil, a substantial proportion of which is vaporised under the reaction conditions; the throughput of solid material is thereby increased.

A. B. MANNING.

Destructive hydrogenation of carbonaceous materials in the liquid phase. H. HARPER, R. SCOTT, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 358,662, 26.8.30).—In the hydrogenation of suspensions of coal in oil the temp. of reaction is prevented from rising by the introduction of 0.2—0.7 ton of middle oil (b.p. 200—230°) per ton of coal, the heat of reaction being absorbed by vaporising the oil. This prevents the increased production of coke and/or CH_4 and C_2H_6 at the expense of valuable oils.

D. K. MOORE.

Manufacture of hydrocarbons by destructive hydrogenation. J. Y. JOHNSON, From I. G. FARBERIND. A.-G. (B.P. 358,926, 9.4.30).—Coals, tars, or other carbonaceous materials are introduced, in a finely-divided form, into a reaction vessel containing H_2 under pressure and having heating members, e.g., tubes traversed by hot gases, or electrically heated sieves, arranged therein. Deflecting members, which may be coated with a catalyst and may also be heated to the reaction temp., are arranged within the vessel in order to interrupt the free fall of the material.

A. B. MANNING.

Gas producers. C. WHITFIELD (B.P. 359,336, 27.1.31).—A gas producer in which the air blast is admitted to separate sections of the grate through air-distribution chambers (cf. B.P. 342,646; B., 1931, 431) has restricted air openings into the distribution chambers, the relative areas of the openings being graded over the area of the grate in such a manner as to supply more air to those portions above which the depth of the fuel bed is greatest, e.g., the centre, if the producer has a single central-feed hopper.

A. B. MANNING.

Gas producer. H. F. SMITH, Assr. to GAS RESEARCH Co. (U.S.P. 1,803,139, 28.4.31. Appl., 26.6.22).—The producer comprises a gas-generating chamber containing

the fuel bed and having a gas offtake formed by a draught tube arranged centrally within the chamber and adapted to be surrounded by fuel during operation. The gases pass thence through an offtake passage in the base of the generator. The draught tube and the blast openings are so arranged that the active zone during operation is restricted in extent and is surrounded by a layer of inactive fuel which serves as a heat insulator. The saturator is situated in the base of the producer in such a manner as to receive heat on its upper side from the fuel bed and on its under side from the off-going gases. By this arrangement the quantity of moisture taken up by the blast varies automatically in accordance with the variations in the load. A rotating worm grate is provided to which is attached a scraper which moves the ash towards the central opening of the base, whence it drops into the ash pit.

A. B. MANNING.

Gas producer. F. H. TREAT, Assr. to DUFF PATENTS Co., INC. (U.S.P. 1,801,398, 21.4.31. Appl., 2.12.24).—The rotary fuel-feed distributor carries water-cooled agitators for the fuel bed. The water from these flows into a reservoir in the distributor and thence through a number of openings into a trough which forms a seal for the distributor. The air supply is drawn over the water in the reservoir, through the openings, over the water in the trough, and through the upper part of an annular space formed by the producer and an outer shell to a fan, by which it is forced through the lower part of the annular space to the tuyères. The air evaporates water during its passage over it, thereby cooling it, and the water-laden air renders a blast of externally generated steam unnecessary.

D. K. MOORE.

Gas producer and steam boiler. C. E. LUCKE, Assr. to FULLER LEHIGH Co. (U.S.P. 1,802,475, 28.4.31. Appl., 13.4.28).—The furnace of a water-tube boiler is mounted over a rotary gas producer. The gas rising from the producer passes through rows of staggered ducts provided with small openings through which air for combustion is forced. The ducts are supported by tubes extending across the furnace and forming part of the water-circulation system.

D. K. MOORE.

Gas production. C. W. ANDREWS, Assr. to H. A. BRASSERT (U.S.P. 1,803,686, 5.5.31. Appl., 23.11.23).—Gas of relatively low calorific val., e.g., blast-furnace gas, is superheated in a regenerator, itself preheated by the combustion therein of some of the gas, and is then passed successively through a zone of coke and ash at a high temp., a zone of coke at a higher temp., and a zone of bituminous coal, all contained in a suitable gas-generating unit, which is provided with means for introducing air and/or steam as required into the high-temp. coke zones. Provision is made for agitating the upper layer of bituminous coal as the hot gas passes through and carbonises it.

A. B. MANNING.

Gas purification. D. L. JACOBSON, Assr. to KOPPERS Co. (U.S.P. 1,800,297, 14.4.31. Appl., 11.1.27).—The fixation of alkali which results from the removal of H_2S from gas by aq. Na_2CO_3 in the presence of compounds of Fe, Co, or Ni and the subsequent deposition of S and regeneration of Na_2CO_3 by aeration is considerably reduced by the addition of a small quantity of a Pb compound.

D. K. MOORE.

Gas-treating apparatus. M. J. LEAHY (U.S.P. 1,800,892, 14.4.31. Appl., 30.12.29).— H_2S is removed from gas, e.g., natural gas, by forcing it and aq. SO_2 along a pipe containing a spiral which is caused to revolve by the passage of the liquid and gas. S is precipitated and the whole passes into a separator in which the gas and slurry separate. The S is removed by filtration and the filtrate recharged with SO_2 in a tower and used again. A series of Venturi-like tubes with perforated plates may be used for bringing about the reaction between aq. SO_2 and the gas. A new form of packing material for the tower is described.

D. K. MOORE.

Absorption of carbon monoxide and/or diolefines from gases and vapours. N. V. DE BATAAFSCHE PETROLEUM MAATS. (B.P. 359,234, 4.11.30. Holl., 6.11.29).— Cu_2Cl_2 in neutral solution with an alkali or alkaline-earth chloride and a small quantity of a reducing agent, e.g., NH_2OH , HCl , $SnCl_2$, absorbs CO and diolefine vapours. The precipitation of the additive compounds of Cu_2Cl_2 with CO and with diolefines may be prevented by keeping the temp. above 10° and using moderately conc. solutions; the addition of an acid amide, e.g., NH_3Ac , also prevents the precipitation of the former. The absorbed substance may be obtained in a pure state and the absorption liquid regenerated by heating at $40-80^\circ$ or reducing the pressure.

D. K. MOORE.

Sealing fluids for gas holders [of disc-closure type]. KOPPERS Co., Asses. of F. W. SPERR, JUN., and K. E. E. LAUE (B.P. 359,053, 19.7.30. U.S., 2.10.29).—The fluid consists of an aq. viscous solution of $CaCl_2$, $Ca(CNS)_2$, or Na_2SiO_3 , etc., to which sugar, glycerin, etc. and a corrosion inhibitor, e.g., CH_2O , may be added. The solution is preferably hygroscopic. Some sulphite waste liquors are suitable for the purpose.

A. B. MANNING.

Production of bitumens from acid resin residues. R. E. ELLIS. From S. HAMBURGER (B.P. 359,461, 21.7.30).—Resin residues from the acid purification of mineral oils etc. are heated for a long time at $80-100^\circ$ under pressure >2 atm. The mass then separates into a H_2SO_4 layer at the bottom, a bituminous layer above, and oils on top. These are separated and the bitumen is freed from H_2SO_4 by heating in a still to 150° , air, steam, or other gas heated to $170-200^\circ$ being forced through the mass from nozzles in a ring at the bottom of the still; to prevent frothing and to cause rapid escape of SO_2 and SO_3 , air or other inert gas at a temp. $20-50^\circ$ above that of the mass is forced through nozzles in a ring below the still cover.

D. K. MOORE.

Bituminous composition. E. S. ROSS, Assr. to PHILIP CAREY MANUFG. Co. (U.S.P. 1,803,488, 5.5.31. Appl., 20.5.27).—Bituminous material is dissolved in a solvent having a b.p. below 100° and the greater part of the solvent is then evaporated off again, leaving a soft plastic mass. This is poured into a dil. aq. alkaline solution heated to above the b.p. of the solvent, the mixture being agitated. The remainder of the solvent is driven off and an emulsion is formed suitable for waterproofing etc.

A. B. MANNING.

Removal of phenols from oils, tars, and the like. N. R. HOOD, and IMPERIAL CHEM. INDUSTRIES, LTD.

(B.P. 359,013, 11.7.30).—The oils etc. are intimately mixed with H_2O and the mixture is passed up a column countercurrent to a stream of H_2O . Preferably the oil- H_2O mixture and/or the descending stream of H_2O is heated to above the crit. solution temp. of the phenols in the mixture. The effluent phenol- H_2O mixture or solution is cooled, the phenols are separated, and the aq. layer is reheated and recirculated. A. B. MANNING.

Removal of phenols from hydrocarbons containing the same and recovery of pure phenols. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 359,681, 8.10.30 and 27.3.31).—Phenols and C_5H_5N are extracted from tar by HCO_2H (min. 77.5%). On distillation, which may be carried out at below 100° and under reduced pressure to obtain a more conc. acid, HCO_2H distils over and leaves a residue of phenols and C_5H_5N ; the presence of the latter is an advantage when the former are to be condensed with aldehydes. Dil. HCO_2H is conc. by distillation with H_2SO_4 . The HCO_2H retained by the tar is removed by distilling over the fraction boiling up to 130° , whereby the HCO_2H in the distillate separates out. D. K. MOORE.

Cracking process [for petroleum oils]. G. L. PRICHARD and H. HENDERSON, ASSRS. to GULF REFINING Co. (U.S.P. 1,802,531, 28.4.31. Appl., 6.7.23).—Oil is fed into a reflux chamber (*A*), which is cooled by an air jacket about halfway down and flows over the baffles, cooling and scrubbing the vapours passing upwards, into a chamber (*B*) under and a continuation of *A*, from the bottom of which it flows into a tubular heater in which it is cracked. The vapours and liquid return to the upper part of *B*, the former rising through *A*. The vapours from *A* pass into a fractionating tower consisting of two air-cooled condensers, the lower one being of the packed type utilising the reflux of the upper tubular one as a scrubbing liquid. The vapours leaving the upper condenser are condensed. Tar is drawn off from the bottom of *B* and the heater. Operating at $400\text{--}430^\circ$ in the heater and under 100 lb./sq. in. pressure in the system, yields of 60–70% of motor spirit are obtained from gas oil. D. K. MOORE.

Continuous treatment of hydrocarbon oil with a metallic halide. R. W. HANNA, ASSR. to STANDARD OIL Co. OF CALIFORNIA (U.S.P. 1,801,627, 21.4.31. Appl., 27.11.26).—The reflux from a dephlegmator flows on to a tray situated in the upper part of a reaction chamber. A pipe carries the liquid from the tray to a trap in which tar and $AlCl_3$ are separated and returned to the chamber; the oil passes to a heater and is delivered into the oil in the chamber through a number of jets, thereby agitating it. Raw oil is fed into the system at one or more of the following places: the top of the diphlegmator, the reflux pipe, and the pipe between the trap and the heater. $AlCl_3$ is fed into the reaction chamber either intermittently as solid, or continuously in suspension in part of the oil feed. Tar and $AlCl_3$ are continuously withdrawn from the chamber to a separator. Operating with a reaction temp. of $290\text{--}345^\circ$, a pressure of 15 lb./sq. in., and 10% of $AlCl_3$ on the feed oil, gas oil is converted into motor spirit. D. K. MOORE.

Refining of mineral oils. M. TEPLITZ, ASSR. to CORONA CONVERSION CORP. (U.S.P. 1,801,213, 14.4.31.

Appl., 18.11.25).—Hydrocarbon oils are chlorinated and the vapours, with or without the addition of a hydrogenating gas, e.g., natural gas, are passed into a reflux tower filled with a dechlorinating agent, e.g., Zn, and the vapours condensed; or the dechlorinating agent may be placed in the still. The process stabilises the gum-forming substances and removes S. D. K. MOORE.

Treatment of mineral oils. K. T. STEIK and H. A. CASSAR, ASSRS. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 1,803,140, 28.4.31. Appl., 24.8.27).—If hydrocarbon oil, otherwise purified by the usual methods, is agitated with 88% H_2SO_4 at about 75° after oleum treatment, neutralisation, and washing, but before percolation through active clay, it becomes stabilised in respect to colour, after long exposure to sunlight, and is improved in odour and taste. D. K. MOORE.

Treatment [purification] of oil. L. CALDWELL, ASSR. to CELITE CORP. (U.S.P. 1,802,628, 28.4.31. Appl., 29.6.26. Cf. U.S.P. 1,603,314; B., 1927, 170).—The vapours of hydrocarbon oils, particularly those formed during cracking, are brought into contact with diatomaceous earth impregnated with $Ca(OH)_2$. S is removed and the formation of unsaturated compounds thereby reduced. D. K. MOORE.

Clarification of [solvent] benzene. J. J. WACK (U.S.P. 1,803,083, 28.4.31. Appl., 21.12.28. Fr., 5.1.28).—Benzene that has been used for cleaning garments is freed from solid matter and then forced through an atomiser into aq. Na_2CO_3 containing NaCl and a mixture of $Ca(OCl)_2$ and K_2CO_3 as bleaching agent, the whole being covered with a layer of viscous liquid, e.g., animal or vegetable glue, contained in the annular space between two funnels. The fatty substances are saponified and the benzene is filtered upwards through the viscous liquid and passes through several openings into a decanter mounted over the funnels, the inner of which forms the cone for receiving the sediment from decantation. D. K. MOORE.

Removal of naphthalene from solvent naphtha. F. F. MARQUARD (U.S.P. 1,801,097, 14.4.31. Appl., 1.7.29).—The solvent naphtha (b.p. $160\text{--}195^\circ$) is freed from $C_{10}H_8$ without polymerising the resins by mixing it with a hydrocarbon oil of higher b.p., e.g., wash oil (b.p. $230\text{--}330^\circ$), and distilling off the naphtha and resins. D. K. MOORE.

Expelling gases, vapours, or their mixtures, etc., especially gases or vapours derived from liquids of high b.p. (e.g., solvent naphtha), from bodies of large superficial area, e.g., active carbon, silica gel, etc., by flushing with steam. METALGES. A.-G. (B.P. 359,868, 31.3.31. Ger., 12.7.30).—Economy in steam results from carrying out the flushing operation at above 3 atm. pressure, by throttling the still outlet of the adsorber or the discharge pipe beyond the condenser. D. K. MOORE.

Manufacture of high-quality lubricating oils. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 358,495, 29.5.30).—Lubricating oils may be obtained by condensing liquid olefines, obtained by cracking paraffins, with liquid hydrocarbon mixtures containing paraffins, e.g., the product obtained by the hydrogenation of brown coal, brown-coal-tar oil freed from

phenol, and paraffin wax, b.p. 200—300°, in the presence of condensing agents, *e.g.*, AlCl_3 , SnCl_4 , BF_3 . Gaseous olefines may be passed into the mixture during condensation. D. K. MOORE.

Production of engine fuel. C. J. GREENSTREET (U.S.P. 1,800,997, 14.4.31. Appl., 10.3.19. Renewed 21.8.30).—Hydrocarbon oils of higher sp. gr. than petrol are rendered usable as fuel for internal-combustion engines by the addition of an oxidising agent, *e.g.*, nitrates or nitrating compounds, or the products resulting from the decomp. of a dioxide, persulphate, percarbonate, etc. with acid, together with an org. "amido-compound" to stabilise the oxidising agent except in the case of the nitrate and a liquid the vapour of which forms an explosive mixture with air, *e.g.*, petrol or EtOH. When the oil is unsaturated, the O_2 may be added wholly or partly by combining it chemically with the oil. D. K. MOORE.

Production of fuels for internal-combustion engines. COMP. ITAL. SVILUPPO INVENZIONI SOC. ANON., and V. GALLARATI (B.P. 358,484, 5.7.30).—To a solution of a nitro-compound, *e.g.*, nitroglycerin, in a suitable solvent, *e.g.*, EtOH, COMe_2 , a vegetable oil, *e.g.*, castor, linseed, is added. The solvent is removed by evaporation or extraction, and the emulsion and one or more substances which facilitate ignition, *e.g.*, PhNO_2 , Et_2O , COMe_2 , are added to one or more solvents, *e.g.*, petrol, EtOH, linseed oil, to give a suitable fuel. D. K. MOORE.

Manufacture of motor spirit. K. UYEDA, and AWOI GOMIE KAISHA (B.P. 359,291, 13.12.30).—Crude petroleum oil is treated in the presence of activated carbon with $\text{K}_2\text{Cr}_2\text{O}_7$ - H_2SO_4 mixture, whereby hydrocarbons of high mol. wt. are converted into those of low mol. wt. After separation, neutralisation, and dehydration, a combustion assistant, *e.g.*, abs. EtOH and a solution of C_2H_2 in COMe_2 , is added. D. K. MOORE.

Apparatus for removing carbonaceous material from oil apparatus. H. W. SHELDON, ASSR. to VACUUM OIL Co. (U.S.P. 1,800,964, 14.4.31. Appl., 11.7.29).—Cables fitted with sharp-cornered lugs are hung from the top of the reaction chamber of an oil-cracking plant. The centre cables, which are attached to the top and bottom central manlids, have a cable spirally wound round and loosely attached to them. To remove coke the spirally-wound cable is pulled through the bottom manhole, and the other cables are then pulled out from the top downwards, thus breaking up the mass of coke. D. K. MOORE.

Revivifying of treating agents [used for purification of mineral oils]. R. K. STRATFORD and G. McINTYRE, ASSRS. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 1,801,942, 21.4.31. Appl., 8.2.29).—The spent material, *e.g.*, clay, in the form of a slurry, is extracted with a volatile solvent and then introduced with a liquid medium, such as heavy naphtha, into the upper part of a rectifying column attached to a still. The solvent vapours are recovered, and the mixture of clay and naphtha, after cooling and mixing, is used for treating further quantities of oil. W. J. WRIGHT.

Manufacture of [paraffin] waxes. BURMAH OIL Co., LTD., and B. C. ALLIBONE (B.P. 358,668, 30.8.30).—

Paraffin wax from which the oil has been largely removed by sweating is refined to products of more clearly defined m.p. by fractional distillation under 2·10 mm. Hg (abs.). The products under gentle pressure form cryst. flakes which are larger the lower is the m.p. They may be blended to give waxes of specified m.p. D. K. MOORE.

Purification of crude paraffin wax. J. Y. JOHNSON. From I. G. FARRENIND. A.-G. (B.P. 359,722, 27.10.30).—The crude wax is freed from oil by heating to 100° and passing down a tower up which steam at preferably 130—160° passes, the oil being carried away by the steam. D. K. MOORE.

Refining of hydrocarbon oils. RICHFIELD OIL Co. OF CALIFORNIA (B.P. 359,419, 15.4.30. U.S., 8.5.29).—See U.S.P. 1,826,139; B., 1931, 1084.

Elimination of combustible constituents from products of combustion of internal-combustion engines. J. C. W. FRASER (B.P. 360,024, 31.7.30. U.S., 12.8.29).—See U.S.P. 1,789,812; B., 1931, 833.

Means for discharge of coke ovens. WELLMAN SMITH OWEN ENG. CORP., LTD., and F. E. WELLS (B.P. 359,699, 16.10.30).

[Burner apparatus for gas-fired] furnaces. J. S. ATKINSON. From CHAPMAN-STEIN Co. (B.P. 360,528, 21.8.30).

Hydrocarbon burners. C. SCOTT-SNELL (B.P. 359,673, 4.10.30).

Apparatus for burning liquid fuels. F. WATSON. From AKTIEBOLAGET BENZO-GAZ (B.P. 359,943, 22.7.30).

[Dyed and scented] lubricating oil or grease. E. VELLNER (B.P. 359,590, 29.7.30).

Coal-washing machines. Oil filters. Distillation. Treating vapours. Separation of volatile substances. Eudiometer for firedamp.—See I. Waxed paper.—See V. Sol. gilsonite. C from CO . H_2 from hydrocarbons.—See VII. Road materials.—See IX. Curing of animal materials.—See XIX.

III.—ORGANIC INTERMEDIATES.

Synthesis of methyl alcohol from carbon monoxide and hydrogen under pressure. V. A. PLOTNIKOV and K. N. IVANOV (J. Chem. Ind., Russia, 1930, 7, 1136—1145).—The Zn-Cr (preferably 4:1) catalyst is used at 330°; changes in the thickness of layers affect the character of the process as well as the speed of the reaction. At 360° CH_4 predominates, whilst at 400° higher hydrocarbons predominate. The catalyst is easily poisoned. When precipitated on asbestos it is more active, and leads to an excessive formation of higher hydrocarbons; ZnO is less active. All catalysts containing Zn tend to form gaseous products, with separation of H_2O and contamination of the gases with CO_2 ; some CO is reduced to C. The oily layer (10 vol.-%) of the condensate contained up to 12% MeOH and 15% EtOH, COMeEt , and Bu^nOH . Ag (5%) or Zn-Cr increases the activity of a Cu catalyst, the activity of which appears at 280°, falls at higher temp., and becomes again stable at 305—310°. The

most active catalyst contained co-precipitated and reduced Cu, ZnO, and Cr₂O₃ (91 : 8 : 1). The Cu catalyst at lower temp. tended to increase the yield of non-oily liquid products (condensate : 85% MeOH, EtOH, and H₂O); the gas is chiefly CH₄ and no free C was observed.

CHEMICAL ABSTRACTS.

Preparation of acetic acid from methyl alcohol and carbon monoxide. E. A. SHILOV (J. Chem. Ind., Russia, 1930, 7, 110—115).—In view of the possibility of the synthesis of AcOH from MeCl and CO by way of AcCl the catalytic decomp. of AcCl was studied. It is stable up to 450°; ZnCl₂ on pumice decomposes 80% at 400° to HCl, CO₂, CO, and H₂. At 200° dehydroacetic acid is formed. Al₂O₃ at 300°, ThO₂ at 350—400°, and CuCl have less effect than ZnCl₂. Al yields 5% of gaseous compounds and polyketones at 350—400°. Cu filings at 350° afford MeCl, CO₂, CO, H₂, dehydroacetic acid, and COMe₂. Reduced Cu reacts violently at 200° affording CuCl. Ni affords HCl, CO₂, CO, H₂, and CH₄. Pt on pumice at 400° affords MeCl (45), CO (49), H₂ (5%).

CHEMICAL ABSTRACTS.

Determination of strong mineral acid in acetic acid. K. TÄUFEL and G. A. HABER (Z. Unters. Lebensm., 1931, 62, 335—342).—The sample is diluted to about 0.1N in total acidity, and the total acidity determined by direct titration to phenolphthalein with 0.1N-NaOH. The neutral mixture is then titrated with 0.1N-HCl in the presence of 5 drops of 0.1% dimethyl-yellow in 90% EtOH until orange in colour, 0.5 c.c. of neutral COMe₂ per 10 c.c. of liquid are pipetted in (change to yellow), and the titration is continued until the colour exactly matches that of a buffer solution of *p*_H 3.1 to which COMe₂ and the same indicators have been added. The HCl titration gives the AcOH, the mineral acid being found by difference. The error is 0 to +1 mg. of HCl or +0.1 to -0.4 mg. H₂SO₄ for up to 268 and 10 mg./100 c.c., respectively. Data are given for 6 other suitable indicators, and titration curves for 10—90% HCl in solutions of 0.05—1.0N total acidity; 0.05N and 1.0N solutions give end-points which are less marked than those of 0.1N solutions and are above and below *p*_H 3.1, respectively.

J. GRANT.

Detection of peroxides in ether. L. W. GREEN and R. E. SCHOETZOW (Amer. J. Pharm., 1931, 103, 603—605).—The CrO₃ test recommended by Leffmann and Pines (B., 1930, 360) is not so sensitive as the U.S.P. X. (CdKI₃) test for detection of peroxides which have developed in Et₂O. The presence of aldehyde decreases its sensitivity, which can be increased slightly by shaking with the Et₂O, but does not in any case equal that of the U.S.P.X. test.

F. R. SHAW.

Action of sodium hydroxide on dinitrochlorobenzene. A. NOVOSELOV and I. KHMELNITZKAJA (J. Chem. Ind., Russia, 1930, 7, 32—34).—In the production of S-black a slight excess of NaOH is used for the conversion of C₆H₃Cl(NO₂)₂ into the dinitrophenoxide, whereby 1.5—2% of NaNO₂ is always formed. The reaction C₆H₃Cl(NO₂)₂ + 4NaOH → C₆H₃NO₂(ONa)₂ + NaCl + 2H₂O + NaNO₂ is considered to occur.

CHEMICAL ABSTRACTS.

Benzylideneacetone, cinnamic acid, and styrene bromide. P. P. SCHORIGIN, V. I. ISSAGULIANTZ, and

A. R. GUSEVA (J. Gen. Chem. Russ., 1931, 1, 506—510).—A commercial method for the prep. of benzylideneacetone by the condensation of PhCHO with COMe₂ is described. Technical-scale methods are given for the determination of benzylideneacetone, for the prep. of cinnamic acid from it by the action of NaOCl (yielding CHCl₃ as a by-product), for the prep. of styrene bromide from cinnamic acid, and of Me cinnamate.

E. B. UVAROV.

[Preparation of] β-naphthylamine from β-naphthol. M. K. BEZZUBETZ (J. Chem. Ind., Russia, 1930, 7, 908—910).—A mixture of commercial β-naphthol (150 g.), 28.9% NaHSO₃ (414 g.), and 20% NH₃ (226 g.) was heated during 8 hr. at 150°/7 atm.; the yield of β-naphthylamine was 87%. With NH₄HSO₃ instead of NaHSO₃ the yield was 88%.

CHEMICAL ABSTRACTS.

EtOH-gasoline mixtures.—See II. Abs. EtOH and denaturant therefor.—See XVIII.

PATENTS.

Concentration of dilute aliphatic [acetic] acids. H. DREYFUS (B.P. 354,198, 2.5.30).—In the solvent method, a phenol ether is used as solvent, e.g., α- or β-naphthyl Me, Et, or Pr ether, anisole, phenetole, Ph₂O, ditolyl ethers, *p*-tolyl β-naphthyl ether, etc.

C. HOLLINS.

Manufacture of aliphatic [acetic] anhydrides. H. DREYFUS (B.P. 354,199, 2.5.30. Addn. to B.P. 279,916; B., 1928, 45).—In the process of the prior patent, phenol ethers, other than phenetole and anisole, are used for scrubbing the reaction gases.

C. HOLLINS.

Manufacture of aldehydes and ketones [from olefine oxides]. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 354,388, 10.5.30. Addn. to B.P. 331,185; B., 1930, 939).—In the process of the prior patent, a catalyst is used comprising a halide or oxyhalide of an alkaline-earth metal, e.g., BaBr₂, Mg(OH)Cl, or CaF₂ and BaF₂.

C. HOLLINS.

Manufactures of alcohols [from alkylene oxides and hydrocarbons etc.]. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 354,992, 25.7.30).—Alkylene oxides, which may be generated *in situ*, are condensed with aliphatic, alicyclic, or aromatic hydrocarbons or heterocyclic compounds or derivatives of these, in presence of AlCl₃ etc. Examples are: phenylethyl alcohol from C₆H₆ and ethylene oxide, *n*-heptyl alcohol from *n*-pentane, alcohols from kerosene, δ-chloro-*n*-butyl alcohol from EtCl, β-hydroxyethyl-pyridines, -cyclohexane, and -naphthalene.

C. HOLLINS.

Manufacture of hydroxyalkyl compounds. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 354,357, 6.5. and 15.11.30).—The reaction between alkylene oxides and alcohols, phenols, carboxylic acids, or amines is catalysed by hydrosilicates in presence of acid, e.g., at *p*_H 3. Thus ethylene oxide is led into boiling EtOH stirred with "tonsil AC" (*p*_H 2.3 in H₂O) to give 80% of glycol Et ether. Glycol mono-methyl, -isopropyl, and -*sec*-butyl ethers, propylene glycol mono-ethyl and -isopropyl ethers, Ph β-hydroxyethyl ether, di-β-hydroxyethylaniline, β-hydroxyethyl-*n*-butylaniline, *NN*-di-β-hydroxyethyl-*p*-aminophenol,

tetra- β -hydroxyethylbenzidine, and butylene glycol monoethyl ether are similarly prepared. Glycol mono- β -chloroethyl ether is obtained from ethylene chlorohydrin and ethylene oxide. C. HOLLINS.

Manufacture of polyhydric alcohols [from aldehydes]. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 354,196, 1.5.30).—Natural aldoses give uniform products when reduced with H_2 in presence of H_2O and a Ni, Cu, or Co catalyst if alkali be added to maintain a pH between 7 and 12, preferably 7—9. C. HOLLINS.

Manufacture of optically active phenylpropanol-methylamines (β -methylamino- α -phenyl- n -propyl alcohols). I. G. FARBENIND. A.-G. (B.P. 354,975, 18.7.30. Ger., 19.7.29).—The d - and l -bases obtained by resolution with d -tartaric acid are freed from dl -base by treatment with a limited amount of light petroleum, petrol, or cyclohexane, which leaves the dl -base undissolved. C. HOLLINS.

Manufacture of wetting, cleansing, and dispersing agents and preparations containing the same. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 354,217, 5.2.30).—Saturated fatty acid esters of alcohols above C_9 are simultaneously hydrolysed and sulphonated by $ClSO_3H$ or other sulphonating agent in an org. diluent (CCl_4 , Et_2O , $PhNO_2$, etc.) and the liberated fatty acid is removed. Examples of starting materials are spermaceti, beeswax, and wool fat. C. HOLLINS.

Manufacture of phenol or its homologues. DR. F. RASCHIG GES.M.B.H. (B.P. 354,948, 7.7.30. Ger., 6.7.29).— $PhCl$ or a homologue is passed with steam over Fe-free Al_2O_3 or $Al(OH)_3$, with or without CuO , at 300—500°. The yield of $PhOH$ or p -cresol is 85—96%. C. HOLLINS.

Manufacture of organic sulphur compounds. D. H. POWERS, ASSY. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,788,632, 13.1.31. Appl., 13.7.28).—Salts of thio-acids react with $CNCl$ to give corresponding sulphides: $2X \cdot CS_2 \cdot Na \rightarrow (X \cdot CS)_2S$. Examples of starting materials are: Na dimethyldithiocarbamate, K ethyl-xanthate, Na dithiobenzoate, Na Et trithiocarbonate, Na phenylmethyldithiocarbamate. C. HOLLINS.

Oxidation of organic compounds [with selenium oxides]. IMPERIAL CHEM. INDUSTRIES, LTD., and H. L. RILEY (B.P. 354,798, 15.2.30).—Compounds containing Me or CH_2 adjacent to CO are oxidised to diketones etc. by SeO_2 , H_2SeO_3 , or selenites at 50—150°, preferably in a diluent or excess of the org. compound. Examples are: pyruvaldehyde from $COMe_2$; acetylpropionyl from $COEt_2$; diacetyl and glyoxal from $COMeEt$; phenylglyoxal from $COPhMe$; cyclohexa-1:2-dione from cyclohexanone, etc. C. HOLLINS.

Sulphonation of aromatic amines. IMPERIAL CHEM. INDUSTRIES, LTD., M. F. S. CHOATE, S. COFFEY, and C. R. HENSHAW (B.P. 354,201, 2.5.30).—The acid sulphate of an arylamine, prepared by adding H_2SO_4 to the arylamine in a suitable high-boiling solvent, is heated in the same solvent, H_2O being continuously distilled off. Examples are: naphthionic acid from α -naphthylamine in "white spirit" (b.p. 150—200°) or transformer oil; sulphanilic acid from NH_2Ph in "white spirit." C. HOLLINS.

Separation of p -toluidine from mixtures of o - and p -toluidines. W. BLYTHE & Co., LTD., W. H. BENTLEY, and B. CATLOW (B.P. 355,018, 12.8.30).—The mixture is treated below 80° in presence of 5—6% of H_2O with enough SO_2 to convert the p -toluidine into solid $2C_6H_4Me \cdot NH_2 \cdot SO_2 \cdot H_2O$ (or, in absence of H_2O , into $2C_6H_4Me \cdot NH_2 \cdot SO_2$), which is separated by filtration and decomposed at 80—100°. C. HOLLINS.

Manufacture of 3-hydroxydiarylamine-5-carboxylic acids and their aryl[am]ides. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 355,114, 28.10.30).— α -Resorcylic acid is condensed with 2 mols. of NH_2Ph or its nuclear halogen, alkyl, or alkoxy derivatives, whereby 3-arylamino-5-hydroxybenzoic arylamides are produced, which have affinity for cotton in an alkaline bath. On hydrolysis with 10% $NaOH$ the free acids are formed. Compounds from NH_2Ph (dihydroxy-anilide, m.p. 218°; anilino-hydroxy-anilide, m.p. 160—161°; anilino-hydroxy-acid, m.p. 220°, p -chloroaniline (m.p. 182—183°, 165—168°, and 212—215°), p -toluidine (m.p. 190—192°, 159°, 222°), m -xylylidine (m.p. 220—226°, 170—174°, 198—200°), and p -anisidine (m.p. —, 180—183°, 182—185°) are described. C. HOLLINS.

Manufacture of styrene. NAUGATUCK CHEM. Co., Asses. of O. H. SMITH (B.P. 354,308, 1.4.30. U.S., 20.4.29).—A mixture of C_6H_6 and $PhEt$, preferably with addition of S and $C_2H_4Cl_2$ or $COMe_2$ to remove H_2 , is heated to 600—750°, e.g., in an Fe or chromel tube-furnace. C. HOLLINS.

Preparation of hydroxyanthraquinones [quinizarins]. I. GUBELMANN and H. J. WEILAND, ASSYS. to NEWPORT CHEM. CORP. (U.S.P. 1,790,915, 3.2.31. Appl., 25.8.27).—Phthalic anhydride is condensed with 4-chloro- or 3:4-dichloro-diazobenzene in 100% H_2SO_4 in presence of H_3BO_3 to give quinizarin or 3-chloroquinizarin. C. HOLLINS.

Manufacture of camphene. SCHERING-KAHLBAUM A.-G. (B.P. 355,094, 13.10.30. Ger., 22.10.29).—Vapour of pinene hydrochloride is passed over a surface catalyst, and/or metal or metal salts, preferably over a Cu catalyst on pumice at 400—500°; the condensate consists of camphene and dil. HCl. C. HOLLINS.

Manufacture of N -substituted derivatives of the pyridone series. SOC. CHEM. IND. IN BASLE (B.P. 355,017, 11.8.30. Switz., 10.8.29).— N -Aminoalkylpyridones and -quinolones are obtained by known general methods. Examples are: 1- β -diethylaminoethyl-2-pyridone, b.p. 127°/1 mm. (B,HCl, m.p. 148°), from Na 2-pyridone and β -diethylaminoethyl chloride, or by oxidation of 1- β -diethylaminoethylpyridine; the corresponding 3-carboxylanilide, b.p. 205°/0.3 mm. (B,HCl, m.p. 195°), by heating 2- β -diethylaminoethoxy-pyridine-3-carboxylanilide (B,HCl, m.p. 172°) from 2-chloropyridine-3-carboxyl chloride, m.p. 56°, b.p., 98—100°/2 mm., via the chloro-anilide, m.p. 125°; 1- β -diethylaminoethyl-lepidone, b.p. 183°/2 mm. (B,HCl m.p. 115°) from the O -ether, b.p. 190°/10 mm.; 1- β -diethylaminoethyl-2-quinolone-4-carboxylanilide, m.p. 154° (B,HCl, m.p. 258°), from 2-hydroxyquinoline-4-carboxylanilide, m.p. 307°; 1- β -diethylaminoethyl-3-phenyl-2-quinoline-4-carboxyldiethylamide, m.p. 118°,

b.p. 220°/0.05 mm. [B,HCl, m.p. 148° (decomp.)], by heating the *O*-ether (B,HCl, m.p. 154°) obtained from 2-chloro-3-phenylquinoline-4-carboxydiethylamide, m.p. 149—150°; 1-β-diethylaminoethyl-4-pyridone, b.p. 175°/0.03 mm., from γ-pyrone and diethylethylenediamine; 1-β-dimethylaminoethyl-2-pyridone-3-carboxylanilide (B,HCl, m.p. 218°) from the *O*-ether (B,HCl, m.p. 204°); the 1-β-di-*n*-butylaminoethyl compound (B,HCl, m.p. 181°), from the *O*-ether (B,HCl, m.p. 123°); the 1-β-piperidinoethyl compound (B,HCl, m.p. 215°) from the *O*-ether (B,HCl, m.p. 198°); 1-β-diethylaminoethyl-2-pyridone-3-carboxyl-*N*-ethylamylide (B,HCl, m.p. 102°), from the *O*-ether (B,HCl, m.p. 142°); 1-β-diethylaminoethyl-2-pyridone-3-carboxyl-β-diethylaminoethylamide (B,2HCl, m.p. 83°), from the *O*-ether (B,2HCl, m.p. 195°).
C. HOLLINS.

Manufacture of *N*-substituted 5:6-dialkoxy-8-aminoquinolines. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 354,352, 2.5.30).—An aminoalkyl, piperidinoalkyl, or aminoalicycyl group is introduced into the NH₂ group of an 8-amino-5:6-dialkoxyquinoline; the alkyl chain may be interrupted by an O, S, or N atom. Examples are 5:6-dimethoxyquinolines carrying in position 8 the groups: ζ-diethylamino-β-hexyl (b.p. 205°/2 mm.), δ-diethylamino-β-amyl (b.p. 203°/mm.), δ-ethyl-β-diethylamino-β-hydroxyisobutyl (b.p. 195°/0.5 mm.), β-(β'-diethylaminoethoxy)ethyl (b.p. 225—227°/mm.), β-(β'-diethylaminoethylthiol)ethyl (b.p. 245—250°/0.5 mm.), 2-dimethylaminocyclohexyl (205—210°/1 mm.), β-*N*-piperidylethyl (b.p. 205°/0.5 mm.), β(or α)-diethylamino-*n*-propyl (b.p. 198°/2 mm.; from the 8-allylamino-compound, b.p. 160—165°/1 mm.), ε-diethylamino-β-amyl [b.p. 201°/1.5 mm.; from the 5-nitro-6-methoxy-compound, b.p. 250—255°/1 mm., which is reduced to amine, b.p. 220—222°/2 mm. (Ac derivative, b.p. 245—250°/2 mm.), diazotised and nitrosated, and the nitroso-5-hydroxy-compound methylated and denitrosated], β-diethylaminoethyl (b.p. 195—197°/3 mm.), and *N*-ethyl-*N*-β-diethylaminoethyl (b.p. 200—205°/3 mm.). 8-(ε-Diethylamino-β-amyl)amino-5-methoxy-6-ethoxyquinoline, b.p. 200°/1.5° mm., and 8-bis-(β-diethylaminoethyl)amino-6-methoxy-5-isopropoxyquinoline, b.p. 225—230°/1 mm., are also described.
C. HOLLINS.

Manufacture of hydroxydiphenylindole derivatives. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 354,392, 10.5.30).—Benzoin condenses with amino-phenols or -naphthols to give hydroxy-2:3-diphenyl-indoles or -naphthalindoles. Compounds from benzoin and *m*-aminophenol (m.p. 168°, b.p. 270°/2 mm.) and 8-amino-β-naphthol (m.p. 197°) are described.
C. HOLLINS.

Phenols from hydrocarbons and oils. C₁₀H₈ from naphtha.—See II. Abs. EtOH. *n*-BuOH. Glycerin.—See XVIII.

IV.—DYESTUFFS.

Preparation of indigo-blue. I. V. I. MINAEV and B. P. FEDOROV (Bull. Inst. polytech. Ivanovo-Vosniensk, 1930, 15, 137—150).—The yield from phthalic anhydride was 81% and from *o*-nitrotoluene 75%.
CHEMICAL ABSTRACTS.

Alizarin-blue. V. I. MINAEV and B. P. FEDOROV (Bull. Inst. polytech. Ivanovo-Vosniensk, 1930, 15, 131—136).—For the production of sol. alizarin-blue S a freshly prepared paste of alizarin-blue obtained by decomp. of the sulphate with H₂O (not the violet-cinnamon substance obtained by recrystallisation from C₆H₆) is employed; the vessel containing the mixture of alizarin-blue, NaHSO₃, and AcOH is kept for a short time at 15—20°/620—650 mm. An excess of NaHSO₃ is advantageous.
CHEMICAL ABSTRACTS.

PATENTS.

Manufacture of [polymethine] dyes. F. M. HAMER, and ILFORD, LTD. (B.P. 354,826, 15.5.30).—The glutacetaldehyde derivatives obtained by interaction of a pyridinium salt and a primary or *sec*-arylamine are condensed with quaternary salts of heterocyclic N compounds carrying a reactive α-Me group. The products are photosensitisers for the infra-red. Examples are glutacetaldehyde dianil hydrochloride with 2 mols of quinaldine ethiodide, or 2-methylbenzothiazole, 2-methyl-α- or β-naphthathiazole quaternary salts.
C. HOLLINS.

Manufacture of dyes from [polymethine] heterocyclic nitrogen compounds. IMPERIAL CHEM. INDUSTRIES, LTD., H. A. PIGGOTT, and E. H. RODD (B.P. 353,863, 24.2.30).—Indoles having a free 3-position react, preferably in a solvent (Ac₂O), with the intermediates obtained by condensation of aryl- or *s*-diarylformamidines with heterocyclic N compounds having reactive Me or reactive external CH₂ groups to give polymethine dyes. 2-Methylindole is condensed in Ac₂O with the product from *s*-diphenylformamidine and 2-methylbenzoxazole ethiodide (greenish-yellow) or 2:3:3-trimethylindolenine methiodide (yellow-orange).
C. HOLLINS.

Manufacture and application of dyes from heterocyclic nitrogen compounds. IMPERIAL CHEM. INDUSTRIES, LTD., I. M. HEILBRON, and F. IRVING (B.P. 353,889, 21.1. and 5.6.30).—(a) 2 mols. of a cyclic NH₄ salt containing a reactive Me group, (b) or of the corresponding CH₂ base, (c) or 1 mol. of each, are condensed with a compound, Q·CX:C(Hal)·CH:P, in which X is halogen, NH₂ or substituted NH₂, OH, alkoxy, or acyloxy, P is a replaceable bivalent radical, e.g., :O, :NR (R being alkyl, aralkyl, or aryl) or (OR)₂, and Q is H or CO₂H. Salts may be used. In (a) a salt of a weak acid, preferably enough to convert 1 mol. of the NH₄ salt into CH₂ base, must be present; in (c) a mineral acid. The products are photographic sensitisers for red and infra-red rays, and are also dyes for textiles. Examples are 2:3:3-trimethylindolenine methiodide with α-bromo-β-anilinoacetaldehyde anil hydrobromide in Ac₂O and NaOAc (bright blue), or with mucobromic acid in EtOH and KOAc; 2-methylbenzthiazole ethiodide with α-bromo-β-anilinoacetaldehyde anil hydrobromide in EtOH and KOAc.
C. HOLLINS.

Manufacture of acid wool dyes [N-substituted 1:8-naphthalimides]. I. G. FARBENIND. A.-G. (B.P. 354,818, 14.5.30. Addn. to B.P. 299,721; B., 1930, 455).—The process of the prior patent gives greenish-yellow acid dyes when applied to a nitro-*N*-cyclohexyl-1:8-naphthalimide.
C. HOLLINS.

Manufacture of fast vat dyes [of the anthraquinone series]. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 354,943, 1.7.30).—An anthraquinone-2-carboxyl halide is condensed with an aminoanthra-pyridone or -pyrimidone, with subsequent alkylation of the heterocyclic NH group if necessary. Vat dyes are obtained from anthraquinone-2-carboxyl chloride and 6- and 7-amino-3-methylanthrapyridones (yellow), and 6- and 7-aminoanthrapyrimidones, methylated (orange to red); also from 1-aminoanthraquinone-2-carboxyl chloride and the same bases (red to bluish-red).

C. HOLLINS.

Treatment [dehalogenation] of vat dyes. S. THORNLEY, R. F. THOMSON, J. THOMAS, and SCOTTISH DYES, LTD. (B.P. 354,323, 30.1.30).—Chlorinated or brominated pyranthrones, flavanthrones, dibenzanthrones, or isodibenzanthrones are treated with NaOMe or other alkali alkoxide in an alcohol, e.g., at 160–300°, to reduce the halogen content. Examples are: 3':3' dichloroflavanthronone, brominated pyranthronone, and pentachlorodibenzanthronone.

C. HOLLINS.

Manufacture of anthraquinone vat dyes [brominated 2:2'-dimethoxydibenzanthrone]. NEWPORT CO. (B.P. 354,974, 18.7.30. U.S., 8.8.29).—The product of bromination of methylated dihydroxydibenzanthrone contains a bright yellowish-green vat dye fast to acid, and a dull yellowish-green vat dye which becomes fast to acid when alkylated. These are separable by fractional precipitation from or extraction with 90% H₂SO₄ at 30°.

C. HOLLINS.

Manufacture of vat dyes [of the anthraquinone-indigoid series]. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 354,716, 9.5. and 2.7.30).—An isatin-carboxylic acid is condensed with a thioindoxyl or indoxyl and then with an aminoanthraquinone to give vat dyes of the type T·CO·NH·Aq, where T is a thioindigo or indigo residue and Aq anthraquinonyl. Alternative syntheses are claimed. Amongst the examples are products from: isatin-7-carboxylic acid, 5-chlorothioindoxyl, and α -aminoanthraquinone (yellow-red); isatin-7-carboxylic acid, β -naphthathioindoxyl, and α -aminoanthraquinone (red-brown); 5-chloroisatin-7-carboxylic acid, 5-chlorothioindoxyl, and 1-amino-5-benzamidoanthraquinone; isatin-5-carboxylic acid, 6-methoxythioindoxyl, and α -aminoanthraquinone (brown); isatin-7-carboxylic acid, 6-chloro-4-methylthioindoxyl, and β -aminoanthraquinone (scarlet); thioindigo-6:6'-dicarboxylic acid and 2 mols. of 1-amino-5-benzamidoanthraquinone (brown); 6-methoxythioindigo-6-carboxylic acid and 1-amino-4-benzamidoanthraquinone (deep red); thioindoxyl-6-carboxylic acid, 1-chloro-2:3-naphthisatin, and 1-amino-4-benzamidoanthraquinone (reddish-brown); thioindoxyl-6-carboxylic acid, bromo- β -naphthisatin, 1-amino-4-benzamidoanthraquinone (olive-green).

C. HOLLINS.

Manufacture of azo dyes insoluble in water [ice colours and pigments]. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 354,485, 21.6.30).—An aminoterephthalic alkyl ester is diazotised and coupled in substance or on the fibre with 2:3-hydroxynaphthoic *o*-toluidide, *o*-alkoxyanilide, or a 5'-halogeno-derivative of these, to give orange dyes fast to light and weather.

Examples are: *o*-anisidide, 5'-chloro-*o*-anisidide, 5'-chloro-*o*-toluidide.

C. HOLLINS.

[Manufacture of] direct-developed azo dyes [ice colours]. E. F. GREYER, Assr. to DOW CHEM. CO. (U.S.P. 1,790,807, 3.2.31. Appl., 7.3.29).—A diaminodiaryl ether is tetrazotised and coupled on the fibre with a 2:3-hydroxynaphthoic arylamide, e.g., 4:4'-diaminodiphenyl ether with the anilide (red), *p*-nitroanilide (red), *o*-toluidide (bordeaux), diphenylamide (red-orange), etc.

C. HOLLINS.

Separation of liquids and solids.—See I. 3-Hydroxydiarylamine-5-carboxylic acids.—See III.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Fibre stain for rapid work. T. L. CROSSLEY (Pulp and Paper Mag., 1931, 31, 1145–1146).—Solutions of I and dil. H₂SO₄ (1:1 by vol.) are used to stain samples of the fibres on microscope slides, and the numbers of each of the different kinds present in a suitably divided microscope field are counted. The colours given by the various fibres are: groundwood and other lignified fibres, amber to brown; unbleached conifers and grasses, greenish-yellow to bluish-green or blue, according to the conditions of cooking; bleached conifers and grasses, navy-blue; deciduous woods, darker navy; cotton and linen, lilac to wine-red.

B. P. RIDGE.

Separation of cellulose and other constituents of various woods. T. KLEINERT and K. VON TAYENTHAL (Z. angew. Chem., 1931, 44, 788–791).—The action of H₂O and of EtOH on woods is discussed and an account is given of the separation of the constituents of wood by means of H₂O–EtOH mixtures. The greater part of the lignin and the carbohydrates which accompany cellulose dissolve, and almost pure cellulose, containing only a little lignin and pentosan, remains. At 180° the action is rapid, and the most active mixture contains 50% EtOH. With increase of the H₂O content of the solvent increasing quantities of reducing sugars and of volatile compounds such as furfuraldehyde are formed. The reactions involved are markedly catalysed by H⁺. The temp. and time of treatment vary little with the type of wood. Details are given of the constituents of spruce, pine, beech, and ash wood.

H. F. GILLBE.

Wood fibres as a papermaking material. G. A. RICHTER (J. Franklin Inst., 1931, 212, 403–437).—Purified chemical wood pulp of high α -cellulose content (94–96%) can be used for the best grades of paper for which good-quality rag stock is normally used. It does not hydrate rapidly and when suitably beaten gives a paper of higher bursting, tearing, and folding strength than does ordinary bleached sulphite-pulp. Its durability as indicated by loss of folding resistance—the most delicate indicator of degradation—after exposure to circulating air at 100° for 72 hr. is equal to that of the best quality rag paper. The value of the accelerated ageing test at 100° is confirmed by the fact that parallel results are obtained when ageing is conducted at 60° for 10 days in O₂ under 200 lb. pressure or at 37.8° in circulating air (45% R.H.) for 100 days. When comparing fibre stabilities, preferably unsized sheets are tested since the presence of traces of acid,

e.g., excess of alum, reduces the permanence even of inherently stable fibres. Thus after exposure at room temp. for 6 days to H₂O-saturated air containing 2% of SO₂ all the samples tested showed serious loss of folding strength though the tearing strength was only slightly affected.
D. J. NORMAN.

Influence of sulphite digestion on length of pulp fibres. A. LAMPÉN (Zellstoff u. Papier, 1931, 11, 521—524).—Sulphite digestions of spruce wood under conditions causing removal of incrustants to varying degree disclose no effect on the length of fibre. Whereas the Bergmann Cl no. of the pulps varies from 2.8 to 7.0, the average fibre length varies only between 3.35 mm. and 3.49 mm.
T. T. POTTS.

Preparation of acetone-soluble cellulose acetate. G. A. DMITRIEVA and N. S. YASINSKI (J. Chem. Ind., Russia, 1930, 7, 375—377).—Introduction of H₂SO₄ (as catalyst) by portions decreases the quantity of H₂SO₄ in the product and increases its heat-resisting properties. Temp. for the production of samples of various viscosity are specified.
CHEMICAL ABSTRACTS.

Reaction between caustic soda and carbon disulphide and xanthation of alkali-cellulose. K. ATSUKI and M. KUWABARA (J. Cellulose Inst., Tokyo, 1931, 7, 207—216).—The methods of analysis of the products formed in the reactions are described. The reaction products of aq. NaOH with excess of CS₂ are Na₂CO₃ 35% and Na₂CS₃ 65% irrespective of the NaOH concentration and the temp. No Na₂S is formed during the reaction and neither Na₂S nor NaOH is present after equilibrium is reached. The velocity of reaction, which is very slow below 15°, is doubled by a rise of 10°, but is diminished by increase in NaOH concentration. Cellulose xanthate made from alkali-cellulose prepared with 18 and 25% aq. NaOH corresponds to C₁₂H₁₉O₉·O·CSSNa when the temp. of xanthation is 25—35°, but at higher temp. partial saponification occurs. With alkali-cellulose made with 12% aq. NaOH the cellulose is not completely xanthated, whilst that from 35% NaOH is xanthated very slowly, the combined S being <10% and decreasing with time. The chief by-products are Na₂CO₃ and Na₂CS₃, any others found being formed by secondary reactions.
F. R. ENNOS.

Trinitrocellulose.—See XXII.

PATENTS.

Production of gas-absorbing fabric. G. K. E. H. STAMPE (B.P. 357,773, 23.9.30).—After removal of loading or finishing material, the fabric is so impregnated with an inorg. gel (SiO₂ or Al₂O₃) that it remains permeable to air, either by pressing the freshly precipitated gel on to the fibres or by precipitating it thereon from suitable solutions. The treated fabric is then dried and the gel activated in such a manner as will not injure the fabric, *e.g.*, by heating in vac. or in inert gases.
F. R. ENNOS.

Woven fabric [for clutch facings] containing lead. S. P. HOWE (U.S.P. 1,798,605, 31.3.31. Appl., 3.5.29).—Asbestos fibres, with or without mica, are rubbed together to make threads, the latter are then twisted about a core of thin Pb wire to form cords, and these

are woven into fabric which is then impregnated with Pb oleate or linoleate; alternatively, the cords may be impregnated before weaving.
A. J. HALL.

Decomposition of vegetable fibrous substances to obtain simultaneously the cellulose and the incrusting ingredients. T. KLEINERT and K. TAYENTHAL (B.P. 357,821, 27.10.30. Austr., 2.11.29).—The fibrous material is heated above 150° under pressure with mixtures of 20—75% of H₂O and alcohols (MeOH, EtOH, glycerin), with addition, if desired, of < 0.1% of an acid or alkali, or a salt with an acid or basic reaction. During the heating process the decomp. agent is repeatedly renewed.
F. R. ENNOS.

Manufacture of high- α -cellulose fibre. (A, B) G. A. RICHTER and (A) M. O. SCHUR, Assrs. to BROWN CO. (U.S.P. 1,801,782 and 1,802,575, [A] 21.4.31, [B] 28.4.31. Appl., [A] 1.12.25, [B] 24.8.25).—(A) A continuous process, depending on the digestion of sulphite pulp with NaOH, is described. Uniform admixture of NaOH solution with the pulp is effected by thickening the raw pulp suspension to 9—12%, diluting it to 2—5% consistency with hot NaOH solution, and then thickening it again to a consistency of 10—12% for the digestion process. (B) Sulphite pulp (4:4 pulp, or kraft pulp, but preferably a sulphite pulp prepared with a NaHSO₃ liquor) is treated with a small quantity of CaOCl₂ solution and, after washing, is digested at a pulp consistency of 5—6% with 100—150% (on the wt. of dry pulp) of NaOH for 0.5—2 hr. at room temp. The washed pulp is then bleached and super-bleached. The high- α -cellulose pulp obtained by this cold process gives cellulose solutions of lower viscosity than similar pulp produced by the hot-digestion process.
D. J. NORMAN.

Drying [of cellulosic or starchy] materials. W. B. CAMPBELL (B.P. 359,641, 8.9.30).—In order to displace its contained H₂O, the material is washed with a non-aq. H₂O-miscible liquid (EtOH, COMe₂) which does not form mucilaginous layers therewith, and is finally dried by evaporation. [Stat. ref.]
F. R. ENNOS.

Manufacture of articles from cork. A. HOLT (B.P. 358,592, 15.7.30).—A mixture of granular cork with a binding agent is continuously fed into a mould with a screw device by which it is shaped under pressure, and is baked or cured in the mould without pressure; it is subsequently ejected and cut to the desired form.
F. R. ENNOS.

Moldable phenolic pentosan material. O. R. SWEENEY, Assr. to IOWA STATE COLL. OF AGRIC. & MECHANIC ARTS (U.S.P. 1,797,559, 24.3.31. Appl., 16.6.24).—A pentosan-containing material (corn cobs or stalks, oat, cottonseed, or peanut hulls) is heated at 100° for 3 hr. with 60 wt.-% of crude cresylic acid and 10 wt.-% of HCl.
F. R. ENNOS.

Manufacture of celluloid substitute. M. SUGATA (U.S.P. 1,797,806, 24.3.31. Appl., 23.5.30. Jap., 11.1.30).—Camphor (35 pts.) and rosin (65 pts.) are melted together at 130—180° in a closed vessel and mixed with the product obtained by boiling 20 pts. of silk with 2% NaOH; the whole is then suspended in EtOH or Et₂O, mixed with 80 pts. of MgCO₃, heated for 48 hr., and kneaded at 70°.
F. R. ENNOS.

Manufacture of viscose solutions [of low viscosity]. I. G. FARBENIND. A.-G. (B.P. 357,808, 15.10.30. Ger., 16.10.29).—Ripened or unripened alkali cellulose is xanthated in the presence of ≥ 10 wt.-% (on the cellulose) of a H_2O -sol. sulphide (Na_2S). F. R. ENNOS.

Manufacture of cellulose esters. KODAK, LTD., Assees. of R. H. V. DYKE, C. S. WEBBER, and C. J. STAUD (B.P. 358,436, 5.7.30. U.S., 15.7.29).—Cellulose acetoni-trates (0.3—3% N, 36—42% Ac) are prepared by acetylating cellulose with Ac_2O containing 4—25% of dissolved NO_2 . *E.g.*, 50 g. of linters previously soaked for 4 hr. at 37° in 350 g. of glacial $AcOH$ containing 2 c.c. of catalyst (H_2SO_4 and H_3PO_4 , 1:3) are stirred for 3 hr. with 140 c.c. of Ac_2O (85 g.) containing 8 g. of dissolved NO_2 , the temp., initially about 18° , being gradually raised to 40 — 45° . By increasing the time of pretreatment to 8 hr. and using 140 g. of Ac_2O containing 18 g. of dissolved NO_2 , esterification may be completed in 0.5 hr. The resulting products are directly sol. in $COMe_2$ to brilliantly clear solutions of high viscosity and are also sol. in $CHCl_3$, $C_2H_4Cl_2$, $EtOAc$, and 1:4-dioxan.

D. J. NORMAN.

Treatment of esters of cellulose. H. MCC. SPENCER (U.S.P. 1,797,843, 24.3.31. Appl., 22.8.23).—Conc. solutions are prepared from cellulose esters, particularly nitrocellulose, by dissolving in a non-aq. solvent ($EtOAc$, Et_2O - $EtOH$, C_6H_6 , etc.) containing an alkali ($NaOH$, Na_2CO_3 , aq. NH_3 , NMe_3 , etc.) which is preferably volatile; the solutions are afterwards thinned down with C_6H_6 , $EtOH$, $COMe_2$. F. R. ENNOS.

Manufacture of cellulose ethers, in particular benzyl cellulose. A. LAUTENBERG (B.P. 358,803, 10.12.30. Italy, 21.12.29).—Alkali cellulose is treated with a halogen-substituted hydrocarbon, *e.g.*, CH_2PhCl , in the presence of $NaOH$, the concentration of which is regulated by elimination of H_2O in the form of an azeotropic mixture with an added non-reactive substance, *e.g.*, C_6H_6 , which is not miscible with H_2O and is continuously returned to the reacting mixture from the condensate. F. R. ENNOS.

Production of fine threads from cellulose compounds. H. SUTER (B.P. 358,512, 5.6.30. Ger., 23.1.30).—Threads of, *e.g.*, cellulose acetate are stretched 300—900% or more during or after passage through a bath containing a swelling agent which has only a slight solvent action on cellulose acetate, *e.g.*, CH_2Cl_2 , $CHCl_3$, $C_2H_2Cl_4$, in admixture with an org. liquid, *e.g.*, CCl_4 , C_2HCl_3 , C_2Cl_4 , C_6H_6 , which is neither a swelling agent nor a solvent for cellulose acetate and will repress the solvent action of the admixed swelling agent. A suitable bath contains 70 vol.-% of CH_2Cl_2 and 30 vol.-% of CCl_4 . The stretched threads, the individual filaments of which may be reduced to 0.5—2 deniers, show up to 100% increase in wet and dry strength (g. per denier) and also reduced extensibility. [Stat. ref.]

D. J. NORMAN.

Production of structures [filaments etc.] from cellulose esters of aliphatic acids. G. MÜLLER (B.P. 358,501, 4.7.30).—Fine filaments of high strength, particularly wet strength, are obtained by stretching a cellulose ester solution, *e.g.*, a cellulose acetate reaction mixture containing 12% of cellulose

acetate, into a conc. solution of a strong acid, *e.g.*, 40—60% aq. H_2SO_4 , preferably containing 1% of CH_2O and optionally other additions, *e.g.*, salts, solvents, etc. [Stat. ref.]

D. J. NORMAN.

Production of artificial products by dry-spinning. H. DREYFUS (B.P. 358,500, 4.7.30).—A solution of cellulose esters or ethers in a volatile solvent ($COMe_2$) and $\geq 30\%$ of a high-boiling solvent (diacetone alcohol, Et tartrate or phthalate), together with a non-solvent if desired (H_2O , $EtOH$), is spun into an evaporative medium containing vapours of a non-solvent for the cellulose derivative (H_2O , $EtOH$). F. R. ENNOS.

Production of artificial silk by the spinning-box process. H. A. GILL. FROM GLANZSTOFF-COURTAULDS GES.M.B.H. (B.P. 357,626, 20.6.30).—The cakes are spun at a high draw-off velocity from a viscose solution containing a small quantity (0.3—1%) of a sulphonated fatty oil (Turkey-red oil), the subsequent treatment being carried out on the thread while still in cake form.

F. R. ENNOS.

Dry-spinning and reducing the lustre of artificial silk. S. DUNLOP. FROM "CHÂTILLON" SOC. ANON. ITAL. PAR LA SETA ARTIF. (B.P. 359,385, 1.10.30).—By means of a small fan placed in the spinning cell near the nozzle, a current of air or gas is directed at right angles to or obliquely to one side of the liquid filaments so that evaporation of the solvent therein proceeds irregularly, with production of filaments showing two or more re-entrant surfaces. F. R. ENNOS.

Production of artificial silk in the form of spun cakes. BRIT. BEMBERG, LTD. (B.P. 359,795, 16.12.30. Ger., 20.12.29).—To facilitate the spinning of filaments of < 60 deniers into pots of the usual max. speed of rotation (6000 r.p.m.) or those of the usual titre (100—150 deniers) into pots of diminished speed, the centrifugal force on the filaments is increased by weighting them with ppts., *e.g.*, basic Cu sulphate, or $PbSO_4$ formed by treatment of the coagulated, unwashed cuprammonium or viscose filaments with sol. Cu or Pb salts, respectively, which are subsequently removed, after spinning, by suitable liquids. F. R. ENNOS.

After-treatment of artificial silk obtained by the spinning-can process. O. SCHWARZKOFF (B.P. 359,127, 1.9.30).—In order to be free to swell under the influence of the treatment liquors, the spun cake, without inner or outer support, is placed with its ends between plates provided with adjustable loading devices, the treatment liquors being introduced through fittings in one or both of the plates. F. R. ENNOS.

Washing, after-treating, and drying of spun cakes of artificial silk. VEREIN. GLANZSTOFF-FABR. A.-G. (B.P. 359,872, 10.4.31. Ger., 10.4.30).—During treatment, the spun cakes are mounted on horseshoe, polygonal, or rod-shaped supports of resilient material which is resistant to the treatment liquids, the supports being introduced in a deformed state so that on release they grip the interior of the cakes. F. R. ENNOS.

Washing and after-treatment of filaments, strips, or the like of artificial silk spun in the form of spun cakes. W. W. TRIGGS. FROM VEREIN. GLANZSTOFF-FABR. A.-G. (B.P. 357,919, 14.2.31).—The spun cakes,



shaped to flat hanks, are wrapped in wide-meshed or net-like fabric and packed in a centrifuge, in which they are subjected to washing and other after-treatment processes.

F. R. ENNOS.

Dressing of artificial silk spinning cakes. VEREIN. GLANZSTOFF-FABR. A.-G. (B.P. 359,819, 15.1.31. Ger., 15.1.30).—The spinning cakes, after the first drying, are supported in permeable net-like coverings, in reel- or bobbin-like devices, or in suitable perforated centrifuges, and treated with solutions or emulsions of drying oils to stick the capillary threads together in the thread strand. This setting process can be promoted by means of O_2 or O_3 .

F. R. ENNOS.

Wet-treatment of artificial silk spinning cakes and other wound yarn packages. VEREIN. GLANZSTOFF-FABR. A.-G. (B.P. 357,908, 12.1.31. Ger., 11.1.30).—The cakes, wrapped in wide-meshed coverings, are placed upon a series of washing bars arranged one under another and are carried through, underneath drip baths, by a mechanical stepwise movement of the bars, the cakes being also rotated through 180° at regular intervals.

F. R. ENNOS.

Device for protecting artificial silk spinning cakes. VEREIN. GLANZSTOFF-FABR. A.-G. (B.P. 357,466, 3.2.31. Ger., 3.2.30).—A tubular permeable fabric or net-like covering with a reinforced margin at each end is used to prevent rubbing up, unravelling, and loosening of the bindings during washing, dyeing, etc.

H. ROYAL-DAWSON.

Papermaking process. F. B. DEHN. From BELOIT IRON WORKS (B.P. 358,615, 21.7.30).—The paper stock is transferred to a Fourdrinier wire, which is left undisturbed until a predetermined quantity of H_2O has drained therefrom, and is afterwards shaken to effect proper distribution and interlacing of the fibres in the sheet.

F. R. ENNOS.

Waterproof paper. C. J. STROBEL and A. P. TALLMAN (U.S.P. 1,803,816, 5.5.31. Appl., 21.3.28).—An emulsion containing paracumarone and menhaden oil is, e.g., added to the beater and precipitated with alum. The emulsion (formula given) is prepared by heating a mixture of Na_2CO_3 , resin, paracumarone, and menhaden oil with H_2O to 260° and gradually diluting the hot mixture.

D. J. NORMAN.

[Waterproof] paper [containing wax]. G. J. MANSON, Assr. to MANSON CHEM. CO. (U.S.P. 1,800,551, 14.4.31. Appl., 8.7.26).—Wax emulsions of greater stability and of a higher degree of dispersion are obtained if during dispersion of the wax a finely-divided ppt. is formed in the liquor by double decomp. of, e.g., $MgCl_2$ and Na_2CO_3 , so that the particles of dispersed wax become coated with a film of $MgCO_3$. Increased quantities of wax can be incorporated with paper pulp when added in this form.

D. J. NORMAN.

Stencil sheet. S. HORII (U.S.P. 1,799,793, 7.4.31. Appl., 30.4.29).—Gelatin is emulsified with a mixture of naphthenic acids and aq. NH_3 , to which may be added oils, fats, or waxes, K_2CrO_4 or formalin, and a suitable colouring matter; the colloidal dispersion is applied to Yoshino paper and allowed to dry.

F. R. ENNOS.

Transfer material. S. A. NEIDICH, Assr. to NEIDICH PROCESS CO. (U.S.P. 1,800,561, 14.4.31. Appl., 5.5.27).—A coating composition for carbon paper contains gutta-percha 30, lampblack 17, carnauba wax 30, and petroleum 40 pts.

D. J. NORMAN.

Ornamental paper. E. J. KIEFER (U.S.P. 1,801,313, 21.4.31. Appl., 11.2.28).—Paper is coated on one side with a dil. pyroxylin solution (<3.5%) containing Cu, Zn, Al, or bronze powder. Softeners, e.g., castor oil, may also be added. The resulting paper is impervious to air and moisture and is suitable for wrapping food-stuffs.

D. J. NORMAN.

Preparation of material for foodstuff containers. S. D. WELLS, Assr. to PAPER MILL LABORATORIES, INC. (U.S.P. 1,801,704, 21.4.31. Appl., 8.4.29).—Straw is digested under pressure with an alkaline liquor and Cl_2 then introduced into the stock (0.1–5% on the wt. of pulp) before it is made into board. Other antiseptic agents (fluorides, fluosilicates) may be used.

D. J. NORMAN.

Manufacture of gas-impervious sheet material. W. C. GEER, Assr. to B. F. GOODRICH CO. (U.S.P. 1,801,666, 21.4.31. Appl., 26.6.25).—Airship fabric is made by cementing metal foil (e.g., Al or alloys of Sn, Pb, Bi, Zn, and Cu) to a textile fabric by means of cements which may have rubber as a basis and be of a heat-plastic type.

A. J. HALL.

[Mechanical] production of bast fibres from the stalks of plants. E. GMINDER (B.P. 358,833, 21.1.31. Ger., 24.1.30).

Production of thread coils of artificial silk. M. SCHOENFELD (B.P. 359,435, 18.7.30. Ger., 6.1.30. Addn. to B.P. 358,900).

Transporting and after-treating textile materials, more particularly artificial silk, wound on bobbins. ALGEM. KUNSTZIJDE UNIE N.V. (B.P. 359,860, 17.3.31. Holl., 22.3.30).

Twisting and winding of artificial filaments, threads, or yarns. CELLULOSE ACETATE SILK CO., LTD., and H. C. CURTIS (B.P. 359,627, 26.8.30).

[Conical] refining engines for use in pulp refining. W. G. FRASER (B.P. 359,835, 10.2.31. Addn. to B.P. 292,223).

Manufacture of marbled papers. V. ANTOINE (B.P. 360,703, 1.12.30. Belg., 23.8.30).

Treatment of vegetable materials.—See I. Solvent benzene.—See II. Bleaching [of wood pulp].—See VI. Composite rubber material.—See XIV. Artificial leather. Sugars from cellulose.—See XVII. Reclaimed dyed film scrap.—See XXI.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

“Red oil.”—See XII.

PATENTS.

Apparatus for treating artificial silk with liquids. H. A. GILL. From GLANZSTOFF-COURTAULDS GES.M.B.H. (B.P. 357,971, 19.6.30).—The apparatus comprises a number of (horizontally) movable tanks each having a no. of perforated tubes or rods of star-shaped cross-section

projecting vertically downwards from its underside. Cakes of artificial silk yarn are mounted on the tubes, one below the other, and the tanks are then moved in succession beneath various liquid supplies so that each liquor passes downwards through the tubes and then outwardly through each cake of yarn. A. J. HALL.

[Kier] treatment of textiles. E. D. JEFFERSON, ASSR. to RODNEY HUNT MACHINE CO. (U.S.P. 1,800,639, 14.4.31. Appl., 20.12.28).—Textiles are treated in the usual form of puffer kier which also contains perforated vertical outer pipes arranged around the inside wall of the kier, and the kier liquor is intermittently circulated through the textile goods inwardly from the outer pipes and outwardly from the upper half of the central perforated puffer-pipe. The intermittent circulation is regulated automatically by a special valve (cf. U.S.P. 1,482,795; B., 1924, 332 A). A. J. HALL.

Bleaching [of fibrous materials] and preparation of liquors therefor. L. BRADLEY and E. P. MCKEEFE, ASSRS. to BRADLEY-MCKEEFE CORP. (U.S.P. 1,795,757, 10.3.31. Appl., 14.3.28).—Wood pulp, obtained from wood by treatment with Na_2SO_3 insufficient to free the fibres from all non-cellulose material, is treated with an alkali manganate or permanganate together with a hypochlorite until all the coloured, non-fibrous org. constituents of the pulp are rendered colourless or readily separable from the fibrous material, the precipitated MnO_2 being dissolved by addition of SO_2 etc. F. R. ENNOS.

Art of [mordant] colouring [with alizarin dyes]. R. S. BARNES, D. SERVICE, J. THOMAS, and SCOTTISH DYES, LTD. (B.P. 358,465, 31.3.30).—Unmordanted cotton or silk is dyed or printed with a liquor containing the H_2SO_4 ester of alizarin (the SO_4H group being attached to the β -OH group), $\text{Al}_2(\text{SO}_4)_3$, and $\text{Ca}(\text{OAc})_2$, and then steamed for development of the true alizarin dye. The alizarin ester is prepared by heating together at 75° for 15–30 min. a mixture of alizarin 15 pts., pyridine 100 pts., and pyridine-sulphur trioxide 50 pts., and then filtering off the pyridine salt of the ester. A. J. HALL.

Dyeing process [for rugs etc. *in situ*]. K. CONDON (U.S.P. 1,800,509, 14.4.31. Appl., 2.11.28).—The textile material is wetted with a soap solution, and a cold solution of an acid or basic dye is then applied by brushing methods. A. J. HALL.

Equalising the colour effect of cotton yarn to that of cuprammonium silk. F. STEINBERG, ASSR. to AMER. BEMBERG CORP. (U.S.P. 1,797,247, 24.3.31. Appl., 26.11.30. Ger., 25.11.29).—Before knitting together with Bemberg (cuprammonium) silk, cotton yarn is treated successively with dil. (0.39–0.40% Cu) and conc. (0.70–0.75% Cu) cuprammonium solutions (tension may be applied to prevent shrinkage in length), whereby its affinity for direct dyes is increased and in the resulting knitted material the two fibres have equal affinities for dyes. A. J. HALL.

Textile printing. D. WALKER (B.P. 358,048, 2.7.30).—Printing is effected by means of a stencil consisting of an open-mesh silk fabric the impervious portions of which are formed by that part of a light-sensitive layer which has been rendered insol. by exposure

to light through a translucent sheet bearing the desired design, the whole of the stencil having finally been rendered resistant to dye pastes by spraying with a suitable varnish. A. J. HALL.

Production of resists under vat colours. I. G. FARBENIND. A.-G. (B.P. 355,059, 11.9.30. Ger., 11.9.29).—The fabric is printed with an oxidant ($\text{Na } m$ -nitrobenzenesulphonate, $\text{Na}_2\text{Cr}_2\text{O}_7$) and an aq. solution of a polyvinyl alcohol, with or without kaolin etc., dried, and dyed with the vat dye. The polyvinyl alcohol is precipitated or coagulated by the warm vat and adheres to the printed portions. C. HOLLINS.

Discharge or reserve printing. J. S. WILSON, S. THOMAS, and SCOTTISH DYES, LTD. (B.P. 354,773, 11.2.30).—The azo dyes of B.P. 333,506 (B., 1930, 1024), *i.e.*, azo dyes containing enolic sulphuric ester groups, before or after development, are discharged by alkali alone followed by steaming. C. HOLLINS.

Treatment [delustring] of textile materials made of or containing organic derivatives of cellulose. BRIT. CELANESE, LTD., G. H. ELLIS, and R. C. STOREY (B.P. 358,574, 10.7.30).—Phenols, previously recommended for use in printing to give lustre pattern effects (cf. B.P. 266,777; B., 1927, 406), are employed in hot aq. solutions for delustring cellulose acetate etc. silk. Complete delustring is effected by immersing the silk woven or knitted material in 0.1N-PhOH at 75 – 95° , and partial delustring is obtained with more dil. PhOH. A softer handle is secured by adding soap to the delustring bath, and delustring and dyeing may be effected simultaneously. A. J. HALL.

Treatment [stiffening] of fabrics containing organic derivatives of cellulose. BRIT. CELANESE, LTD., G. M. LANGDON, A. G. FLOWER, and S. M. FULTON (B.P. 358,593, 15.7.30).—A firm handle and glossy appearance are conferred on cellulose acetate etc. silk by steeping in a cold solution of gelatin or casein followed by treatment with CH_2O . A. J. HALL.

Treatment of fabrics. H. I. JONES (U.S.P. 1,799,047, 31.3.31. Appl., 14.3.27).—Fabric is rendered more creasable and suitable for use in pleated garments by impregnation with a solution containing soap 15, casein 10, carrageen moss 5, bentonite 30, petroleum jelly 500, and water 2400 pts., followed by passage through a 2.5% solution of Ce chloride (or salt of other metal, *e.g.*, Hg, Cu, Pb, Bi, or rare-earth metal), rinsing, and drying. Although the treated fabric contains a large proportion of petroleum jelly it does not readily pick up dirt. A. J. HALL.

Treating of [knitting] yarn. S. P. RUFF, JUN., ASSR. to ABERFOYLE MANUFG. CO. (U.S.P. 1,803,869, 5.5.31. Appl., 13.1.30).—Yarn is treated with any suitable softening emulsion to which is added 5 vol.-% of pine oil while being wound into package form, and at the same time is sprayed with a perfume. A. J. HALL.

Casein composition for treating [sizing] artificial silk yarns and threads or filaments [particularly of cellulose acetate]. STEIN, HALL & CO., INC., ASSEES OF H. S. BOSLAND and F. G. LAPIANA (B.P. 359,802, 22.12.30. U.S., 7.1.30).—Casein (50–80 pts.), dextrinised flour (40–10 pts.), and maize sugar (about

10 pts.) are dissolved in an alkaline (*e.g.*, ammoniacal) aq. liquor, together with a small proportion of a neutral sol. oil, and applied to the filaments (*etc.*) at 60—70°.

F. R. ENNOS.

Decoration of cellulose materials. P. M. S. SCHLOCHOFF (B.P. 359,072, 25.7.30).—A transparent or opaque cellulose derivative sheet is applied by means of a roller to an engraved plate of glass, on which the impression has been sunk by HF or a sand jet in such a manner that the surface presents two or more different depths of engraving. A suitable solvent (CMe₂) is injected between the sheet and the glass and, after drying, the former is removed bearing an impression from the glass-plate matrix.

F. R. ENNOS.

[Roller] printing of fabrics. F. JUST (B.P. 359,662, 24.9.30. Czechoslov., 28.4.30).

Improving the quality of textiles [by calendering]. W. SCHREY (B.P. 358,129, 8.7.30. Ger., 3.4.30).

Solvent benzine.—See II. **Wetting *etc.* agents.**—See III. **Dyes from heterocyclic N compounds.**—See IV. **Protecting artificial silk spinning cakes.**—See V.

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

Theory of the sulphuric acid chamber reaction. W. J. MÜLLER (Z. angew. Chem., 1931, 44, 821—825).—From theoretical considerations and technical yields it is concluded that in the H₂SO₄ chamber process (*a*) the reaction 2NO + O₃ → 2NO₂ occurs in the gas, (*b*) dissolution of SO₂ in H₂O, and of oxides of N₂ in H₂O and H₂SO₄, occurs at the gas-liquid interface, and (*c*) reactions in the liquid phase consist of all or some of the following: oxidation of H₂SO₃ by HSN₂O₅ or HNO₃, production of NO from H₂SO₄ and HNO₃, or from H₂SO₃ and HNO₂, and decomp. of HSN₂O₅ by H₂O to H₂SO₄ together with HNO₃ and NO or N₂O₄ and NO. The last two reactions are stated to take place under the conditions of the process.

R. S. CAHN.

Catalytic oxidation of sulphur dioxide in the presence of tin vanadate. E. B. MAXTED and N. J. HASSID (J.S.C.I., 1931, 50, 399—400 T).—The yields of SO₃ obtainable by the oxidation with air of SO₂ in the presence of Sn vanadate have been examined, in view of the relatively low temp. at which this catalyst becomes active for other processes of oxidation. The catalyst begins to be appreciably active at 300—350°, and conversions of the order of 98—99% are obtained at temp. slightly below 500°. If the catalyst has been used under unsuitable conditions, particularly with too high a rate of SO₂ or at too low a temp., some time may elapse before normal activity is attained with normal rates of passage of gas, and the maintenance of optimum activity apparently involves the keeping of the Sn vanadate in a special condition with regard to its adsorbed or otherwise associated SO₂ or SO₃ content.

Concentration of phosphoric acid by submerged combustion. C. F. HAMMOND (Chem. and Ind., 1931, 733—738).—In the author's unit, gas and air are mixed in the burner head, which is vertical and central in a refractory-lined combustion chamber. The max. temp. in the chamber as measured by Seger cones is

1740°, and the temp. of the inner wall is 1470° (*calc.*). Non-return valves in the air and gas lines prevent danger of flooding. The casing is surrounded by an open-ended cylinder extending above the liquid surface. Within this the fine bubbles of combustion gases produce an upward liquid current, which impinges on a deflector. The H₃PO₄ to be conc. flows through 3 stoneware containers in series, each having a submerged-combustion unit. The exhaust gas main is of stoneware. For the burner casings fused SiO₂, enamelled cast Fe, and Au-plated Cu or steel were all open to objection, and special steels machined from the solid metal, rolled, annealed, and pickled, were chosen. The degree of corrosion varies as between crude and pure H₃PO₄, and the metal to be used must be selected for each liquor dealt with. Risk of contamination of "B.P." acid is minimised by the small size of the casing, and the problem is simply one of a reasonable working life. Losses of acid are under 1%. When SiF₄ is present in the fume flushing of the exhaust pipe is necessary. The installation of a works' plant for this process is now being carried out. It is *calc.* to be equal to the conventional one in fuel costs if producer gas is used.

C. IRWIN.

Active silica gel precipitated on asbestos. M. O. CHARMANDARYAN and G. D. DAKHNYUK (J. Chem. Ind., Russia, 1930, 7, 1578—1580).—The adsorption activity of SiO₂ gel is increased by the presence of asbestos or pumice. The activity is increased by washing with hot H₂O; drying before washing increases the adsorption capacity of acid gels and decreases that of alkaline gels.

CHEMICAL ABSTRACTS.

Graphical determination of ammonia solubility. D. S. DAVIS (Chem. & Met. Eng., 1931, 38, 576—577).—The solubility of NH₃ in H₂O for vals. of *S* below 100 is given by $S = p/[0.0015p + 6.989(100+t)^{5.7359} \times 10^{-13}]$, and for vals. of *S* above 100 by $S = \sqrt{p(e^{-0.02512t+3.542} + 1) - 100 \sinh^{-1} \tan [-21.844 \log(t+25) + 76.264]}$, in which *p* is the partial pressure of NH₃ in mm. Hg over a solution of *S* g. NH₃ in 1 kg. H₂O at *t*°. The equations are valid for vals. of *p* up to 1000, and of *t* from 0° to 50°. Nomographs for the solution of the above equations are given.

D. K. MOORE.

Purification of brine from calcium and magnesium salts in its purification from sulphates with barium carbonate. N. N. VORONIN and G. S. PLAKHOTNYUK (J. Chem. Ind., Russia, 1930, 7, 1148—1152).—Treatment with BaCO₃ and CO₂ affords a ppt. of BaSO₄ and CaCO₃, leaving Ba, Ca, and Mg hydrogen carbonates and MgCl₂ in solution; CO₂ is removed by air. Addition of more brine removes BaCO₃ and Ba(HCO₃)₂, the other salts being removed with NaOH, and the filtered brine is neutralised with HCl. The BaSO₄ is treated with HCl and converted into BaCO₃ with Na₂CO₃.

CHEMICAL ABSTRACTS.

Production of potassium chlorate. S. S. SHRAIBMAN (J. Chem. Ind., Russia, 1930, 7, 1556—1567, 1742—1749, 1907—1912).—A detailed study of production by the reactions $6\text{Ca(OH)}_2 + 6\text{Cl}_2 \rightarrow \text{Ca(ClO}_3)_2 + 5\text{CaCl}_2 + 6\text{H}_2\text{O}$ and $\text{Ca(ClO}_3)_2 + \text{K}_2\text{CO}_3 \rightarrow 2\text{KClO}_3 + \text{CaCO}_3$. Chlorination with air-cooling gives a 97.5% yield of chlorate; with water-cooling the loss is 1—2%. Excess of Cl₂ is important. The best temp. for the milk

of lime is 30°; a concentration represented by d 1.08—1.09 gave good results. Fe (up to 0.4% Fe_2O_3) had no catalytic effect. CaCO_3 up to 5—6% is slowly chlorinated. In the last absorber, with a high concentration of Cl_2 , explosive gases containing Cl_2 and 30—40% H_2 and O_2 are formed. 0.2—1.0N-HOCl does not destroy filter-cloth at low temp. Molasses, sawdust, and charcoal in optimal quantities accelerate the conversion of ClO' into ClO_3' . Flue gases convert at least 90% of HOCl into HClO_3 . In overchlorinated media the decomp. of HOCl is best effected by nitrite.

CHEMICAL ABSTRACTS.

Removal of silicic acid in treatment of leucite with acids. G. A. BLANC (Atti III Cong. Naz. Chim. pura appl., 1929, 226—230; Chem. Zentr., 1931, i, 3153).—Colloidal SiO_2 remaining in solution after treatment of leucite with HCl or HNO_3 separates with the SiO_2 liberated when the Al_2O_3 is dissolved out.

A. A. ELDRIDGE.

Production of cyanamide. J. A. LEE (Chem. & Met. Eng., 1931, 38, 564—567).—A description of the CaCN_2 plant at Niagara Falls.

D. K. MOORE.

Solid CO_2 in cold-storage practice.—See XIX.

PATENTS.

Ammonia oxidation equipment and its use for manufacture of sulphuric acid. A. M. FAIRLIE (U.S.P. 1,800,786, 14.4.31. Appl., 12.8.26).—The N oxides from the NH_3 converter may be passed either directly to the Glover tower or to a tower in which they are absorbed in a suitable liquid, the solution being led into a storage tank from which it can be pumped to the Glover tower. By this arrangement the converter can operate at optimum capacity and max. efficiency, irrespective of the fluctuating requirements of the H_2SO_4 plant.

W. J. WRIGHT.

Reaction towers for manufacture of sulphuric acid. A./S. DANSK SVOVLSYRE- & SUPERPHOSPHAT-FABR. (B.P. 359,368, 20.4.31. Denm., 24.4.30).—The Pb mantle surrounding the tiled walls of the towers is reinforced by a wire network or a series of wire belts drawn tight against the mantle by a rigging screw. The network is so constructed that where the wires cross there are no protruding parts pressing into the Pb.

L. A. COLES.

Production of hydrofluoric acid low in silica. A. L. MOND. From I. G. FARBENIND. A.-G. (B.P. 359,292, 15.12.30).—Fluorspar containing SiO_2 is stirred with sufficient 70—90% H_2SO_4 to prevent solidification of the pulp, at a temp. such that all the SiO_2 is converted into and removed as SiF_4 ; the acid is then conc. by the addition of oleum and the temp. raised to expel HF.

L. A. COLES.

Production of anhydrous hydrofluoric acid. A. L. MOND. From I. G. FARBENIND. A.-G. (B.P. 357,438, 10.12.30).—High-% HF is fractionally distilled in an Fe apparatus with a fractionating column maintained at 19.5°.

H. ROYAL-DAWSON.

Technical hydrolysis of thiocyanic acid or salts thereof. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 359,004, 8.7.30).—The acid or salt is heated under pressure with a dil. acid (H_2SO_4), or mixture of acids,

in the presence of a salt [$(\text{NH}_4)_2\text{SO}_4$] not decomposed by the acid under the conditions of the reaction. The apparatus is constructed of or lined with Mo-steel.

L. A. COLES.

[Catalyst for] synthesis of ammonia. SOC. CHEM. IND. IN BASLE (B.P. 359,378, 1.7.31. Switz., 1.7.30).—An Fe catalyst contains the usual activators, e.g., CaO , KNO_3 , and small quantities of As, B, or P, or compounds of these elements.

L. A. COLES.

Preparation of sodium bicarbonate. A. MENTZEL (B.P. 359,272, 2.12.30. Ger., 16.12.29).—A solution containing NH_3 and NaCl, which may be precharged with a little CO_2 , is sprayed into the top of a vertical tower free from baffles etc., and CO_2 is blown in through dispersing pipes at the lower end of the tower. The suspension falls on to a suction filter whence, after straining, the NaHCO_3 is removed from the tower.

L. A. COLES.

Manufacture of dithiocarbamates. I. G. FARBENIND. A.-G. (B.P. 359,589, 29.7.30. Ger., 8.8.29).—Reaction between primary and/or secondary amines and CS_2 is carried out in an aq. emulsion. As emulsifying agents soaps, alkali salts of alkylated naphthalenesulphonic acids, etc. may be employed.

W. J. WRIGHT.

Manufacture of alkali cyanates. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 359,559, 25.7.30).—Alkali carbonates are heated with NH_3 and CO_2 or with NH_4 carbamate at temp. up to 400° and under a pressure of at least 50 atm.

W. J. WRIGHT.

Manufacture of soluble gilsonite. I. J. NOVAK, ASSR. to RAYBESTOS CO. (U.S.P. 1,803,637, 5.5.31. Appl., 26.7.29).—Complete solubility in gasoline and other solvents is obtained by melting the gilsonite and maintaining it at 163—205° for $\frac{1}{2}$ hr.

W. J. WRIGHT.

Manufacture of products [fertilisers] containing nitrogen. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 359,652, 16.9.30).—Alkaline-earth or Mg oxides, carbonates, or carbamates are treated at 70—900°, in the absence of O_2 or gases yielding it, with HCNO, cyanuric acid, cyamelide, or NH_4CNO , or with mixtures of NH_3 and CO in the presence of catalysts promoting the formation of HCNO. Urea may be added to the HCNO when the initial material is a carbamate.

L. A. COLES.

Working up crude phosphate and potassium salts to mixed fertiliser. CHEMIEVERFAHRENGES. M.B.H. (B.P. 359,450, 11.7.30. Ger., 14.8.29).— CaSO_4 obtained in the decomp. of phosphates is stirred with a solution containing $(\text{NH}_4)_2\text{CO}_3$ and NH_4Cl and, after removal of CaCO_3 , the liquor is treated with KCl and NH_3 to precipitate K_2SO_4 for use together with HNO_3 in the decomp. of the phosphates. The liquor remaining after removal of the K_2SO_4 is cooled to separate part of the NH_4Cl and is then saturated with CO_2 for re-use in the process. If sylvinite be used instead of KCl, the liquor, after cooling to remove part of the NH_4Cl , may be used in the NH_3 -soda process.

L. A. COLES.

Treatment of phosphate rock and manufacture of fertilisers. ODDA SMELTEVERK A./S., and H. JOHNSON (B.P. 359,680, 8.10.30. Norw., 11.10.29).—A part (a) of the liquor obtained by the dissolution of

phosphatic rock in HNO_3 is cooled to crystallise and remove the $\text{Ca}(\text{NO}_3)_2$ as completely as possible and the remainder of the liquor (*b*) is cooled to remove $\text{Ca}(\text{NO}_3)_2$ in quantity such that sufficient Ca remains in solution to ppt. all the H_3PO_4 as CaHPO_4 on subsequent treatment of the liquor with NH_3 ; after removal of the CaHPO_4 , the NH_4NO_3 in the solution is converted into KNO_3 , which is removed by crystallisation, and added to the H_3PO_4 solution obtained from (*a*), after which the mixture is neutralised with NH_3 and dried to yield a mixed fertiliser. Part of the CaHPO_4 obtained from (*b*) may be mixed with the product, or the CaHPO_4 may be mixed with $\text{Ca}(\text{NO}_3)_2$ and KNO_3 to yield a mixed fertiliser.

L. A. COLES.

Burning of pyrites, or iron sulphide, and production of iron oxide. D. TYRER, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 359,478, 16.6.30).—The temp. of the FeS combustion zone in, *e.g.*, a shaft furnace is controlled and maintained at 800–1000° by withdrawing part of the gas (mainly N_2 and SO_2) from the top of the zone and, after cooling, returning it at a point just above the air inlet. Secondary air may be admitted in the upper section of the furnace to convert the S completely into SO_2 , or C may be added to the charge or CO mixed with the gases if S is the desired product.

L. A. COLES.

Manufacture of powdered metallic chloride. S. B. HEATH, Assr. to the DOW CHEM. CO. (U.S.P. 1,801,000, 14.4.31. Appl., 1.9.28).—The fused hydrated salt or its solution is sprayed into a cylindrical, rotary dryer into which are passed the gases from a furnace together with air admitted to the furnace. The gaseous current, containing in suspension finely-divided particles of the salt, is drawn by means of a fan through a separator, whence the salt is collected in a receiver, while the heavier portions of the salt become ultimately disintegrated in the dryer, which may be provided with stirring or abrading devices. To regulate the humidity of the exit gases and prevent absorption of H_2O by the salt, a portion of the hot combustion gases is mixed with them.

W. J. WRIGHT.

Production of nitrides of aluminium or magnesium from their minerals. C. G. MINER (U.S.P. 1,803,720, 5.5.31. Appl., 6.7.26).—After reduction of the metallic oxide at 1800–2200°, the uncooled gases and the vaporised metal are conducted to a separate reaction chamber into which a gas containing N_2 is introduced, the temp. in this chamber being lower than that in the reduction chamber, but higher than that at which the metal and reducing agent react to reproduce the oxide.

W. J. WRIGHT.

Uninterruptedly carrying out the precipitation of heavy-metal azides. J. MEISSNER (B.P. 359,659, 22.9.30. Ger., 25.9.29).—Solutions of Na azide and a heavy-metal salt are introduced into, and agitated in, a vessel forming the top portion of a cylindrical apparatus to effect precipitation and crystallisation. The mother-liquor and crystals flow from the bottom of this vessel over a series of baffle plates, thereby promoting the growth of the crystals, and ultimately leave the apparatus through an exit at the base. By means of a siphon communicating with the lower part of the apparatus,

excess of mother-liquor can be removed as required, the base exit being closed during this removal.

W. J. WRIGHT.

Manufacture of carbon and carbon dioxide from carbon monoxide. N. GRÜNSTEIN (B.P. 359,175, 3.10.30. Ger., 3.10.29).—The decomp. is effected in the presence of a metal catalyst, preferably Ni or Fe, deposited on a carrier which can be removed from the product by dissolution, *e.g.*, MgO , but which preferably consists of C; in this case the carrier remains in the product and the Ni or Fe is removed as its carbonyl, preferably after treatment of the mass with H_2 below 400°.

L. A. COLES.

Manufacture of hydrogen [from hydrocarbons]. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 359,620, 20.8.30).—Catalysts for the thermal decomp. of hydrocarbons comprise mixtures of at least two solid oxides free from compounds which are reduced to metals under the conditions of the process; *e.g.*, suitable mixtures comprise 100 pts. of Al_2O_3 and 60 pts. of ZrO_2 , or 100 pts. of MgO , 1 pt. of H_3BO_3 , and 1 pt. of ZrO_2 .

L. A. COLES.

Obtaining pure sulphur from substances containing sulphur by continuous operation. K. VON SZOMBATHY, K. KELL, and P. SCHMITZ (B.P. 358,935, 8.7.30. Switz., 8.7.29).—The S content is converted, *e.g.*, as described in B.P. 358,558 (B., 1931, 1140), into H_2S and SO_2 and the gases in the proportion 4–7 : 2 are led simultaneously into a vessel in which they are sprayed at 45–65° with a solution containing equal proportions of tetra- and penta-thionates and, preferably, 1–2% of glycerin. The solution, after filtration to remove S, is returned to the process.

L. A. COLES.

Simultaneous production of phosphorus and alumina. I. G. FARBENIND. A.-G. (B.P. 359,074, 26.7.30. Ger., 31.8.29).—Ores containing AlPO_4 are heated at a temp. above the m.p. of Al_2O_3 in an electric furnace in the presence of sufficient C to reduce the P_2O_5 and also the gangue so that TiO_2 , SiO_2 , Fe_2O_3 , etc. are reduced and the Ti and Si are removed as Fe alloys, Fe_2O_3 being added if there is insufficient in the ore. The Al_2O_3 is tapped off or removed as blocks from the furnace.

L. A. COLES.

Absorption of CO. Revivifying oil-treating agents.—See II. Reduction of Fe compounds.—See X. Basic Pb sulphate.—See XIII. Fertilisers.—See XVI. Hydrated CaO.—See XVIII. Ca gluconate preps.—See XX.

VIII.—GLASS; CERAMICS.

Decolorisation of glass. F. R. PESSERL (Sprechsaal, 1931, 64, 298–299; Chem. Zentr., 1931, i, 3155).—A discussion. With < 0.08% Fe, Co is employed; with more, Se in presence of 1.2–2.5% of ZnO is preferred.

A. A. ELDRIDGE.

Sulphuric acid content of plate glass during fusion. H. SALMANG and A. MERTEN (Glastechn. Ber., 1931, 9, 148–151; Chem. Zentr., 1931, i, 3155).—The SO_3 content of the furnace gases was 0.7% at the beginning of clarification, 0.47% after 3 hr., and 0.54% at the end. Addition of C causes decomp. of the SO_3 ; further

small diminution is due to thermal dissociation assisted by the action of SiO_2 . The SO_3 appears to be largely combined with CaO .
A. A. ELDRIDGE.

Solubility of glasses in water in relation to their composition. III. Comparison of existing solubility data on $\text{Na}_2\text{O}-\text{CaO}-\text{SiO}_2$ glasses. I. S. MORIYASU (J. Soc. Chem. Ind., Japan, 1931, 34, 358—361 B).—The ratio of total wt. of glass dissolved to wt. of Na_2O extracted is a function of time, temp., and amount of solvent, but for practical purposes is nearly const.

E. S. HEDGES.

Mechanics of enamel adherence. I. Technique of preparing enamel metal sections for microscopic analysis. J. O. LORD and W. C. RUECKEL. **II. Effect of composition and firing atmospheres on the adherence of ground-coat enamels.** W. C. RUECKEL and R. M. KING. **III. Enamels on copper: nature of their adherence.** W. K. CARTER and R. M. KING (J. Amer. Ceram. Soc., 1931, 14, 777—781, 782—788, 788—794).—I. The section, cut at an angle to expose greater cross-section, is mounted in sealing wax and ground, with a movement always from enamel to metal, on a wheel covered with levigated Al_2O_3 and paraffin. The final polishing is carried out on broadcloth. In this way the softer enamel is kept level with the metal and no misleading ridges are formed. Examples of the false appearances of badly-prepared sections are given.

II. Experiments were made on two series, viz., a commercial ground-coat enamel known to be satisfactory and a simple $\text{Na}_2\text{O}-\text{B}_2\text{O}_3-\text{SiO}_2$. The adherence (measured by impact and flexure tests) of an enamel is not due to a rough surface on the metal and a penetration by the enamel. Small amounts of CoO (max. effect at 1.25%), NiO , and Mn_3O_4 in the commercial enamel improve the impact strength. In the simple glass, CoO has a max. effect at 5% and NiO at 2.5%. In general, firing in an atm. of O_2 or N_2 decreases the impact-resistance of commercial enamels, but increases that of simple enamels.

III. Standard steel ground-coat enamels coat satisfactorily on Cu. Enamels containing CoO adhere to steel better than to Cu when judged by impact tests, but not as well when judged by bend tests. Enamels containing NiO adhere to steel better than to Cu according to impact tests, and better to Cu than CoO enamels judged by both impact and bend tests. Mn_3O_4 enamel give only a slight adherence to Cu, and the best adherence was given by a black, commercial, high-Pb enamel and the standard white cover-coat. Addition of CoO decreases the adherence of the cover-coat.

J. A. SUGDEN.

Melting relations of potash felspar, soda felspar, and flint mixtures. C. R. AMBERG and J. L. GALUP (J. Amer. Ceram. Soc., 1931, 14, 733—738).—No deformation eutectic was found in either potash felspar-flint or soda felspar-flint systems. At least 20% of free SiO_2 can be added to potash felspar and up to 10% to soda felspar without appreciably affecting the deformation point; hence the use of the refractoriness as a criterion of the composition of a felspar is doubtful. The system soda felspar-potash felspar shows the presence of some (ill-defined) eutectic. In the ternary system with flint,

however, the eutectic nature of the curve becomes more pronounced as the flint corner is approached.

J. A. SUGDEN.

Colemanite as glaze material. M. M. FRENCH (J. Amer. Ceram. Soc., 1931, 14, 739—741).—It is possible to produce good, raw, leadless, insol. glazes to fire at least as low as cone 04, by using colemanite ($\text{CaO} \cdot 1.5\text{B}_2\text{O}_3$) together with kryolith ($\text{Al}_2\text{O}_3 \cdot 3\text{Na}_2\text{O}$). These glazes are less liable to craze than other raw leadless glazes at this temp. Matt and coloured glazes are possible.

J. A. SUGDEN.

Overglaze polychrome cone no. 6. A. M. STRUSHOLM (J. Amer. Ceram. Soc., 1931, 14, 751—754).—Full details of the prep., application, and glaze firing of satisfactory glazes and a wide range of colours are given.

J. A. SUGDEN.

Crazing in terra-cotta glazes. C. W. PLANJE (J. Amer. Ceram. Soc., 1931, 14, 747—750).—The tendency of a fritted Pb glaze to craze was decreased by replacing the ZnO content by SnO_2 , using Cornish stone in place of flint and clay, and adding small amounts of B_2O_3 .

J. A. SUGDEN.

Metallised terra cotta. M. BARRETT (Trans. Ceram. Soc., 1931, 30, 315—320).—The technique of spraying terra cotta with various metals by means of a pistol is described.

J. A. SUGDEN.

Properties of some North Dakota bentonites. F. L. HAMMERS and W. E. BUDGE (J. Amer. Ceram. Soc., 1931, 14, 742—746).—Measurements of swelling, osmotic pressure, loss in wt., dye adsorption, and H_2O -softening tests were made.

J. A. SUGDEN.

Possibilities of sillimanite for use in extrusion dies. P. W. DAGER and A. G. BETTELEY (J. Amer. Ceram. Soc., 1931, 14, 706—708).—Sillimanite dies for extrusion of plastic columns gave twice as long a life as the best metal tested and the quality of the extruded column was also better.

J. A. SUGDEN.

Iron compounds as mineralisers in the transformation of kaolinite into mullite and of quartz into tridymite. P. P. BUDNIKOV and W. G. POPOV (Feuerfest, 1931, 17, 145—146).—The addition of small quantities of ferruginous material, e.g., Fe blast-furnace dust, open-hearth slag, or Fe foundry slag, to the mix used for the manufacture of kaolinite and SiO_2 bricks accelerates the transformation into mullite and tridymite, respectively, during burning and increases the strength and refractoriness of the bricks.

A. R. POWELL.

Resistance of single clay bodies to the action of steam. C. L. DEEDS (J. Amer. Ceram. Soc., 1931, 14, 770—772).—Twelve whiteware bodies were made up with one clay in each body. Autoclave tests showed that bodies with the lower adsorption have the lesser tendency to craze, but those of equal adsorption may differ greatly in crazing tendency. The structure of the clay itself is an important factor.

J. A. SUGDEN.

Shrinkage observations on a porcelain body. M. H. HUNT (J. Amer. Ceram. Soc., 1931, 14, 773—776).—Rods and tubes show an increasing shrinkage from the bore diam. to the outside diam. The solid rods showed a more uniform shrinkage, but the method of making

greatly influences the amount of shrinkage, and the pieces exhibit an increasingly uniform shrinkage in the order pugged (extruded), thrown, wedged or tamped, and cast.

J. A. SUGDEN.

[Clayware] drying and dryer operation. J. T. ROBSON (J. Amer. Ceram. Soc., 1931, 14, 709—715).—The causes of various types of drying faults are discussed in detail, and data obtained in the running of several types of dryers are recorded. J. A. SUGDEN.

Accelerating the drying of ceramic products.

P. P. BUDNIKOV, G. V. KUKOLEV, and E. L. MANDELGRÜN (Tonind.-Ztg., 1931, 55, 409—411; Chem. Zentr., 1931, i, 3155—3156).—Coagulants, e.g., 0.25% $Al_2(SO_4)_3$ and 0.5% $FeSO_4$, are added. A. A. ELDRIDGE.

Difficulties in firing white ware. J. T. ROBSON (J. Amer. Ceram. Soc., 1931, 14, 716—724).—A biscuit body with an average adsorption of 0.37% gave good glazed ware, but certain batches with an average adsorption of 1.48% blistered badly. This was due to volatilisation from the thicker glaze on the more porous body which picked up more glaze during dipping. The formation of "dry" edges on vitrified china was traced to adsorption of the volatilised glaze by the wadding. This trouble was overcome by reducing the amount of wadding and increasing the Pb content of the sagger wash. Pyrometric cones give the best results only when care was taken to set them uniformly. A suitable setting guide is illustrated. The appearance of Fe spots during the glost firing of a semi-vitreous ware was traced to the fact that the heating schedule had been speeded up so much that not enough time was allowed for the oxidation period, and reducing conditions had prevailed. These conditions caused adsorption of Fe from the sand in which the ware was set. Holes cut in the saggars to admit more air eliminated the trouble. The same modification overcame similar difficulty in firing pink ware. In precipitating $CoCO_3$ for glaze prep, the ppt. should be well washed to remove sol. salts which, during drying, may be conc. over areas where drying is most rapid. This causes patches of varying colour and lustre.

J. A. SUGDEN.

Researches in dry-press refractories. III. Effect of vacuum on the unfired properties of some dry-press refractory batches. W. C. RUECKEL (J. Amer. Ceram. Soc., 1931, 14, 764—769; cf. Birch, B., 1931, 65).—Pressures of 5000 lb./sq. in. now obtainable in present-day press installations cannot be used (except with a longer cycle) owing to "pressure-cracking." This trouble is largely eliminated by evacuation during pressing; at the same time the properties of the brick are thereby improved. Details of a press equipped for forming brick in vac. are shown. J. A. SUGDEN.

Refractory materials for electric furnaces. III. Nickel and its alloys. A. B. SEARLE (Metal Ind., London, 1931, 38, 569—571).—A discussion. The properties required in bricks for electric furnaces in which Ni and its alloys are melted are indicated.

CHEMICAL ABSTRACTS.

Missouri hard flint clay firebrick. M. E. HOLMES and A. J. PAUL (J. Amer. Ceram. Soc., 1931, 14, 755—763).—Satisfactory bricks were made from a clay which, owing to its low bonding power and high shrinkage, had

been used only in admixture with other clays. The unweathered clay was mixed with 20% of its own grog and dry-pressed at 1400 lb./sq. in. The addition of 4% of bentonite increased the bonding strength at the expense of lowering the refractoriness from cone 34 to 33. Many experimental bricks were made and the results of spalling, strength (hot and cold), porosity, shrinkage, and after-contraction tests are recorded.

J. A. SUGDEN.

Determination of true silicon in carborundum.

E. W. CHEESBROUGH (Chemist-Analyst, 1931, 20, No. 4, 7).—The total Si is determined by fusion with 10 pts. of Na_2CO_3 (97.5%) and KNO_3 (2.5%); the Si as SiC is then determined by treating the material with H_2SO_4 and HF and fusing the residue.

CHEMICAL ABSTRACTS.

PATENTS.

Refining of glass and the like. A. FOURLINNE (B.P. 359,801, 19.12.30. Belg., 2.1.30).—The fused glass flows into the central cavity of a rotating pot and escapes through peripheral ducts leading to a common duct below, whence it issues as a jet. The apparatus is heated externally, and also internally by the passage of hot gases through ducts parallel to the discharge ducts.

L. A. COLES.

Treatment of ceramic and other articles in tunnel kilns or furnaces. HARROP CERAMIC SERVICE Co. (B.P. 359,428, 14.7.30. U.S., 10.4.30).—The furnace gases are introduced into the middle firing zone through overlapping staggered ports so as to produce a whirling vortex of the hot gas inside the kiln; cold air is introduced into the far end of the cooling zone, but the greater part is withdrawn before it reaches the firing zone. The walls of the preheating zone, which are built close to the article settings, are provided on both sides with staggered inset panels to distribute the gases laterally into the settings.

L. A. COLES.

Production of [insulating] enamel coatings [e.g., for resistance coils]. INTERNAT. GEN. ELECTRIC Co., Inc., Assees. of ALLGEM. ELEKTRICITÄTS-GES. (B.P. 359,758, 19.11.30. Ger., 21.11.29).—The coils etc., coated with a thick layer of enamel composition, are rotated about their longitudinal axes in a furnace maintained at about 40° above the normal vitrifying temp. of the enamel.

L. A. COLES.

Production of abrasive compositions. CELLULOSE CORP. (B.P. 359,324, 16.1.31. U.S., 16.1.30).—The compositions, which are moulded under heat and pressure, comprise 100 pts. of an org. cellulose derivative, e.g., cellulose acetate, 25—75 pts. of a plasticiser or modifier, and 100—1000 pts. of abrasive material; fire-resisting agents (Ph_3PO_4 , $CaSO_4$, AlF_3), pigments, and volatile solvents may also be added. L. A. COLES.

[Installation for] manufacture of glassware. W. J. MILLER, INC. (B.P. 359,456, 17.7.30. U.S., 26.7.29).

* **Apparatus for gathering and delivering molten glass.** HARTFORD-EMPIRE Co., Assees. of K. E. PEILER (B.P. 359,489, 18.7.30. U.S., 21.8.29).

Pottery mouldings.—See IX. **Metal-to-glass seals.**—See X.

IX.—BUILDING MATERIALS.

Hydration of cements. VII. Hydro-expansion of cement grains. T. YOSHIOKA, K. KUMAGAE, and H. IJIMA (*J. Soc. Chem. Ind., Japan*, 1931, 34, 408 B).—The hydration of cement grains is accompanied by expansion of the cement (hydro-expansion) but a contraction of the total vol. of the system cement-water. The hydro-expansion of Portland cement is 50% and the contraction of the whole system 5%. The decrease of vol. forms the best means of measuring the swelling of the cement phase, and data have been obtained for various cements. The swelling occurs rapidly at first and continues slowly for more than 30 weeks, the magnitude of the change varying with the kind of cement. Blast-furnace slag undergoes hydro-expansion in $\text{Ca}(\text{OH})_2$ solution, but only slightly in H_2O .

E. S. HEDGES.

Hydrothermal synthesis of calcium silicates under ordinary pressure. I. S. NAGAI (*J. Soc. Chem. Ind., Japan*, 1931, 34, 378—381 B).—Mixtures of finely-divided CaO and SiO_2 were heated at high temp. in superheated steam and air. $3\text{CaO}, 2\text{SiO}_2$ was produced at temp. between 600° and 800° and $2\text{CaO}, \text{SiO}_2$ at 900 — 1100° . CaO, SiO_2 was not produced under these conditions.

E. S. HEDGES.

Improvement of the strength of cement. T. YOSHIOKA and H. IJIMA (*J. Soc. Chem. Ind., Japan*, 1931, 34, 409 B).—The strength of 1 : 3 Portland cement-standard sand mortars is increased by replacing 5—20% of the Portland cement by finely-divided, chemically inert substances such as cryst. limestones, clays, etc.

E. S. HEDGES.

New wood preservative of general utility. R. FALCK and S. KAMESAM (*Chem.-Ztg.*, 1931, 55, 837—838).—A mixture of As_2O_5 and $\text{K}_2\text{Cr}_2\text{O}_7$ (1 : 1.25—1 : 1.75) is the best wood preservative hitherto investigated, being highly toxic to moulds and termites, inactive towards Fe, and cheaper, more easily handled and transported, and producing a less inflammable and more easily painted wood than creosote. Wood impregnated with a 2% solution, dried, and washed with 20,000 pts. of distilled H_2O for 6 hr. yielded no As or Cr to the liquid; when, however, the ratio was 1 : <1.25 or 1 : >1.75, As or Cr was dissolved, respectively. The As_2O_5 is replaceable by As_2O_3 or Na_3AsO_4 , which are less toxic (especially As_2O_3) though cheaper; $\text{K}_2\text{Cr}_2\text{O}_7$ is replaceable by CrO_3 (e.g., $\text{As}_2\text{O}_5 : \text{CrO}_3 = 1 : 0.75$) or by K_2CrO_4 (cf. B.P. 2972 of 1912; B., 1912, 1079).

J. GRANT.

PATENTS.

Cement kiln. J. C. BUCKBEE (U.S.P. 1,800,247, 14.4.31. Appl., 5.3.29).—A cement kiln is surrounded by an outer shell (having plates which form a number of longitudinal passages in the annular chamber) which extends around the cooling portion of the kiln. The latter portion is formed from a number of overlapping longitudinal plates mounted on a frame so as to leave tangentially disposed slots. Air is blown through the annular chamber and enters the cooling chamber through the slots, and it is arranged by means of two blowers that the pressure is higher over the arc on which the clinker rests than at the unobstructed upper part of the cooling

chamber. The heated air is then utilised for combustion.

C. A. KING.

Rotary tube furnace for calcining cement and the like. F. KRUPP GRUSONWERK A.-G. (B.P. 359,277, 4.12.30. Ger., 6.12.29).—A water-cooled baffle-plate is hung from the head of a tube furnace opposite to the gas outlet. The inclination is fixed, but the baffle is movable either towards or from the tube or in its own plane.

C. A. KING.

Apparatus for heating cement raw material. D. J. UHLE and M. E. GRUNEWALD (U.S.P. 1,801,467, 21.4.31. Appl., 2.2.29).—Waste gases from a rotary kiln pass into a separate chamber which contains an elongated preheating tube. Powdered raw material is fed mechanically into the tube, which discharges direct into the rotary kiln.

C. A. KING.

Production of cement, lime, or the like. A. BUES (B.P. 359,080, 30.7.30).—The raw-material sludge is atomised downwardly in a shaft furnace and meets the combustion gases of fuel and air atomised upwardly.

C. A. KING.

Manufacture of Portland cement. R. D. CHEESMAN (U.S.P. 1,802,196, 21.4.31. Appl., 22.8.28).—The moisture liberated from $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ by the heat of grinding is removed by passing a current of air through the mill in which Portland cement clinker (or cement-making material) is being ground with gypsum containing H_2O of crystallisation. The discharge end of the usual compound tube mill is connected upwardly to a dust collector and thence to a fan, and downwardly to a chute in which a rotating element permits the discharge of the ground material, but acts as a valve against admission of air.

F. YEATES.

Pretreatment of raw material mixed for cement burning. J. S. FASTING (B.P. 358,621, 24.7.30).—Carriers, e.g., chains or corrugated metal, are dipped in, or sprayed with, raw cement slurry and are moved through a chamber independent of the kiln, but through which the waste kiln gases pass, thereby drying and partly calcining the charge.

C. A. KING.

Manufacture of cement. M. T. J. LÉPINE (B.P. 358,096, 3.7.30).—The constituents of Portland cement are burned at a much lower temp. than normal, in the presence of an alkali, e.g., NaOH , K_2CO_3 , or NH_3 , a slightly reducing atm. of H_2 or CO , and steam. Fe, Pt, and Ni act as catalysts favourable to the reaction. The addition of Fe oxide which has been heated in the presence of the former reagents is claimed to improve cement produced under ordinary conditions.

C. A. KING.

Grinding of material [Portland cement]. G. A. WITTE, ASSR. to INTERNAT. PRECIPITATION Co. (U.S.P. 1,803,821, 5.5.31. Appl., 8.6.27).—By grinding Portland cement in air of lower R.H. than that of the atm., conveniently attained merely by heating the air and/or the cement, the grinding time for a certain fineness is much reduced and the setting times are maintained.

B. M. VENABLES.

Oxychloride composition [for cement, pottery mouldings, etc.]. T. HUGHES (B.P. 359,031, 17.7.30).—A cement consisting of a mixture of an oxide of a metal

(Mg, Zn) forming an oxychloride with the corresponding chloride, a sol. sulphate of a similar type of metal, CaCl_2 , and a protein. Such material may be formed by mixing fused CaCl_2 111, anhyd. MgSO_4 120, calcined magnesite (80% MgO) 250, and casein 10 pts. by wt., together with suitable pigments and fillers. C. A. KING.

Wall plaster. G. R. WALPER (U.S.P. 1,803,445, 5.5.31. Appl., 22.12.28).—Gypsum shale is used instead of sand in making a plaster mixture comprising calcined gypsum, coarser particles of virgin gypsum shale of a suitable size to provide internal support, and particles of calcined gypsum of substantially the same size. F. YEATES.

Treatment of walls, partitions, etc. to prevent the formation of efflorescence. E. GARAPON (B.P. 357,365, 16.9.30. Fr., 16.9.29).—The walls are scaled, brush-washed with aq. CH_2O (0.04% solution), left to dry, coated with cement or lime mixed with this CH_2O solution, and then covered with plaster in 0.04% aq. CH_2O containing alum. H. ROYAL-DAWSON.

Manufacture of constructional material [production of coloured surfacing granules]. D. FINLEY, ASSR. to PARAFFINE COMPANIES, INC. (U.S.P. 1,802,008, 21.4.31. Appl., 26.7.26).—Mineral granules are mixed dry with S and inorg. colouring matter (e.g., Cr or Fe oxide) and simultaneously heated and agitated in a furnace at 115–175°. The S liquifies and coats the granules with the colouring matter, fixing and preserving it indefinitely. Mixtures of pigments may be used, and ZnO added to lighten one colour or ultramarine-blue to counteract the colour of the S. F. YEATES.

Expansion-joint material [for building and paving construction]. A. C. FISCHER, ASSR. to PHILIP CAREY MANUFG. CO. (U.S.P. 1,803,178, 28.4.31. Appl., 7.12.25).—A resilient, plastic, jointing material is composed of clay 70–95%, non-drying oil 4–25%, and uncoagulated latex 1–5%. Colourless oils are preferred and the latex may be partly or wholly replaced by polymerised oils, waterproof glues, or other similar viscous materials. C. A. KING.

Sound-absorbing material. JOHNS-MANVILLE CORP., ASSEES. of J. H. NASH (B.P. 358,995, 10.6.30. U.S., 11.6.29).—Fibrous material, e.g., felt, is faced with a layer of non-combustible granular material having large void space. C. A. KING.

Bituminous road materials. C. A. AGTHE (B.P. 358,974, 10.7.30. Ger., 13.7.29).—A cold-working binding agent is produced by thinning bitumen with a volatile diluent at least partly sol. in H_2O , in particular with COME_2 or an alcohol. C. A. KING.

Manufacture of materials for road construction. C. A. AGTHE (B.P. 358,142, 10.7.30. Ger., 13.7.29).—The binder used in making a rough-surfaced roadway is produced by softening petroleum or natural bitumen (m.p. > 55° Krämer-Sarnow) with a tar-oil fraction of b.p. 150–400° and incorporating a small proportion of rubber, preferably in solution. The mixture may be emulsified before application. C. A. KING.

Lime-slaking machines. E. J. SHAUT, H. R. BAKER, and P. S. DICKINSON (B.P. 359,853, 4.3.31).

Manufacturing [moulding of] artificial stone, specially applicable to concrete tiles. R. ABRAHAM, LTD., and R. A. ABRAHAM (B.P. 359,928, 23.7.30).

Heat-exchange apparatus.—See I. Bituminous composition.—See II. Rubber flooring etc.—See XIV.

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

Protection, by cathodic polarisation, of iron in aerated saline solutions. E. HERZOG and G. CHAUDRON (Compt. rend., 1931, 193, 587–589).—Using the pile described previously (B., 1931, 582) and a device for determining the potential of either electrode relative to the normal calomel electrode, the addition to the cathode compartment of salts of Zn, Pb, Ni, Co, Mn, Cr, or Mg results in the formation on the cathode of a coating, and a rapid approximation of the potential of the cathode to that of the anode. Some of the salts also produce a coating on the anode, but effect little change in its potential, though causing marked increase in resistance. C. A. SILBERRAD.

Effect of molybdenum on graphitisation of white cast iron. J. H. JENNINGS, JUN., and E. L. HENDERSON (Metals and Alloys, 1931, 2, 223–225).—Alloys containing 1–5% Mo have been made in the induction furnace from white cast Fe and Fe-Mo (63% Mo) and have been annealed for various periods at 705° and 930°. The time necessary to effect both primary and secondary graphitisation was inversely proportional to the Mo content, an alloy containing 5% Mo not being completely graphitised in 4 times the period required by the original white Fe. Additions of Mo also appear considerably to refine the grain size of cast Fe. E. H. BUCKNALL.

Mechanical and creep properties of molybdenum-cast iron. C. H. LORIG and F. B. DAHLE (Metals and Alloys, 1931, 2, 229–235).—Additions of Mo to cast Fe result in improved mechanical properties at room temp. and at 450°. Alloys containing 0.8% Mo also have high creep-resistance at 700°, comparing favourably with some steels. The resistance to wear is also increased by addition of Mo. E. H. BUCKNALL.

Quantitative X-ray analysis of iron alloys. S. SHIMUR and M. TAKASU (J. Iron Steel Inst. Japan, 1930, 16, 961–970).—With Fe-Mn-Ni alloys the results were largely in error (Mn 0–25%, Ni 0.5–15%).

CHEMICAL ABSTRACTS.

Determining the cleanness of a heat of steel. S. ERSTEIN (Metals and Alloys, 1931, 2, 186–191).—By careful sampling and microscopical examination, according to a method described, a figure can be obtained which represents a fair val. for the content of non-metallic inclusions in a heat of steel. E. H. BUCKNALL.

Electrical resistivity of certain copper alloys in the molten state. C. S. WILLIAMS (Metals and Alloys, 1931, 2, 240–241).—Measurements have been made of the resistance of hollow cylinders of alloys contained between a refractory rod and a silica heath. Alloys containing 2% and 4% Sn in Cu yield resistivity-temp. curves parallel to that for Cu, whilst the Cu-Zn alloys give less regular results. E. H. BUCKNALL.

Oxidation—a cause of porosity in leaded bronze. E. DOUGHTY (Metals and Alloys, 1931, 2, 181—183).—A defect frequently met in hollow Pb-bronze bearings is a ring of discoloured holes near the position of the core in casting. The defect appears to be caused by reaction between Pb oxides in the alloy and carbonaceous matter in the core, and may be avoided by judicious deoxidation of the melt with Zn or Cu_3P or by coating cores with a non-porous material, *e.g.*, plaster of Paris.

E. H. BUCKNALL.

Adherence of lubricants to metals. A. BOUTARIC and R. AMIOT (Compt. rend., 1931, 193, 593—594).—The rate at which various oils flow off uniform-sized plates of Cu, Fe, Al, and an unoxidisable steel, determined by plotting wt. of adhering oil against time, decreases, and the limiting weight (π) increases with viscosity of the oil, but π is slightly greater for vegetable oils than for mineral oils of equal viscosity. Accelerated results, obtained by centrifuging, are expressed by the relation $1/(p - \pi) = 1/(p_0 - \pi) + mt$, where p is the wt. of oil adhering after time t , p_0 the initial wt., and m a const. For non-acid oils, such as most lubricating oils, π and m depend solely on the viscosity of the oil, being independent of its nature or of that of the plate. Acid oils give higher values of π for Cu and Fe, but not for Al or steel.

C. A. SILBERRAD.

Metallography with polarised light. J. S. G. PRIMROSE (Metallurgia, 1931, 5, 9—11).—A description of the use of the Reichert "opaque illuminator."

Rust- and acid-resisting steels from the standpoint of the chemical engineer. W. H. HATFIELD (Ind. Chem., 1931, 7, 477—479).

Tunis plant of the Coley process of zinc manufacture. D. W. ROSKILL (Ind. Chem., 1931, 7, 449—452).

Enamel adherence. Metallised terra cotta. Ni and its alloys.—See VIII. **Painting of Fe.**—See XIII. **Solubility of Cu in milk.**—See XIX. **Containers for tooth paste.**—See XXIII.

PATENTS.

Furnaces for the reduction of iron oxides and other iron compounds. M. AMOROSO, and SOC. ANON. METALFER (B.P. 358,481, 2.7.30. Italy, 3.7.29).—A furnace chamber contains a hopper in which a mixture of Fe ore and a reducing agent is heated, *e.g.*, by oil, to the reduction temp. From the hopper the heated material passes through the magnetic field of two horse-shoe magnets having exciting coils outside the furnace.

C. A. KING.

Metallurgical furnace process. T. B. STILLMAN, Assr. to BABCOCK & WILCOX Co. (U.S.P. 1,800,669, 14.4.31. Appl., 22.4.26).—The hearth of a melting furnace is heated more uniformly by introducing atomised fuel oil at one end in the form of a cone with a relatively small angle, *e.g.*, 30° . The air for combustion surrounds the oil spray and is so regulated that part of the oil has progressed a considerable distance into the furnace before combustion is completed.

C. A. KING.

Cupola. C. G. HAWLEY, Assr. to CENTRIFIX CORP. (U.S.P. 1,801,045, 14.4.31. Appl., 24.7.26).—A dust-

catching chamber with suction fan is mounted on a truck which runs on rails in alignment with the top of a series of intermittently operated cupolas.

C. A. KING.

Sintering machine. E. W. SHALLOCK, Assr. to AMER. ORE RECLAMATION Co. (U.S.P. 1,800,571, 14.4.31. Appl., 16.7.28).—In a continuous sintering furnace of the Dwight-Lloyd type, a frame carrying a number of friction shoes is fitted so that light friction applied to the palettes on the return track ensures continuous contact of the palettes without any leakage of the material.

C. A. KING.

Continuous furnaces for heat treatment of hollow metal articles [e.g., cartridge cases]. K. (FRÄU.) VON GILLERN, A. (FHR.) VON GILLERN, M. NATHUSIUS, and M. NATHUSIUS (POLTE), and H. OESTERLIN (B.P. 359,017, 14.7.30).—The articles, having one closed end, are delivered from the making machine on to a chain conveyor with the closed end in the forward position. The motion of the conveyor is such that the shells enter the furnace liquid seal so that they are filled with the liquid and leave it drained of the sealing liquor. They are then passed through the heating chamber and slide down a chute into another sealing chamber from which they are collected in any arrangement by a conveyor.

C. A. KING.

Metal transfer and heating mechanism. W. H. HOLT (U.S.P. 1,801,349, 21.4.31. Appl., 6.10.27).—A preheating furnace is arranged near to an open-hearth or reheating furnace so that billets or bars may be moved on a conveyor in a direct line for preheating and forward to be discharged on to the hearth of the melting furnace. The waste gases from this furnace are used to preheat the billets.

C. A. KING.

Electric smelting furnace. E. DYER and R. E. SUTHERLAND, Assr. to MINERAL POWER Co. (U.S.P. 1,800,721, 14.4.31. Appl., 2.11.28).—Materials to be smelted are fed through a relatively narrow passage between refractory-lined walls of the furnace and so pass through arcs between suitably disposed electrodes. In one form the narrow channel may be formed between the external walls and an internal rotary disc, an electrode being maintained automatically in arcing contact with the disc. Tapping holes are provided at different levels, and the furnace is operated under reduced pressure to recover volatile products.

C. A. KING.

[Electro-magnetic] heat-treating apparatus [for metals]. C. R. G. STEWART and C. J. ZERN, Assrs. to WESTERN ELECTRIC Co. (U.S.P. 1,800,912, 14.4.31. Appl., 15.11.26. Renewed 23.9.30).—Magnetic materials (Fe) are heated in a bath of metal, *e.g.*, Pb, of higher sp. gr. than that of the material to be treated, and are retained at the bottom of the molten bath by magnetic means until the crit. temp. is reached at which the material becomes non-magnetic.

C. A. KING.

Metal-to-glass seals. ASSOCIATED ELECTRICAL INDUSTRIES, LTD., Assces. of H. SCOTT (B.P. 358,934, 7.7.30. U.S., 5.7.29).—Alloys for sealing electrical conductors into borosilicate or Pb glass comprise Fe, Ni, Co, and Mn in proportion such that $[\%Ni + 2.5(\%Mn) + 18(\%C)]/\%Fe = 0.50-0.60$; *e.g.*, the alloy contains 23—45% Ni, 5—23% Co, 0—1% Mn, 0—0.3% C, and

the remainder Fe. Alloys suitable for use with glasses of given composition are described. L. A. COLES.

[Chromium]-plating of wire. C. P. BROCKWAY, Assr. to WORLD BESTOS CORP. (U.S.P. 1,803,691, 5.5.31. Appl., 28.11.28).—Wire is passed continuously through apertures in a series of positively charged electrodes while immersed in a bath of plating solution. The wire is charged negatively at points near to the electrodes, the object being to apply firstly a light plating and at a later stage a denser and heavier coating.

C. A. KING.

Casting metals in metal moulds or dies. METAL CASTINGS, LTD., and F. W. MCCONNELL (B.P. 359,565, 26.7.30).

[Heat-treatment] furnaces. Gaseous treatment of ores. Ore-separating machines. Metallurgical filter.—See I. Ornamented rubber[-metal] surfaces. See XIV.

XI.—ELECTROTECHNICS.

Selecting equipment for electrostatic precipitation [in gases]. R. H. KAUFMANN (Chem. & Met. Eng., 1931, 38, 570—572).—In the precipitator through which the gas passes at low velocity are positive electrodes of large area, generally pipes or plates which are earthed, and negative electrodes, usually insulated wires. The suspended matter is deposited on the positive electrodes. A d.c. potential of 25,000—75,000 volts is required and individual units of 15 and 25 kv.-a. are indicated. To increase the freedom from arc-over at a given current a drooping-voltage characteristic should be introduced into the power-supply unit by the addition of series resistance or reactance. To protect the apparatus from electrical oscillation a damping effect in the form of series resistance should be used, but this should not be excessive or unnecessary loss of efficiency will result. Fractional precipitation can be applied by treatment at high temp. at which only a portion of the material is solid and then treatment at successively lower temp.

D. K. MOORE.

Refractories for furnaces.—See VIII. Protecting Fe. Resistivity of molten Cu alloys.—See X. Measurement of p_H of foods.—See XIX.

PATENTS.

High-frequency induction furnaces. SIEMENS & HALSKE A.-G. (B.P. 359,343, 13.2.31. Ger., 20.3.30. Addn. to B.P. 291,774; B., 1929, 101).—The conductors of the external layer of the primary winding are formed as tubes insulated from one another, and each is supplied with a separate stream of cooling fluid.

J. S. G. THOMAS.

[Heaters for] electric furnaces and ovens. J. P. D. COLEMAN, and WILD-BARFIELD ELECTRIC FURNACES, LTD. (B.P. 359,104 15.8.30).—The ends of U-shaped rods, supported within the furnace at spaced intervals so that substantially the whole length of the rod within the furnace is exposed, project through the furnace wall.

J. S. G. THOMAS.

[Electrical] condensers. C. H. STAVE (B.P. 359,549, 24.7.30).—Plates comprising a metal of high resistance, e.g., steel, coated with a metal of low resistance, e.g., Cu, are spaced by thermo-plastic material, e.g., Bakelite.

J. S. G. THOMAS.

Electric[-discharge daylight] lamps. GEN. ELECTRIC CO., LTD., Assees. of PATENT-TREUHAND-GES. F. ELEKTR. GLÜHLAMPEN M.B.H. (B.P. 359,875, 24.4.31. Ger., 28.6.30).—One or more discharge tubes filled, respectively, with a mixture of a rare gas and Hg and with Cd vapour, and one or more electric incandescence lamps are arranged in a housing having translucent windows and a phosphorescent lining. J. S. G. THOMAS.

[Filling for] gas-filled electric lamps. VEREIN. GLÜHLAMPEN U. ELEKTRICITÄTS A.-G. (B.P. 359,749, 10.11.30. Austr., 8.8.30).—A gas filling, e.g., a mixture of Kr, Xe, and N₂, having a mol. wt. at least one third that of the material of the filament, e.g., W, is used at a pressure < 10 mm. Hg. J. S. G. THOMAS.

Impregnation [in vacuo] of dielectric materials. GEN. ENG. CO. (RADCLIFFE), LTD., S. TAYLOR, and W. BROWN (B.P. 358,872, 4.4.30. Addn. to B.P. 313,987).—Dielectric material is washed with EtOH in an impregnator, which is then evacuated to remove the EtOH, as the first stage of impregnation in accordance with the prior patent. J. S. G. THOMAS.

Rectifier system for feeding electric arc furnaces from alternating current. A.-G. BROWN, BOVERI, & COE. (B.P. 360,288, 2.2.31. Ger., 1.2.30).

Mercury-vapour electric-discharge devices with two cooling systems. F. LUTZ (B.P. 360,407, 30.5.30. Ger., 29.6.29).

[De-ionising screen for] mercury-vapour rectifiers. BRIT. THOMSON-HOUSTON CO., LTD. From GEN. ELECTRIC CO. (B.P. 359,587, 29.7.30).

Glow-discharge lamps. J. L. BAIRD, and TELEVISION, LTD. (B.P. 359,054, 13.9.30).

[Quartz] piezo-electric devices. L. G. LEVY, D. W. WEST, and J. ROBINSON (B.P. 359,567, 26.7.30).

Manufacture of [electric] insulating bands [of obliquely-woven, lac-impregnated fabrics]. L. MELLSHER-JACKSON. From SIEMENS-SCHUCKERTWERKE A.-G. (B.P. 360,454, 22.7.30).

Temp. control. Indicating rate of combustion. Heating liquids. Automatic regulation for mixing gases etc. Gas-analysis apparatus. Eudiometer.—See I. Resistance coils.—See VIII. Furnaces for reducing Fe ores. Smelting furnace. Heat-treating apparatus. Metal-to-glass seals.—See X. Rubber articles. Vulcanisation of rubber.—See XIV. Bleaching molasses.—See XVII.

XII.—FATS; OILS; WAXES.

Soap boiling. III. Fitting process. I. Y. KAWAKAMI (J. Soc. Chem. Ind., Japan, 1931, 34, 398—400 B; cf. B., 1931, 982).—The vols. at equilibrium of neat soap, nigre, and lye of soap (tallow 80%, coconut 20%)—brine mixtures after settling for 1—2 days at 99° are plotted against concentration of NaCl. The "limiting fitting concentration" (F) is defined as the max. concentration of electrolyte in neat soap-nigre equilibrium (cf. Merkle's "limited lye" in soap-lye equilibrium). The relation of F to the concentration of the soap solution and its variation with the composition (% tallow) of the soap is shown. The same fitting equilibrium exists when NaOH or mixed electrolytes

are used for salting out, if the total electrolyte concentration is taken with equiv. reduction concentration for NaCl (1 NaOH \equiv 1.15 NaCl). Glycerol reduces the sensitivity of the soap solution towards the electrolyte (*i.e.*, F increases). Equilibria for 50% solutions of 13 soaps from different oils are plotted: the diagrams for soaps from old oils and for castor oil differ markedly from those for the ordinary fresh oils. E. LEWKOWITSCH.

Importance of the titre and fatty acid content of milled soaps. I. NIKOLAEV and N. SKVORTZOV (Masloboino Zhir. Delo, 1929, No. 10, 25—26).—The best milling results are obtained when the titre is $> 44^\circ$ and the fatty acid content $< 75\%$. CHEMICAL ABSTRACTS.

Determination of the unsaponified matter in soaps and unsaponifiable matter in oils. F. M. BIFFEN (Chemist-Analyst, 1931, 20, No. 4, 8).—Soap (5—10 g.) or saponified oil (0.5N-KOH in EtOH, refluxed, evaporated) in 100 c.c. of H₂O is shaken with 50 c.c. of Et₂O, 3 c.c. of EtOH being added carefully if a homogeneous emulsion is formed. The treatment with Et₂O is repeated twice, the extract being washed with three 20-c.c. portions of H₂O, evaporated, and dried (105° or 65° in vac.) CHEMICAL ABSTRACTS.

[Unsaponifiable value of] fat from eating chocolate. J. GROSSFELD [with P. MECHLINSKI, H. SEITH, and M. SCHNETKA] (Z. Unters. Lebensm., 1931, 62, 441—456).—To A g. of the filtered fat extracted in Et₂O from the chocolate (cf. B., 1931, 399) and to 1 c.c. of H₂O in a separate flask with B g. of pure BzOH or camphoric acid are added 25 c.c. of 0.5N-KOH in EtOH previously titrated with 0.5N-HCl (v c.c.), the amounts added being adjusted by weighing for accurate work. The two solutions are heated under reflux for 15 min., 20 c.c. of a mixture of 200 c.c. of 0.5N-HCl and 1 litre of 90% neutral EtOH are added, and the titration is finished with 0.05N-HCl in the presence of 0.3 c.c. of filtered 1% alkali-blue 6B in 90% EtOH. The end-point colour is given by a mixture of 15 c.c. of borate buffer solution of p_H 8.5 and 43 c.c. of 90% EtOH, to which methyl-red and Bismarck-brown are added to match the colour of the original soap solution, and then 0.3 c.c. of indicator. If x c.c. is the actual titration for the sample and y c.c. for the acid blank, and these corrected for the HCl in EtOH added are $a = (x + 33.3)/10$ and $b = (y + 33.3)/10$ c.c., respectively, then the sap. val. $S = BK(v - a)/A(v - b)$, with an accuracy of ± 0.05 (olive oil) to ± 0.3 (linseed oil). K is the acid val. of the BzOH (459.7) or camphoric acid (560.7), and a table is given relating S , v , and the wts. of fat and acid to be taken. Chocolate fats (23) fluorescing normally in ultra-violet light had S 192.4—194.8 (mean 193.7), and unsaponifiable matter 0.17—0.41 (mean 0.32%), both results corresponding with those found for expressed cacao fat (*loc. cit.*). For 14 fats from milk chocolates, the figure for S — (1.5 \times butyric acid val.) was 192.2—194.9 (mean 193.8), and for the unsaponifiable, 0.13—0.43 (mean 0.30%). Unusually intense fluorescence normally indicated a higher unsaponifiable val. (*e.g.*, 1.04—1.72%) and, in extreme cases, a depressed sap. val. (191.6). J. GRANT.

Hübl's method for determining the iodine value of fatty substances. E. DE'CONNO, L. FINELLI, and

L. TARSIANO (Annali Chim. Appl., 1931, 21, 436—442).—This method gives results low by 4—5 units if fresh, neutral, alcoholic I solution is used (cf. Marcille, A., 1910, ii, 1122), but results agreeing well with those of the Wijs method are obtained if the I solution is either kept for some months before using or acidified with 3% of HI. With either method the influence of temp. within the range 10—25° is negligible, and contact of the fat and solution for 1 hr. is sufficient when the Hübl method is used. T. H. POPE.

Antioxidants of fats and oils. V. Action of aniline and some of its substitution products. Y. TANAKA and M. NAKAMURA (J. Soc. Chem. Ind., Japan, 1931, 34, 405—406 B; cf. B., 1930, 776).—Solutions of 0.01 mol./100 g. of NH₂Ph and its Me, NO₂, and Cl substitution products in linseed oil were studied. NH₂Ph, xylydine, *o*- and *p*-toluidines, *m*- and *p*-chloroanilines acted as anti- or pro-oxidants according to the conditions of the "insolation"; this explains the discrepancies between the authors' earlier observations of the action of PhOH, resorcinol, etc. and those of De'Conno (B., 1926, 135), and supports Moureu and Dufraisse's theory of the mechanism of the action. *m*-Toluidine was the most active antioxidant of the three isomerides, and xylydine less effective. Monochloroanilines, and especially dichloroaniline, behaved mainly as pro-oxidants. *o*-Nitroaniline behaved as a moderate antioxidant, and nitroanilines (*di* $>$ *m* $>$ *p*) as powerful pro-oxidants. E. LEWKOWITSCH.

Identification of fats and fat mixtures. III. Solidification curves of fats in solvents. B. LUSTIG, M. NABIH, and K. WIRNITZER (Biochem. Z., 1931, 240, 268—275; B., 1929, 253).—Curves showing the temp. changes which occur during the solidification under fixed conditions of solutions of vegetable fats (and of mixtures of them) in org. solvents (BuOH, C₆H₆, tetralin, NH₂Ph, EtCO₂H, AcOH) have been plotted and const. useful in investigating purity or nature and degree of adulteration of the fats obtained. W. MCCARTNEY.

Solubility of fats in various solvents. VII. Solubility of camellia oil in [aqueous] acetone of various concentrations. K. HASHI (J. Soc. Chem. Ind., Japan, 1931, 34, 356—357 B; cf. B., 1931, 894).—Solubilities were determined as in the previous papers and are shown graphically. For COMe₂ of concentrations 100, 96.73, 95.25, 92.49, 90.03 wt.-%, respectively, the crit. temp. is 1.3°, 96.3°, 68.0°, 102°, 127°, and the crit. concentration of oil 35, 65, 76.5, and 79.5%. E. LEWKOWITSCH.

Twitchell reagent. VI. Fat-splitting power of Divulson D and the darkening of the fatty acids produced therewith. K. NISHIZAWA and K. FUZIMOTO (Chem. Umschau, 1931, 38, 305—310).—A detailed account of work already noted (B., 1931, 399). E. LEWKOWITSCH.

Hydrogenation of fatty oils by tri-component catalysts. S. UENO and Z. OKAMURA (J. Soc. Chem. Ind., Japan, 1931, 34, 349—351 B).—Ni-Cu catalyst containing $< 20\%$ Cu was not very effective in lowering the reduction temp. Co-precipitated mixed catalysts containing 75% Ni—20% C (*A*) and 75% Cu—20% Ni (*B*)

were most active when reduced at 245–275° and 175–195°, respectively. *A* was most active when 5% Mn or Fe was present, and Co had little effect, whilst addition to *B* of Co was more effective than of Fe or Mn. The test (soya-bean) oil was hydrogenated in each case at 180°, under atm. pressure, using as catalyst 0.4% of metals on a kieselguhr support. E. LEWKOWITSCH.

Hydrogenation of [fatty] oils at high temperatures and under high pressures. II. Hydrogenation with Cu–Ni catalyst. S. UENO, T. YUKIMORI, and S. UEDA (J. Soc. Chem. Ind., Japan, 1931, 34, 351–355 B; cf. B., 1931, 550).—Crude and refined herring oils were hydrogenated with about 1% of an unsupported Ni(OH)₂–Cu(OH)₂ (Ni : Cu = 1 : 3) catalyst and 4% of acid earth, at 50 atm. pressure and temp. from 100° to 200° (steady, or increasing). The catalyst was reduced and hardening proceeded smoothly at 150° and more rapidly at 180–200°. At low temp. (100°) the catalyst appeared to act as a dehydrogenating catalyst: the I val. of the oil rose and then fell as the temp. was raised. E. LEWKOWITSCH.

Composition of shea fat. S. J. HOPKINS and F. G. YOUNG (J.S.C.I., 1931, 50, 389–391 T).—A chemical examination of a sample of shea fat showed the chief fatty acids to be palmitic, stearic, and oleic. The non-saponifiable matter contained considerable amounts of an unsaturated hydrocarbon C₃₂H₅₆, m.p. 64°, apparently identical with illipene isolated by Kobayashi from illipé fat (B., 1922, 987 A). There were also present resin, a substance resembling gutta, and small amounts of phytosterol and higher alcohols.

Vegetable oils of the Union of S.S.R. VIII. Fats of varieties of sumach *Rhus* ("Soviet plant wax"). S. L. IVANOV and S. B. RESNIKOVA (Chem. Umschau, 1931, 38, 301–305; cf. B., 1931, 501).—Full analyses are given for the fats from the whole fruit, the flesh, seed, and kernel of *Rhus succedanea* (*a*) and *R. vernicifera* (*b*) grown in the U.S.S.R. The fruit-flesh and seed-shell yield solid fats [I val. 10 (*a*), 16 (*b*) and approx. 40 (*a*), respectively]; the kernels furnish liquid oils having I val. 126 (*a*) and 133 (*b*). E. LEWKOWITSCH.

Improvement of soya-bean oil extraction. II. Relation between the b.p. of gasoline and the optimum proportion of gasoline and methanol in the mixture. III. Effect of the b.p. of gasoline on the extraction with azeotropic mixture of gasoline and methanol. M. MASHINO and S. NISHIMURA (J. Soc. Chem. Ind., Japan, 1931, 34, 402–404 B, 404–405 B; cf. B., 1930, 291).—II. In admixture with MeOH, the optimal proportions of gasolines of b.p. 60–70°, 70–80°, 80–90° are 54, 52, and 50 wt.-%, respectively; as the b.p. rises the solubility of the gasoline in the MeOH decreases and the two layers separate more easily.

III. Results of extractions with azeotropic mixtures of b.p. 69.6–112.6° are tabulated. The wt. of gasoline in the azeotropic mixture at the transition point is 31%; under such conditions the solvent separates into two layers after the extraction, if the b.p. of the gasoline is below 104°. E. LEWKOWITSCH.

Detection of sesamé oil in margarine. F. BOLM (Z. Unters. Lebensm., 1931, 62, 353–357).—Objections

to Baudouin's test for sesamé oil include decrease in sensitiveness towards old samples of margarine, and dependence of the intensity of colour on the proportions of the reagents and nature of the solvent. The most reliable results are obtained by dissolving the sample in light petroleum, the more volatile portions of the solvent (which may themselves give a positive reaction) being removed by evaporation on the water-bath. This solution is shaken with 0.2 c.c. of 1% furfuraldehyde in EtOH and 29–34% of HCl for 30 sec. In cases of doubt a more reliable procedure (Soltsien's test) is to dissolve 0.5 c.c. of fat in 5 c.c. of light petroleum and shake the solution on the water-bath with 1 c.c. of ZnCl₂, when in the presence of sesamé oil the red colour due to sesamin is produced. J. GRANT.

Changes in cottonseed oil by the action of moisture and gentle warming in the air. H. SCHLOSSBERG-JAESCHA (Masloboino Zhir. Delo, 1930, No. 1, 10–13).—Vals. before and after moistening (16%) and warming (25–30° for 19 days) were, respectively: (seeds) oil 24.31, 23.78; dextrose 0.56, 1.33; invert sugar 0.47, 2.43%; (oil) *d* 0.9300, 0.9325; I val. 106.3, 110.05; acid val. 13.9, 16.04; Hehner val. 92.73, 93.37; Ac val. 44.3, 53.5.

CHEMICAL ABSTRACTS.

Action of negative catalysts with "red oil." A. H. GILL and F. EBERSOLE (Ind. Eng. Chem., 1931, 23, 1304–1305).—The temp. of a "red oil" containing Fe stearate (cf. B., 1924, 183) as positive catalyst rose to 156–165° in the Mackey test (1 hr.); resorcinol, orcinol, *o*-chlorophenol, PhCHO, PhNO₂, etc. were unsatisfactory as negative catalysts, but addition of 1% of quinol, pyrocatechol, benzoquinone, thymol, or commercial creosote oil prevented the temp. from rising above 100° in 1–2 hr. (Cf. U.S.P. 1,791,057; B., 1931, 923.) E. LEWKOWITSCH.

Adherence of lubricants.—See X. **Hempseed oil in varnishes etc.**—See XIII. **Vegetable oils as fungicides.**—See XVI. **Fat of frozen mutton.**—See XIX. **Stearates in cosmetics.**—See XXIII.

PATENTS.

Apparatus for melting fat or the like, and for heating and boiling liquids. G. W. YALE and E. A. PYE (B.P. 359,675, 6.10.30).—An electrically heated, asbestos-lined hot-box, with one or more removable walls, contains one or more removable melting chambers each of which is fitted with strainer, cocks, etc.

E. LEWKOWITSCH.

Cleaning compositions [containing rubber latex]. DUNLOP RUBBER Co., LTD., and W. G. GORHAM (B.P. 358,584, 12.7.30).—An aq. dispersion of rubber together with one or more substances such as pumice, which aid the production of a friable coagulum and also may act as light abrasives, is used as a cleaning and grease-removing composition, e.g., by rubbing on the hands; a suitable mixture contains rubber (as latex) 37.07, pumice 37.07, K oleate 1.12, Na₂CO₃ 0.74, glycerin 10, H₂O 25 pts. D. F. TWISS.

Plant for extraction of animal materials. Separation of volatile substances.—See I. **Wetting etc. agents.**—See III.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Unsolved problems in the protection of iron by paint. H. WOLFF, F. WILBORN, and F. WACHHOLTZ (Farben-Ztg., 1931, 37, 52—53, 91—92).—A general dissertation is given, outlining the directions in which information is lacking on pigments, vehicles, thinners, application, weathering, etc. S. S. WOOLF.

Comparative study of co-precipitated and "extended" pigments. H. WAGNER and G. HOFFMANN (Farben-Ztg., 1931, 37, 56—57, 93—94).—Coloured pigments, *e.g.*, chrome-yellow, zinc-yellow, Milori-blue, and dyes, *e.g.*, Varnish-red C, Orange II, Rhodamine B, co-precipitated with extenders, were compared with the corresponding pigments made by mixing colour and extender in the wet and in the dry. The resulting pigments were examined for tone, content of black and white, opacity, H₂O and oil absorption, sedimentation, drying time in oil, properties of paints made therefrom, characteristics under the microscope, etc., and the results are briefly summarised. The "wet mixtures," hitherto regarded with the "dry mixtures" as extended pigments, are now found to be comparable with the co-precipitated pigments, and the distinction between substrate and extender is considered to be defined by wet or dry prep. This point and the characteristics of each type are illustrated by generalisations from the various results obtained. Attention is, however, drawn to the fact that a true substrate pigment is usually extended subsequently in practice, so that the combined functions of both types are exerted. S. S. WOOLF.

Use of hempseed oil in varnish making and in boiled oils. V. KISELEV and M. CHAROV (Masloboino Zhir. Delo, 1929, No. 11, 24—30).—Hempseed oil is more easily decolorised than linseed oil; boiled hempseed oils are lighter in colour, require less drier, and (unless obtained by hot-pressing) dry more rapidly. With polymerised and oxidised oils the viscosity of hempseed oil increased more slowly than that of linseed oil. When oils of approx. equal viscosity are employed the varnishes have practically the same properties.

CHEMICAL ABSTRACTS.

New methods of surface protection. II. A. EIBNER (Farben-Ztg., 1931, 37, 13—15, 54—55, 88—90; cf. B., 1931, 851).—A general dissertation on modern trends in research on protective materials, with special reference to the improvement of the oil components of varnishes as apart from correcting the known defects of oils by adding compensating resins. The exchange of acids in glyceryl esters on forming resin-oil complexes is described, and the use of stand oil or, better, "stand oil extract" (a product, now being patented, consisting of the highly polymerised and quick-drying portions of stand oil, freed from the more highly dispersed phases), in place of the resin component of oleo-resinous vehicles is recommended. The constitution of such products, which are non-yellowing and relatively quick-drying, is discussed. "Olovines," *i.e.*, combinations of polyvinyl esters with "stand oil extract," give elastic films of high gloss etc. and are extraordinarily difficult to saponify.

S. S. WOOLF.

Effect of the temperature of preparation of rosin on its ability to absorb oxygen from air. K.

KOROTKOV (J. Chem. Ind., Russia, 1930, 7, 1165—1166).—The most stable rosins were those prepared at 200—270°. I vals. decrease by 74—78% and acid vals. by 12—18%.

CHEMICAL ABSTRACTS.

Synthetic resins and the rubber industry.—See XIV.

PATENTS.

Cellulose derivative [coating] compositions. BRIT. CELANESE, LTD. (B.P. 359,387, 7.11.30. U.S., 7.11.29).—The lacquer contains a cellulose derivative, a compatible synthetic resin (*e.g.*, an arylsulphonamide-CH₂O resin), and a ketone COMeR, where R is a radical containing at least two C atoms and an unsaturated linking, *e.g.*, methyleneacetone, Me isopropenyl ketone, together with plasticisers etc. E. LEWKOWITSCH.

Production of patterned films, sheets, and coatings. I. G. FARBENIND. A.-G. (B.P. 358,761, 5.11.30. Ger., 5.11.29).—"Crystallising varnishes" etc., comprising cellulose ether or ester compositions containing a H₂O-insol. urea derivative or urethane, *e.g.*, diphenyldiethylurea, Bu⁶ carbanilate, in quantity at least equal to that of the cellulose derivative, are claimed. S. S. WOOLF.

Coating compositions. H. WADE. FROM BAKELITE CORP. (B.P. 358,603, 15.7.30).—A "phenol-oil composition" (reaction product of a phenol and a fatty oil) is caused to react with a methylene-containing compound, *e.g.*, aq. CH₂O, in the presence of a high-boiling org. solvent, *e.g.*, BuOH, capable of retarding gelation, and H₂O reaction is eliminated, the b.p. of the liquid being kept at or below 120°, *e.g.*, by distillation under reduced pressure or by addition of a solvent, *e.g.*, PhMe, giving a suitable const.-b.-p. mixture with the first solvent.

S. S. WOOLF.

Compositions containing drying oils. IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 358,472, 4.6.30. U.S., 4.6.29).—Substituted guanidines, *e.g.*, the Ph₂ or di-tolyl derivatives, or phenolic substances, *e.g.*, pyrocatechol, a trihydric phenol, or an ether thereof retaining at least one phenolic OH group, are used as anti-agers for paints etc. based on drying oils, *e.g.*, linseed oil. Increased retention of flexibility without objectionable retardation of drying is claimed.

S. S. WOOLF.

Manufacture of [basic lead sulphate and of] paint [therefrom]. S. NEGISHI (B.P. 358,644, 7.8.30).—Light basic Pb sulphate (containing > 75% of PbSO₄ and < 25% of PbO) of large reactive surface and great covering power, obtained by suspending Pb-containing materials, *e.g.*, finely-powdered Pb suboxide, in an atm. of mixed air and SO₂ at 700°, is kneaded with a paint vehicle.

S. S. WOOLF.

Refining of rosin. I. W. HUMPHREY, Assr. to HERCULES POWDER CO. (U.S.P. 1,800,834, 14.4.31. Appl., 23.8.26. Renewed 15.8.28).—A solution of rosin (15%) in gasoline is decolorised by treating with PhOH (*e.g.*, 30% on the wt. of the rosin solution) in a small amount of H₂O; the refined rosin solution is separated by cooling to, *e.g.*, 7°, washed, and evaporated.

E. LEWKOWITSCH.

Manufacture of various polymerised vinyl chloride modifications. I. OSTROMISLENSKY, Assr. to

L. A. VAN DYK (U.S.P. 1,791,009, 3.2.31. Appl., 2.11.25).—The β -polymeride is obtained by isolation beyond the α -stage, but short of the δ -stage. The conversion of β - into δ -polymeride is hindered by the presence of PhCl , Et_2O , EtOH , MeOH , $\text{C}_2\text{H}_2\text{Cl}_4$, etc. The change from sol. (α - and β -) into insol. (δ - and γ -) forms during isolation is due usually to the use of impure vinyl chloride; it may be prevented by addition of solvent. The β -form is obtained from the α - by heating at 50–135°, and from the δ - and γ -forms by treatment with amines (NH_2Ph , pyridine, toluidines), PhNO_2 , or COPh_2 . The β -form, preferably plasticised with $\text{C}_6\text{H}_4\text{Cl}_2$, $1\text{-C}_{10}\text{H}_7\text{Cl}$, COPh_2 , etc., is suitable for film supports, the α -, γ -, and δ -forms for ebonites. C. HOLLINS.

Manufacture of artificial masses. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 359,147, 15.9.30).—The condensation of H_2O -sol. urea (thiourea, or methylolurea)- CH_2O combinations is conducted at increased pressures and at temp. above 100° (120–150°) with or without condensing agents, but in the presence of sufficient of a hydroxylated organic solvent, *e.g.*, *n*- or *iso*- BuOH , to retain the final products in solution (cf. B.P. 296,361; B., 1928, 826). E. LEWKOWITSCH.

Manufacture of synthetic resins. M. M. EATON, and POLLOPAS, LTD. (B.P. 358,470, 4.6.30).—A small proportion, *e.g.*, 0.25–1%, of a "delayed polymeriser," *e.g.*, Me oxalate or other neutral org. substance capable of liberating acid under moulding conditions, is added to urea- or thiourea- CH_2O condensation products. S. S. WOOLF.

Manufacture of moulding materials containing urea-formaldehyde condensation products. BRIT. CYANIDES CO., LTD., E. C. ROSSITER, and A. BROOKES (B.P. 359,498, 23.7.30).—Incorporation of an acid or potentially acid accelerator (*e.g.*, 0.5–1% of oxalic acid, or hexamethylenetetramine thiocyanate) and sufficient hexamethylenetetramine to ensure an excess of base over acid improves the stability on storage and does not unduly retard curing. E. LEWKOWITSCH.

Manufacture of [resinous] condensation products. G. WALTER (B.P. 359,522, 17.7.30. Austr., 20.7.29).—Thermo-hardening, colourless resins are prepared by condensing an aldehyde (CH_2O) with a compound containing reactive groups of which at least one is $\text{CO}\cdot\text{NH}_2$ and one $\text{CS}\cdot\text{NH}_2$, *e.g.*, *p*-sulphaminobenzamide (prepared from by-products of saccharin manufacture). E. LEWKOWITSCH.

Phenol-furfural resins. H. WADE. From BAKELITE CORP. (B.P. 359,047, 18.7.30).—The thermo-hardening of a slow-curing but reactive cresol-furfuraldehyde resin is accelerated by the addition of an alkaline-earth oxide (*e.g.*, CaO) and a relatively small amount (*e.g.*, 2%) of a CH_2 -containing compound (*e.g.*, hexamethylenetetramine). E. LEWKOWITSCH.

[Moulds for] phonographic records. A. VARA Y DE RUEDA (B.P. 358,928, 7.5.30).—A dichromated gelatin cast (film) of the wax master record is prepared and, after mounting on a metallic or celluloid sheet support (and hardening by exposure to light), is used as a mould for the production of records. E. LEWKOWITSCH.

Manufacture of composite moulded articles [with metal inserts]. BRIT. THOMSON-HOUSTON CO.,

LTD., Assees. of C. F. PETERSON (B.P. 359,353, 23.2.31. U.S., 26.2.30).

Manufacture of [metal-thermoplastic material] sound records, such as those used on gramophones. J. R. CRAIG (B.P. 360,520, 18.8.30).

Heating for drying etc. Drying [of moulded articles].—See I. Bitumens from acid resin residues Phenols from hydrocarbons.—See II. Azo pigments.—See IV. Coloured granules.—See IX.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Gutta-percha and balata. A. W. K. DE JONG (Chem. Weekblad, 1931, 28, 570–579, 602–612).—The modes of occurrence and extraction and the chemical and physical properties are discussed. Experiments on extraction with C_6H_6 and light petroleum are described, and the results reconciled with the properties and stability ranges of the α - and β -forms. S. I. LEVY.

Extraction of gutta-percha leaf. II. A. W. K. DE JONG (Rec. trav. chim., 1931, 50, 1018–1020; cf. B., 1930, 1039).—The amount of the melt of a cold C_6H_6 extract of gutta-percha leaf which is sol. in light petroleum (b.p. 50–80°) at room temp. diminishes with repeated treatment. Since very little loss occurs when sheet balata, obtained by Obach's method, is similarly treated, it would appear that old gutta-percha leaf contains a compound which hampers the crystallisation of the hydrocarbon and is removed by crystallisation of the hydrocarbon from light petroleum. Extraction of the leaf with this solvent (Obach) is, therefore, the best method of obtaining the pure hydrocarbon. J. W. BAKER.

Use of some synthetic resins in the rubber industry. W. J. S. NAUNTON and F. J. SIDDLE (India-Rubber J., 1931, 82, 535–538, 561–563).— $\text{PhOH}\text{-CH}_2\text{O}$ dispersions do not disperse well in rubber, but a solution of such resins in aq. NaOH when neutralised yields the resin in a finely-divided form. If this precipitation is effected in the presence of rubber latex a powder is obtained which when dried and milled contains the resin in a better state of dispersion than if it had been milled into rubber in the normal manner and yields a stronger vulcanised product. Using an excess of tetramethylthiuram disulphide, the presence of the resin has little influence on the rate of vulcanisation, but the addition of PbO results in less rapid vulcanisation. The presence of "glyptal" resins in rubber retards vulcanisation by S with tetramethylthiuram disulphide, but the influence of PbO is less pronounced than with the mixture containing $\text{PhOH}\text{-CH}_2\text{O}$ resin; the glyptal-rubber products have satisfactory qualities with respect to ageing, flexing, and abrasion. Moulding experiments with a mixture of ebonite dust, $\text{PhOH}\text{-CH}_2\text{O}$ resin, hexamine, wood meal, and a little Al stearate gave an ebonite of improved resistance to mineral oils; the presence of sufficient $\text{PhOH}\text{-CH}_2\text{O}$ to give a "skin effect" in moulding also protects the surface of the ebonite from the deleterious action of light, but the characteristic tendency of phenolic moulding powders to form a conducting surface path when subjected to high-tension current is still present. Ebonite mixtures containing thermo-hardening resins can be vulcanised to the desired hardness with less free

S than a similar mixture without resin. Glyptal resins can be adapted to the formation of lacquers for the varnishing of rubber goods and are superior to nitrocellulose and oil varnishes in several respects; the glyptal varnish film is hard, glossy, and flexible, and can even be cold-vulcanised with S_2Cl_2 . D. F. TWISS.

Nature of vulcanisation. IV (cont.). H. P. and W. H. STEVENS (J.S.C.I., 1931, 50, 397—398 T).—Further analyses of "low-temp." vulcanites have shown that the method of Et_2O-HCl extraction, for the removal of mineral sulphides, is quite effective with hard vulcanised rubber. The results confirm those previously reported (B., 1929, 334), where coeffs. of vulcanisation exceeding those required by the formula C_5H_8S were obtained. Some experiments on the evolution of H_2S , when vulcanising to the hard rubber stage, have shown that in the presence of an ultra-accelerator substitution occurs only when the temp. exceeds a certain crit. val. and when the S is present in large excess. In the case of Zn diethyldithiocarbamate this crit. temp. appears to lie between 70° and 100° , and it is thus possible, by vulcanising at 70° or below, to prepare true caoutchouc sulphide (C_5H_8S) free from substituted products.

Rôle of the natural concomitants of rubber, particularly the proteins, in vulcanisation. L. ECK (Kautschuk, 1931, 7, 206—208).—Attention is directed to the probability that the natural protein of rubber is more intimately concerned in the vulcanisation process than is commonly believed. D. F. TWISS.

Vulcanisation experiments with the accelerator-activator "Barak." W. HUHN (Kautschuk, 1931, 7, 204—206).—Experiments are quoted demonstrating that the results obtained by Hauser and Wolf (B., 1931, 1108) can be produced equally with combinations of well-known accelerators. D. F. TWISS.

PATENTS.

Manufacture of rubber-like masses. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 358,877, 29.5.30. Addn. to B.P. 339,255; B., 1931, 264. Cf. B.P. 342,314; B., 1931, 407).—The olefine-benzenes of the prior patents may advantageously be replaced by olefine-naphthalenes, the proportion not exceeding 50 wt.-% of the diolefine component. [Stat. ref.] D. F. TWISS.

Manufacture and use of expanded rubber material. EXPANDED RUBBER Co., LTD., and G. P. DENTON (B.P. 358,967, 14.5.30).—The dough-like rubber mixture is subjected to heat and high pressure, preferably with an inert atm., e.g., N_2 , in a container, and after withdrawal the partly expanded and vulcanised material is again subjected to heat, whereby further expansion and completion of vulcanisation are effected. D. F. TWISS.

Manufacture of rubber dispersions. W. L. SEMON and R. A. CRAWFORD, ASSRS. to B. F. GOODRICH Co. (U.S.P. 1,797,243, 24.3.21. Appl., 11.8.27).—A mixture of rubber (100 pts.) with a minor proportion of a volatile softener such as C_6H_6 (10—100 pts.) and a small proportion of glue (1 pt.) and casein (1 pt.) is masticated while an aq. solution of K oleate is added slowly until the rubber constitutes the dispersed phase

of the batch. The viscous product can be diluted with H_2O in any proportion to form a dispersion of desired consistency. The dispersions have good wetting qualities and give rubber films of good surface adhesion.

D. F. TWISS.

Compounding process [for rubber dispersions]. W. A. GIBBONS, ASSR. to AMER. RUBBER Co. (U.S.P. 1,798,253, 31.3.31. Appl., 7.6.24).—Substances such as stearic acid are converted into a H_2O -sol. soap, preferably of a volatile base such as NH_3 , and are mixed with an aq. dispersion of rubber, e.g., latex. The NH_3 is lost during evaporation of the latex, and a uniform mixture of rubber and stearic acid results. Rubber-compounding ingredients such as C black may be dispersed in the soap solution before this is introduced into the latex.

D. F. TWISS.

Forms for manufacture of rubber articles by filtration. L. MELLERSH-JACKSON. From MORGAN & WRIGHT (B.P. 358,715, 30.9.30).—For the manufacture of motor tubes (etc.) direct from rubber latex, a suitable form comprises a foundation member constructed to permit fluid flow, a fabric sleeve of an originally slightly larger size shrunk, e.g., by treatment with alkali, so as to fit snugly and smoothly, and an outermost coat of filtering material, such as celite, on which the rubber may be deposited by filtration. D. F. TWISS.

Manufacture of rubber articles by electrodeposition. ANODE RUBBER Co., LTD., ASSEES. of A. SZEGVARI (B.P. 357,740, 28.8.30. U.S., 26.9.29).—When rubber latex of high alkalinity is subjected to the electric current, the resistance of the deposit is so high that the current rapidly falls to a very low value. If the alkalinity is very low, the rubber globules are deposited in a loose reticulate structure in which the retained serum continues to conduct the current and permits continued deposition. By adjusting the alkalinity and/or resistivity between these two extremes it is possible to obtain a deposit the resistance of which is more than proportional to its thickness, whilst the resistivity of the dispersion remains almost const., and a substantially uniform deposit is formed even on anodes of irregular contour. D. F. TWISS.

Manufacture of rubber articles. E. B. NEWTON, ASSR. to AMER. ANODE, INC. (U.S.P. 1,797,240, 24.3.31. Appl., 6.3.29).—A layer of unvulcanised masticated rubber can be caused to adhere firmly to one of unmasticated latex rubber by superposing after the latter has been coagulated, but before it has dried; the composite product is subsequently dried and vulcanised.

D. F. TWISS.

Ornamentation of surfaces of articles or materials [using rubber latex]. DUNLOP RUBBER Co., LTD., ANODE RUBBER Co., LTD., E. A. MURPHY, and E. W. B. OWEN (B.P. 358,562, 10.7.30).—The factors of a dispersion such as rubber latex are so adjusted that when a film supported on a suitable backing, e.g., rubber, leather, or metal, is contacted with a coagulating medium, preferably of higher sp. gr., the rate of coagulation is comparatively slow and the initially resulting coagulum is of low mechanical strength. An irregular pattern suggestive of the markings on crocodile leather is consequently produced. D. F. TWISS.

Manufacture of goods [tiles or flooring] of rubber or similar material. DUNLOP RUBBER Co., LTD., ANODE RUBBER Co., LTD., and G. LIVINGS (B.P. 358,561, 10.7.30).—Rubber flooring (etc.) is coated with a backing or facing of sponge or cellular rubber by applying a layer of frothed aq. dispersion of rubber and then causing the froth to set to a permanent structure.

D. F. TWISS.

Manufacture of goods of rubber or similar material. DUNLOP RUBBER Co., LTD., ANODE RUBBER Co., LTD., E. A. MURPHY, and E. W. B. OWEN (B.P. 359,584, 29.7.30. Addn. to B.P. 332,526; B., 1930, 1040).—In the manufacture of articles of sponge-like structure from a frothed dispersion or emulsion, the formation of a continuous surface skin is avoided and exposure of the cellular structure is effected by causing the frothy mass (with the exception of the outer layers) to set and then removing the latter, *e.g.*, by washing with H_2O .

D. F. TWISS.

Vulcanisation of rubber. IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 359,820, 15.1.31. U.S., 15.1.30).—Acceleration of vulcanisation is effected by the joint use of a substituted NH_4 salt, *e.g.*, dibutylamine oleate or acetate, and an org. accelerator of a different class, *e.g.*, a mercaptobenzthiazole or tetramethylthiuram monosulphide.

D. F. TWISS.

Vulcanisation of rubber and rubber-like substances. HUNGARIAN RUBBER GOODS FACTORY, LTD., P. KLEIN, and S. GOTLÉB (B.P. 357,806, 13.10.30).—In the manufacture of rubber goods by hot vulcanisation, each mould is provided with a separate electric heating device.

D. F. TWISS.

Composition of matter [for vulcanisation of rubber]. H. GRAY, Assr. to B. F. GOODRICH Co. (U.S.P. 1,796,018, 10.3.31. Appl., 31.7.26).—If a small proportion of an amine such as *n*-butylamine or *p*-aminodimethylaniline is heated with an excess of a liquid aliphatic aldehyde, *e.g.*, *n*-butaldehyde, the reaction product, which contains one mol. of the former to more than 3 of the latter, is of use as an accelerator of vulcanisation. The presence of a small proportion of acidic substances in the reaction mixture, *e.g.*, even acidic impurities in the aldehyde, facilitates the condensation reaction and leads to a product of higher accelerating val.

D. F. TWISS.

Accelerator for the vulcanisation of rubber. A. CAMBRON, Assr. to ROESSLER & HASSLACHER CHEM. Co. (U.S.P. 1,796,240, 10.3.31. Appl., 20.1.26. Renewed 17.7.30. Cf. U.S.P. 1,754,010; B., 1930, 998).—A hard $MeCHO-NH_2Ph$ product is obtained by effecting the condensation in the presence of $ZnCl_2$ preferably together with an acid, *e.g.*, HCl . The product is not only a good accelerator, but also has excellent anti-ageing qualities.

D. F. TWISS.

Rubber accelerator. R. V. HEUSER, Assr. to AMER. CYANAMID Co. (U.S.P. 1,798,159, 31.3.31. Appl., 23.11.26).—Vulcanisation is assisted by dibenzylguanidine, which may be obtained by the action of $CNCl$ on a solution of CH_2Ph-NH_2 in $PhCl$.

D. F. TWISS.

Manufacture of rubber compositions [and their preservation]. L. B. SEBRELL, Assr. to GOODYEAR

TIRE & RUBBER Co. (U.S.P. 1,797,179, 17.3.31. Appl., 3.3.27).—Reaction between NH_2Ph and $MeCHO$ in solution at 0° gives white crystals of anilidobutylidene-aniline in 2 isomeric forms, m.p. 122° and 86° , respectively. Analogously $EtCHO$ yields anilidohexylideneaniline. These products are used to impart age-resisting properties to vulcanised rubber.

D. F. TWISS.

Rubber antioxidant. W. S. CALCOTT and W. A. DOUGLASS, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,796,980, 17.3.31. Appl., 8.8.29).—The condensation product of glucose and a primary aromatic diamine, *e.g.*, *m*-tolylendiamine, retards the deterioration of rubber.

D. F. TWISS.

Rubber composition and method of preserving rubber. M. C. REED, Assr. to B. F. GOODRICH Co. (U.S.P. 1,797,241, 24.3.31. Appl., 16.11.28).—Rubber is treated with the additive product of a secondary arylamine, *e.g.*, phenyl- β -naphthylamine, and an aromatic nitro-compound such as chlorodinitrobenzene or nitrotoluene. The additive compounds are produced by mixing the two constituents in the molten state or in solution.

D. F. TWISS.

Treatment [improving the ageing and mechanical properties] of rubber. NAUGATUCK CHEM. Co., Asses. of W. P. TER HORST (B.P. 359,267, 29.11.30. U.S., 4.12.29).—Rubber or similar material is treated with the reaction product of a ketone, *e.g.*, $COMe_2$, and an aldehyde-arylamine condensation product, or the reaction product of a ketone and the salt of an aromatic amino-compound, *e.g.*, diphenylguanidine hydrochloride, or a rearranged reaction product of a ketone and an aromatic amino-compound or with a derivative of such compounds, *e.g.*, a naphthol additive compound or an aldehyde derivative. Numerous examples are cited.

D. F. TWISS.

Preservation of rubber and artificial rubber-like masses. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 359,045, 18.7.30).—Prior or subsequent to vulcanisation a reaction product of S_2Cl_2 or SCl_2 and an aromatic hydroxy-compound, *e.g.*, a hydroxydiaryl sulphide, is mixed with the rubber material.

D. F. TWISS.

Treatment of rubber [to retard cracking in sunlight]. S. M. CADWELL and L. MEUSER, Assrs. to NAUGATUCK CHEM. Co. (U.S.P. 1,798,133, 31.3.31. Appl., 30.7.27).—A sulphoxide, *e.g.*, Ph_2SO , is incorporated in the material before vulcanisation.

D. F. TWISS.

Re-utilisation of old vulcanised rubber. O. C. HOSKING (B.P. 359,205, 20.10.30).—Disintegrated, old, vulcanised rubber, with or without associated cotton, is mixed with a small proportion of new rubber dispersed in a volatile liquid medium (C_6H_6); the mixture is dried in layers, preferably below 100° , in light from which actinic rays are excluded.

D. F. TWISS.

Uniting of articles wholly or partly composed of microporous rubber, with one another, or with articles composed of other substances. METALLGES. A.-G. (B.P. 359,784, 8.12.30. Ger., 8.1.30).—Microporous rubber, preferably that rich in S, is heated until it melts superficially at the places to be united, and after cooling somewhat, the seats of the junction are pressed together.

D. F. TWISS.

Composite rubber[-cork] and like material. M. M. DESSAU, O. LATHAM, and J. A. BASHFORD (B.P. 358,556, 8.7.30).

Uniting rubber-containing tiles to bituminous layers and rubber pavements for roads or like surfaces manufactured thereby. N. V. DE BATAAFSCHE PETROLEUM MAATS. (B.P. 358,973, 7.7.30. Holl., 9.8.29).

Measurement of plasticity.—See I. **Cleaning compositions.**—See XII. **Polymerised vinyl chloride.**—See XIII.

XV.—LEATHER; GLUE.

Pickling [of hides]. S. SAWAYAMA (J. Fac. Agric. Hokkaido, 1931, 31, i, 1—17).—The more HCl is present, the more is absorbed by the skin and given up when the skin is extracted with NaCl solution. The more acid is the pickle, the less is the decrease in Cr_2O_3 content of the chrome tanning liquor and the lower is the contraction temp. of the skin when tanned for a fixed time.

CHEMICAL ABSTRACTS.

"Salt stains" on Indian hides and skins. V. N. PATWARDHAN (Chem. and Ind., 1931, 722).—Such "salt stains" consist of irregular deep blue patches on both sides of the wet salted hides and skins, which permanently discolour black or dark purple on tanning. Their intensity was diminished by treating the washed limed pelts for several days with a H_2SO_4 -NaCl pickle of p_{H} 2.5—3.0.

D. WOODROFFE.

PATENTS

Treatment of hairy hides and skins. N. V. INDUSTRI. MAATS. v.H. NOURY & VAN DER LANDE (B.P. 358,133, 8.7.30. Holl., 16.7.29).—The skins are placed on an inclined washing board, free to travel to and fro, moved in and out of a liquor in a trough, and subjected to the pressure of a roll mounted above the surface of the liquor and having the same speed, direction of rotation, and means for reversal of motion as the washing board.

D. WOODROFFE.

Preparation of [rabbit] skins for use in articles of clothing. S. E. RODMAN (B.P. 359,480, 23.6.30).—The skins are fleshed and pickled, the hair is shorn, the skins are tanned, wheeled on the flesh side to produce a suede finish, dyed, and dressed.

D. WOODROFFE.

Tanning of hides. J. M. BROWN (U.S.P. 1,800,131, 7.4.31. Appl., 16.11.29).—Limed hides are well washed and then treated for 24 hr. with a solution of gum catechu (12%), fluid extract of wild haw (0.24%), and alum (3%), fleshed, and again treated in this solution.

D. WOODROFFE.

Manufacture of artificial leather. P. H. PERRIN (B.P. 358,856, 14.3.31. Fr., 20.3.30).—A fibrous material or other base is mixed with a solution of glycerin, tannin, and powdered koniaku (from *Conophallus konjah*), or sheets of artificial leather may be cemented together with this mixture.

D. WOODROFFE.

Adhesive. A. MENGER, ASST. to I. G. FARBEIND. A.-G. (U.S.P. 1,798,097, 24.3.31. Appl., 2.8.28. Ger., 10.8.27).—The composition contains nitrocellulose, acetethylanilide, a softening agent (castor oil) and a solvent therefor, and at least 10% of asbestos powder.

L. A. COLES.

Ornamented surfaces.—See XIV.

XVI.—AGRICULTURE.

Law of base exchange and its significance in practical agriculture. P. VAGELER (Forts. Landw., 1931, 6, 76—81; Bied. Zentr., 1931, 1A, 433—434).—The adsorptive complex of soils exhibits selectivity of action in base-exchange phenomena. The nature of the exchange of bases is dependent on the character of the complex, of the ions added, and of those already present. Experimental data are discussed in relation to theories of the mineral nutrition of plants, and to their application to determinations of the nutrient conditions of soils.

A. G. POLLARD.

Stability of base-exchange capacity in chernozem and solonetz soils. I. KANIVETZ (Nauk. Zapiski Tzuk. Prom., 1931, 11, 275—306).—Soil may be dried at 20°. Addition of $(\text{NH}_4)_2\text{SO}_4$ results in increase of p_{H} and decrease in adsorbed Ca and dispersibility; H_2O -sol. Ca and unsaturation are slightly increased. With NaNO_3 there is less change.

CHEMICAL ABSTRACTS.

Is the absorption complex of soils stable? L. SMOLIK (Bull. Czechoslov. Acad. Agric., 1931, No. 1; Proc. Internat. Soc. Soil Sci., 1931, 6, 110).—The adsorption complex of soils is not stable, but varies with soil reaction, concentration of dissolved salts, fertiliser treatment, tillage, and cropping rotation.

A. G. POLLARD.

Determination of replaceable bases in soils. L. SMOLIK (Bull. Czechoslov. Acad. Agric., 1931, No. 5; Proc. Internat. Soc. Soil Sci., 1931, 6, 107).—The "alcohol" method gives satisfactory results for soils containing CaCO_3 .

A. G. POLLARD.

Determination of the adsorptive capacity of soils and of the adsorbed bases in soils containing carbonates. I. I. KANIVETZ (Zentral-lab. Agrik. Chem., 1931, 61; Proc. Internat. Soc. Soil Sci., 1931, 6, 107—110; cf. B., 1931, 506).—Methods described previously are modified for use with soils containing CaCO_3 . The leaching of adsorbed bases by means of $N\text{-BaCl}_2$ leads to the formation of some BaCO_3 which reacts with NaCl in the subsequent washing and, moreover, BaCl_2 does not remove all other bases completely. The use of $N\text{-CaCl}_2$ is preferable. The soil is washed with 500 c.c. of CaCl_2 solution and then with H_2O (preferably hot) till the washings are free from Cl and finally is leached with $N\text{-NaCl}$. The adsorptive capacity is equiv. to the Ca content of the first litre of leachate, corrected for carbonates (mean of Ca in 3rd and 4th $\frac{1}{2}$ -litres). Preliminary removal of CaCO_3 with 0.05N-HCl or 0.16N-AcOH is unsatisfactory owing to chemical changes involved in the colloids, to the appearance of turbidity during H_2O -washing, and to the risk of inaccuracy in the recorded adsorptive vals. In certain degraded soils leaching with BaCl_2 causes considerable turbidity in the extracts. A preliminary washing with CO_2 -free H_2O removes these highly dispersed particles which contain little adsorbed base. During the H_2O -washing of soil saturated with Ba or Ca some hydrolysis of the adsorptive complex occurs. In the rapid determination of adsorbed soil bases by shaking with $N\text{-NaCl}$, bases are removed completely by shaking at 5-min. intervals. Acidification of the CaCl_2 or NaCl solutions used for leaching reduces the adsorptive capacity and

increases the solubility of Ca, Mg, and Ba carbonates. The subsequent washing free of Cl should be completed in 1 day to avoid hydrolysis of the colloids and turbidity of the extracts. A. G. POLLARD.

Law of exchange acidity and its use in determining the salt concentration of the soil solution and the association of the adsorbed bases in soil. A. V. TROFIMOV (Z. Pflanz. Düng., 1931, 22A, 332—353).—Mathematical relationships are traced between the concentration of the soil solution before and after the addition of CaCl₂ solution, the soil-moisture content, and the p_H . The application of these to determinations of the degree of dissociation of adsorbed bases in the colloid complex and of the exchange acidity are discussed. In a normal Ca soil < 1% of the total exchangeable Ca appears in the soil solution. The drying of soils results in a continuous increase in the concentration of the soil solution, which is closely analogous to that recorded by Bouyoucos (A., 1917, i, 510). A. G. POLLARD.

Factors affecting soil reaction values as determined by the quinhydrone electrode. B. THOMAS and F. J. ELLIOTT (J.S.C.I., 1931, 50, 303—306 T).—A detailed investigation has been made of the effects of soil-H₂O ratio, and wt. of quinhydrone used, on the reaction vals. of two soils as determined by the quinhydrone electrode. All determinations were adequately replicated, and the results submitted to statistical treatment. With an acid soil the soil-H₂O ratio of 1:1.5 gave the smallest variance. There was no significant difference between the variance of the soil-H₂O ratios 1:0.5, 1:1, and 1:1.5 in the case of the limed soil. The wt. of quinhydrone necessary per unit vol. of a standard soil suspension was shown to be less than that generally employed.

Soil reaction in some experimental drainage plots at Cockle Park. B. THOMAS and T. W. SIMPSON (J.S.C.I., 1931, 50, 349—352 T).—The mean p_H val. of field soil to a depth of 30 in. has been significantly increased by pipe draining. It has been shown, by the application of appropriate statistical methods, that the depth distribution of reaction has also been affected. No significance could be attached to the changes induced by the use of mole drains at varying intervals. The effects of season and of manurial treatment were investigated.

Relations between soil reaction and soil type. K. NEHRING (Forts. Landw., 1931, 6, 41—44; Bied. Zentr., 1931, 1A, 435).—The reactions of the various horizons of a soil profile are discussed in relation to soil type. A. G. POLLARD.

Dependence of the solubility of soils on their mechanical composition. A. SALMINEN (Bull. Agrogeol. Inst., Finland, 1931, No. 30; Proc. Internat. Soc. Soil Sci., 1931, 6, 117—118).—In soils of similar origin, but of different mechanical composition, the solubility in conc. HCl of basic PO₄ ions increased with the proportion of finer particles. In 4% HCl this proportionality was less definite and the PO₄ solubility was independent of the size of the clay fraction. With dil. HNO₃ the solubility of Ca and Mg and, to a lesser extent, of Na and K, increased and that of PO₄ decreased with rising colloid content. A. G. POLLARD.

Is the orthokinetic type of coagulation of a clay a function of the p_H of the sedimentation medium? A. MUSIEROWICZ and L. SMOLÍK (Bull. Czechoslov. Acad. Agric., 1931, No. 3; Proc. Internat. Soc. Soil Sci., 1931, 6, 123—124).—The clay fraction of soils was separated by decantation in AcOH and HCl of varying p_H . With decreasing p_H the degree of orthokinetic coagulation increased although the extent of the coagulation was not the same for all samples. At the same p_H AcOH was a more effective coagulant than HCl. Equilibrium between the p_H of the suspension and that of the solution added was reached more quickly in the more acid solutions. The fraction functioning as clay in soil varies in amount with the p_H . A decreased p_H reduces the effective clay fraction by orthokinetic coagulation. A. G. POLLARD.

Value of soil maps in relation to the nutrient contents of soils. H. NEUBAUER (Ernähr. Pflanz., 1931, 27, 169—170; Bied. Zentr., 1931, 1A, 439—440).—Difficulties in the correlation of soil-nutrient values with geological soil maps are discussed. A. G. POLLARD.

Separation of the mineral from the organic constituents of the adsorption complex of soils. B. MALAČ (Mitt. Cechoslov. Akad. Landw., 1930, No. 10; Proc. Internat. Soc. Soil Sci., 1931, 6, 107).—Pyridine extracts org. colloids from soils without appreciably affecting the condition of the adsorbed bases in the mineral complex. A. G. POLLARD.

Comparison of soil analyses by von Wrangell's method with results of other methods and of field experiments. A. NĚMEC (Forts. Landw., 1931, 6, 321; Proc. Internat. Soc. Soil Sci., 1931, 6, 132).—In reply to various critics the author emphasises the close correlation between the results of field trials and those of his method for P determination. Essential points of technique are explained. A. G. POLLARD.

Effect of carbon dioxide and lime on the solubility of soil phosphoric acid. L. MEYER (Pflanzenbau, 1931, 5, 585—612; Chem. Zentr., 1931, i, 3159).—CO₂ solution (p_H 3.8—3.9) increases, whilst CaO decreases, the readily sol. portion of the soil P₂O₅ as determined by Wrangell's method; only in 50% of the soils examined was the total H₂O-sol. P₂O₅ increased by CO₂. A. A. ELDRIDGE.

Radioactivity and fertility in soils. JIRKOVSKY (Bull. Czechoslov. Acad. Agric., 1931, No. 3; Proc. Internat. Soc. Soil Sci., 1931, 6, 138).—The fertility of soils may in certain cases be judged by their radioactive behaviour. A. G. POLLARD.

Value of "sticky point" determinations in field studies of soil moisture. E. S. WEST (J. Agric. Sci., 1931, 21, 799—805).—The difference between the moisture and sticky-point moisture of field soils offers a supplementary and more exact basis of comparison of the moisture condition of soils than does the moisture content alone. A. G. POLLARD.

Changes in the permeability of soils to water, produced by gelatin sol. F. DANNENBERG (Z. Pflanz. Düng., 1931, 22A, 353—359).—The permeability of soil was increased by the addition of a solution containing

0.001 g. of gelatin per litre, but decreased by solutions of 0.01 and 0.1 g. per litre. The effect of the gel on the degree of dispersion of the colloids is discussed.

A. G. POLLARD.

Availability of manganese in the soil. C. S. PIPER (J. Agric. Sci., 1931, 21, 762—779).—The availability of soil Mn to plants is controlled by the reaction and oxidation-reduction potential of the soil. Plants can utilise Mn only. Soils showing Mn deficiency can be made to produce normal plant growth by an artificial increase in acidity and/or oxidation-reduction potential (e.g., by temporary water-logging). A. G. POLLARD.

Nature of soil organic matter as shown by the attack of hydrogen peroxide. W. MCLEAN (J. Agric. Sci., 1931, 21, 595—611).—Soil org. matter is oxidised by H_2O_2 in definite stages. With dil. H_2O_2 (up to 1.2% approx.) a complex of const. composition is oxidised in increasing amount. With more conc. H_2O_2 no further attack on N material occurs, but non-N constituents are progressively oxidised. A portion of the org. matter is not decomposed even by 12% H_2O_2 . The "oxidisable complex" forms 70—80% of the total C and N of soil org. matter and is the principal factor determining the C:N ratio of soils. The composition of the oxidisable complex is sp. for a given soil, but varies somewhat in different soils. It is more easily oxidised in soils free from carbonates than in those containing carbonates. A. G. POLLARD.

Effects of burning of moorlands. E. G. SVINHUFOUD (Wiss. Veröff. Finn. Moorkulturver., 1931, 10, 1—84; Bied. Zentr., 1931, 1A, 445).—The burning of moorlands destroys surface peat by a process exactly resembling peat distillation in retorts, NH_3 being an important product. From feebly burning peat $AcOH$ is produced in approx. the same proportion as NH_3 , but with more intense heating NH_3 production is much increased. Liming has but a small effect on the volatilisation of NH_3 during burning. The max. temp. of the burnt layer was 185° at 1—2 mm. and 55° at 1—2 cm. depth. Burning increased the solubility of the mineral matter of the soil and reduced its acidity. Bacterial activity, as judged by the CO_2 - and NH_3 -producing power, was increased. Subsequent manuring of the burnt soil with N, P, or K was unnecessary. A. G. POLLARD.

Influence of antiseptics on the bacterial and protozoan population of greenhouse soils. II. Naphthalene. S. E. JACOBS (Ann. Appl. Biol., 1931, 18, 98—136).—Changes in the numbers of bacteria and protozoa in soils following treatment with $C_{10}H_8$ are recorded. $C_{10}H_8$ -decomposing bacteria utilise the available N of the soil, and, when the supply of $C_{10}H_8$ is exhausted, decompose soil org. matter, producing considerable amounts of NH_3 . A strain of bacteria utilising $C_{10}H_8$ as the sole source of C produced phthalic acid as an intermediate product of its decomp. $C_{10}H_8$ decomp. in soil is followed in the first instance by a slight increase in soil pH , but a second treatment causes a temporary acidity, probably due to CO_2 . A. G. POLLARD.

Relative heats of solution as a simple means of identification of fertilisers. K. KRUMINS (Z. Pflanz. Düng., 1931, 22A, 373—380).—Among commercial

fertilisers the heat of solution is greatest for N materials, less for K mixtures, and least for P fertilisers. The differences are sufficiently wide to permit identification.

A. G. POLLARD.

Possible effects of phosphates on salinised soils. N. D. SMIRNOV (Udobr. Urozhai, 1931, 3, 152—158).—Soils saturated with Na, K, or NH_4 , but not Ca, release into solution appreciable quantities of P from raw phosphates. Phosphate corrected the injurious effect on oats of large quantities of Na and Ca sulphates.

CHEMICAL ABSTRACTS.

Variable effect of phosphates from year to year. F. N. GERMANOV (Udobr. Urozhai, 1931, 3, 141—151).—In good years phosphates with winter rye on chernozem were effective and in poor years ineffective. The moisture factor is not directly responsible, but may have an indirect effect. Probably the nitrates are not const. from year to year, and whenever they are high the P is effective. CHEMICAL ABSTRACTS.

Nitrate-assimilating power of soils. R. A. PENDLETON and F. B. SMITH (Proc. Iowa Acad. Sci., 1930, 37, 65—69).—When sol. org. matter was added to Calhoun silt loam (poor) the nitrate-assimilating organisms were stimulated; accumulation of nitrates without a corresponding increase in available C depressed the activity. This soil showed a lower nitrate content and a higher nitrate-assimilating power than Carrington loam. When org. matter was added to the soils for incubation the differences largely disappeared, and Carrington loam showed a higher nitrate-assimilating power.

CHEMICAL ABSTRACTS.

Physiological reaction of some nitrogenous and potash fertilisers. W. JESSEN (Z. Pflanz. Düng., 1931, 22A, 307—332).—Acidity produced in sandy soils by applications of $(NH_4)_2SO_4$ is much greater than that resulting from equiv. additions of N in the form of urea or NH_4NO_3 . Growth of the higher plants in soils treated with $(NH_4)_2SO_4$ reduced the acidity produced by amounts which varied with the nature of the plants. Acidity produced in cropped soils by urea and NH_4NO_3 was very small. The increased alkalinity produced in cropped soils by $NaNO_3$ treatments was small, but sufficient to cause some reduction in yields. The greater relative intake by plants of the K ion as compared with the anion in KCl or K_2SO_4 causes the physiologically acid reaction of these salts. This is small in the case of KCl, but considerable with K_2SO_4 . A. G. POLLARD.

Studies in soil reaction. VIII. Influence of fertilisers and lime on the replaceable bases of a light acid soil after 50 years of continuous cropping with barley and wheat. (An examination of the Stackyard field plots, Woburn Experimental Station.) E. M. CROWTHER and J. K. BASU (J. Agric. Sci., 1931, 21, 689—715).—The loss of Ca from plots continuously manured with $(NH_4)_2SO_4$ was greater than from those receiving $NaNO_3$, and less than from unmanured plots. The effect of superphosphate on the replaceable Ca content was negligible. The final replaceable Ca was reduced at the rate of 0.8 mol. CaO per mol. $(NH_4)_2SO_4$ added throughout the experiment, and increased at the rate of 0.5 mol. Ca per mol. $NaNO_3$ added. Where the original CaO content was low the majority of the added

lime was recovered in later years, but added CaO was rapidly leached from soils having high replaceable Ca contents. Yields of wheat and barley in recent years were significantly correlated with the replaceable Ca contents of the soils. The degree of "unsaturation" or exchangeable-H content of soils is determined by extracting a soil-CaCO₃ mixture with N-NaCl, the difference between the Ca⁺⁺ and HCO₃['] contents of the extract being taken as a measure of the replaceable Ca⁺⁺ and H⁺. A method is suggested for calculating the effects of various N fertilisers on the CaO content of soils.

A. G. POLLARD.

Influence of inorganic fertilisers on soils. M. HARADA (Bull. Sci. Res. Alumni Assoc. Morioka Coll. Agric. Forestry, 1930, 4, 23—31; Proc. Internat. Soc. Soil Sci., 1931, 6, 129—130).—In continuous manuring trials, an increase in the HCl-sol. Ca of soils was observed when superphosphate was used, and in K and SO₄ with K₂SO₄. Superphosphate did not increase the sol. SO₄^{''} content. The mol. ratio of bases: Al₂O₃ in the acid extracts of soils was increased by superphosphate and K₂SO₄ and reduced by (NH₄)₂SO₄. (NH₄)₂SO₄ definitely increased the exchange and hydrolytic acidities and the [H⁺] of soils, the effect being partly or wholly nullified where conjoint applications of superphosphate or of K₂SO₄ were made. The use of superphosphate increased the exchangeable Ca and Mg contents of the soil, the degree of saturation with bases, and the total and relative PO₄ solubility.

A. G. POLLARD.

Technology of organic fertilisers. S. S. DRAGUNOV (Udobr. Urozhai, 1931, 3, 158—162).—Peat was extracted with 2% NaOH and 2, 4, 10, and 25% NH₃ solutions. The greatest quantity of humic acid was extracted by NaOH from undried peat; with 10% NH₃ 31.2% was obtained, containing 6.31% N. Humic acid intended for use as fertiliser may be precipitated with H₃PO₄ instead of HCl.

CHEMICAL ABSTRACTS.

Effect of manures and crop residues on nitrogen changes and micro-organisms in the soil. F. B. SMITH and P. E. BROWN (Iowa State Coll. J. Sci., 1931, 5, No. 3, 155—166).—Carbonaceous materials in soils prevent NO₃['] accumulation. Sweet clover roots and tops stimulate N assimilation in the soil, but furnish more N and stimulate the development of *Mucor* and *Rhizopus*, organisms which do not assimilate NO₃['] but produce NH₃. Straw and stalks stimulate the development of *Aspergillus*, *Trichoderma*, and *Alternaria*, organisms which decompose cellulose and assimilate NH₃ and NO₃[']; soils containing straw and stalks contained little NO₃[']. "Adco" and (NH₄)₂SO₄ produced a small increase in nitrifying power, nitrate-assimilating power, and nitrate content.

CHEMICAL ABSTRACTS.

Nitrogenous manuring of grassland. H. W. GARDNER, J. HUNTER-SMITH, and H. R. WILLIAMS (J. Agric. Sci., 1931, 21, 780—798).—Further results are recorded (cf. B., 1929, 731). Under the rotational grazing system, rainfall is the predominating factor governing the yield of grass. Annual applications of N fertilisers definitely reduced the proportion of legumes in the pasture. Rotational grazing tended to increase the proportion of sheep's fescue and reduce that of Yorkshire fog and meadow grass. Applications of N produced

no differential effects. The crude protein content of grasses, clovers, and weeds was increased by N fertilisers. The protein content of pasture is largely controlled by its botanical composition.

A. G. POLLARD.

Silicic acid manuring. A. WEIHE (Z. Pflanz. Düng., 1931, 22A, 281—306).—In field and pot-culture trials crop yields were increased by applications of SiO₂. This is due, at least in part, to the improved H₂O-holding capacity of light and medium soils produced by the finely-divided SiO₂.

A. G. POLLARD.

Constancy of the "effect value" of P₂O₅ and K₂O in various agricultural crops. J. PAZLER (Z. Zuckerind. Czechoslov., 1931, 46, 105—116).—The constancy of the "effect values" (Mitscherlich) for K and P and their numerical vals. for oats, barley, and potatoes is confirmed. The val. for horse beans was approx. one half that given by Mitscherlich. The latter's val. for K in the presence of Na (0.93 g./hectare) was high in all cases, the figure observed approaching that for K in the absence of Na (0.33 g./hectare).

A. G. POLLARD.

Crop yields in relation to residual soil organic matter. J. W. WHITE (J. Amer. Soc. Agron., 1931, 23, 429—433).—Soils of low productivity contain a higher ratio of org. to air-dry matter than do more productive soils. When P is applied the ratio is low. N stimulates decay of org. matter. Ratios after various treatments are recorded.

CHEMICAL ABSTRACTS.

Influence of soil reaction on plant growth. D. N. PRIANISHNIKOV (Udobr. Urozhai, 1931, 3, 53—61).—Chernozem and podsols adjusted to various p_H vals. (4.5—8.0) behave differently towards mustard, peas, and beet; soils with a high buffer capacity support plants at a low p_H val. Acid soils with a high buffer capacity contained appreciable amounts of sol. Ca. Beet grows best at p_H 7.0 with NH₃ and at p_H 5.5 with NaNO₃ as source of N. In cultures of acid range the intake of Ca was hindered by using NH₃ as source of N; the effect was counteracted by addition of CaSO₄. With NO₃['] as source of N and increased Ca, Mg, or K in the nutrient solution the yield decreased.

CHEMICAL ABSTRACTS.

Influence of the plant on seasonal changes in soil acidity. A. M. SMITH and I. M. ROBERTSON (J. Agric. Sci., 1931, 21, 822—831).—In laboratory and field experiments, soil acidity increased in the early part of the growing season when salt accumulation was most marked and decreased again as the end of the season approached. The growth of potatoes reduced the extent of these changes, and in the late season the p_H of cropped and uncropped soils were approx. the same. Seasonal changes in soil acidity are definitely connected with the quantity of electrolytes present in the soil.

A. G. POLLARD.

Assimilation and translocation of plant nutrients in wheat during growth. F. KNOWLES and J. E. WATKIN (J. Agric. Sci., 1931, 21, 612—637).—The distribution of mineral nutrients in wheat plants from 7 weeks prior to ear emergence until harvesting is recorded. In whole plants the % of nutrients in the dry matter decreased throughout the period. The SiO₂ content remained approx. const. The nutrient of the ear

declined from 2 weeks after emergence until harvested. The total wt. of nutrients in the whole plant markedly increased until ear emergence. The subsequent intake was much slower. The quantity of the various nutrients in the plant attained maxima at the following periods prior to harvesting: K, 7 weeks; Ca and Cl, 5 weeks; N, 3 weeks; C, P, and SiO₂, 2 weeks. Transition of nutrients from stems to ears continued until within 1 week of harvesting. A downward movement of K, Ca, and Cl as the plant approaches maturity is suggested. The dry matter entering the ear became richer in N-free org. matter and poorer in nutrients as the plant matured.

A. G. POLLARD.

The sulphur of pasture grass. I. Cystine content of pasture grass. R. E. EVANS (J. Agric. Sci., 1931, 21, 806—821).—The org. S content of grass cut for hay averaged 39% less than that of grass cut at 7—14-day intervals. Heavy dressings of inorg. sulphates produced an average increase of 8% in the org. S content of grasses. No relationship was apparent between the protein and org. S contents. The average cystine content of pasture grasses was 0.1% of the dry matter.

A. G. POLLARD.

Some effects of legumes in relation to economical crop production. R. C. COLLISON (New York Agric. Expt. Sta. Bull., 1931, No. 596, 16 pp.).—A comparative study is made of N economy in the soil and crop in lucerne-grain and timothy-grain rotations.

W. G. EGGLETON.

Pine injury in N.-W. Germany. M. TRÉNEL (Forstarchiv, 1931, 7, 285—294; Proc. Internat. Soc. Soil Sci., 1931, 6, 134).—Roots of injured pines containing a fungus were abnormally high in Al and Mn, and the ash was low in Ca. The soils were acid (pH 3.0—3.6) with high KCl-sol. Al contents. The growth of the fungus was favoured by the presence of Al in soil and root sap.

A. G. POLLARD.

Removal of plant nutrients in oil palm cultivation. C. D. V. GEORGI (Malayan Agric. J., 1931, 19, 484—489).—Analyses of the various organs of the plant are recorded and manurial measures discussed.

A. G. POLLARD.

Commercial suspensions used in the spraying of plants. R. M. WOODMAN (J.S.C.I., 1931, 50, 391—397 r).—A manufactured suspension of a Cu compound (Bouisol) has been found to be finer particled than ordinary Bordeaux mixture. Sulsol, an experimental S suspension, gave indications of being slightly finer particled than the well-known commercial product, Ialine S, but the latter was found to contain about 5½ times as much S, and this is of great practical importance because it tends to easier handling and economy in labour. The need for actual field trials, in addition to the experiments made, is emphasised. Soft soap and gelatin tend to coagulate Ialine S, whilst gum arabic is an indifferent protective colloid for this S.

Arsenical substitutes for peach spraying. S. MARCOVITCH, W. W. STANLEY, and M. V. ANTHONY (J. Econ. Entom., 1931, 24, 844—850).—In areas where standard Pb arsenate sprays caused foliage injury, dusting with a 1:1 mixture of S and BaSiF₆ gave superior control of peach pests.

A. G. POLLARD.

Fungicidal properties of certain spray-fluids. VIII. Mineral, tar, and vegetable oils. H. MARTIN and E. S. SALMON (J. Agric. Sci., 1931, 21, 638—658; cf. B., 1930, 877).—Results of numerous trials with laboratory and proprietary preparations are recorded. The margin of safety between the toxic action of mineral oils on powdery mildews and the injurious effect on foliage is small. No relation exists between the ease of breaking of oil emulsions and their fungicidal effects. It is doubtful if the higher refining of mineral oils would obliterate foliage injury, or if such oils would satisfactorily replace S as fungicides. Tar oils freed from tar acids are injurious to foliage at fungicidal concentrations.

A. G. POLLARD.

Spraying and dusting for the curculio on peach in 1930. O. I. SNAPP and J. R. THOMAS (J. Econ. Entom., 1931, 24, 854—860).—Heavy dusting with 5% Pb arsenate dusts gave as good results as wet spraying. Standard Pb arsenate sprays were not improved by addition of fish oil. Combined sprays of Pb arsenate, CaS, and no CaO produced greater foliage injury than those of self-boiled CaO-S and Pb arsenate.

A. G. POLLARD.

Vegetable seed treatment with special reference to the use of hot water and organic mercurials. E. E. CLAYTON (New York Agric. Expt. Sta. Tech. Bull., 1931, No. 183, 43 pp.).—Stimulation of growth by chemical or heat treatment of seed cannot be produced at will. Treatment with various org. and organo-metallic preparations exercises a protective effect on the seed which prevents decay and increases the stand of plants. The effect is greatest in early spring, when the germination period is longest and the chances of decay are greatest. The best results were obtained with org. mercurials used as dusts.

Petroleum oils and oil emulsions as insecticides and their use. San José scale on peach trees. H. S. SWINGLE and O. I. SNAPP (U.S. Dept. Agric. Tech. Bull., 1931, No. 253, 48 pp.).—In cold-stirred oil emulsions the quality of the emulsion was largely influenced by the viscosity of the soap used. Soaps made with only a slight excess of KOH and containing 60—75% H₂O gave the best results. BuOH had good stabilising properties for these emulsions. The f.p. of emulsions ranged from —0.1° to —1.3°. If unstirred, oil emulsions remained stable after freezing and thawing. The viscosity of oils gave the best indication of their toxicity to San José scale, other physical properties and the sulphonation test showing little relationship. Oil sprays did not affect the period of blooming of peaches, and no cumulative injury was detected.

A. G. POLLARD.

Cage tests of the effectiveness of insecticidal dusts for the control of the cotton-leaf hopper. K. P. EWING (J. Econ. Entom., 1931, 24, 821—827).—Nicotine dusts (4%) were very toxic to both adults and nymphs of *Psallus seriatius*. S was more toxic to nymphs than adults. Na₂SiF₆ and a commercial prep. of Ca arsenate and Paris Green were unexpectedly effective.

A. G. POLLARD.

Determining the relative toxicity of contact insecticides, with special reference to the action

of nicotine against *Aphis rumicis*. H. H. SHEPARD and C. H. RICHARDSON (J. Econ. Entom., 1931, 24, 905—913).—Technique and methods of evaluating results are described. A. G. POLLARD.

Nitrogen fixation in some Iowa soils. R. H. WALKER (Proc. Iowa Acad. Sci., 1930, 37, 75).

PATENTS.

Manufacture of fertilisers. IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 359,020, 14.7.30. U.S., 13.7.29).—Superphosphates are sprayed and intimately mixed with a solution of NH_4NO_3 in liquid or aq. NH_3 , prepared, e.g., by saturating 40—65% HNO_3 with NH_3 .

L. A. COLES.

Storage of fertilisers which are hygroscopic or have a tendency to cake. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 359,163, 26.9.30).—The fertilisers during storage are sprayed on the exposed surface with material providing a protective layer impermeable to moisture; e.g., $\text{NH}_4\text{NO}_3 + (\text{NH}_4)_2\text{SO}_4$ is sprayed with linseed oil, urea with a lacquer or a solution of a urea- CH_2O condensation product, or $\text{Ca}(\text{NO}_3)_2$, after covering with kieselguhr, with dil. caoutchouc solution.

L. A. COLES.

Fungicides. J. GUILLISSEN, and UNION CHIM. BELGE, Soc. ANON. (B.P. 357,443, 18.12.30).—A 1:1 or 1:3 mixture of dry alkali fluosilicate (Na salt) is added to basic Cu carbonate, or other insol. Cu salt, for use in the disinfection of dry seeds. H. ROYAL-DAWSON.

Fertilisers.—See VII. Hydrated CaO.—See XVIII.

XVII.—SUGARS; STARCHES; GUMS.

Combined drying of sugar beets. A. VOSTOKOV (Sovet. Sakhar, 1930, 680—684).—S compounds in the gases employed invert the sugar in the cosettes. The cosettes are preferably dried in a drum to 70% H_2O , treated with CaCO_3 (1% of wt. of raw beets), dried to 10% H_2O , pressed into bricks, and dried at 90° for 1 hr. to coagulate the surface layer. CHEMICAL ABSTRACTS.

[Sugar juice] carbonatation studies. II. Parallel carbonatations. L. DOSTÁL (Z. Zuckerind. Czechoslov., 1931, 56, 1—9; cf. B., 1931, 900).—A method and apparatus for the liming, carbonatation, and filtration of beet juice on a laboratory or semi-factory scale are described, by which much more concordant results can be obtained than hitherto in such studies. Average differences in parallel trials with the same raw juice were 0.06% in the purity of the final juice, 0.6% Stammer in its colour, 6.7% in the duration of filtration, and 38.5% in the duration of sweetening-off, the sugar content of the scums being reduced to 0.29% with a H_2O consumption of 146%. J. H. LANE.

Influence of liming on the filtration of carbonated [beet-sugar] juice. J. VONDRÁK (Z. Zuckerind. Czechoslov., 1931, 56, 13—22).—In laboratory experiments on the treatment of raw beet juice at 85° with 1% of CaO, followed by carbonatation, addition of about 10% of the CaO a few min. before the main quantity resulted in much more rapid filtration of the carbonated juice than when the whole of the CaO was added at one time. The amount of CaO which must be added before the main quantity, to give the best results, may vary with

different juices. The higher the temp. at which it is added and the longer the pause before the main addition (up to 7 min. at least), the greater is the improvement in filtration. The improvement is due to increased density of the carbonatation ppt., as shown by its rate of subsidence in the carbonated juice. The ppt. formed before carbonatation also subsides more compactly as the result of fractional liming, and this affords a rapid means of determining the optimum amount of CaO to add before the main quantity. The benefit of fractional liming is not equally pronounced for different total amounts of CaO used; probably there is for each juice an optimum amount of total CaO. J. H. LANE.

Clarification of beet juice by reduced lime treatments. J. VAŠÁTKO (Z. Zuckerind. Czechoslov., 1931, 56, 117—120).—Optimum conditions for the clarification of beet juice are obtained by the use of less than the customary amounts of CaO. Excessive liming may involve dissolution of a portion of the precipitated matter. Efficiency of clarification varies with the temp. of the solution and the time of treatment. A method for determining the optimum CaO dosage is described. A. G. POLLARD.

Clarification of cane juice in relation to phosphate content. H. D. LANIER (IV Ann. Conf. Assoc. Sugar Tech. Cuba, 1930).—The possibility of improvement in clarification by addition of phosphate varies with the locality; 95—98% of the P_2O_5 is precipitated as $\text{Ca}_3(\text{PO}_4)_2$ when the juice is limed beyond p_{H} 7.0. Application of phosphate reduced the losses and the yield of molasses. CHEMICAL ABSTRACTS.

Action of carbonic and sulphurous acids on beetroot juice containing precipitated organic calcium compounds. J. ZAMARON (Bull. Assoc. Chim. Sucr., 1931, 48, 375—377).—The juice should be filtered before treatment with CO_2 and SO_2 , since the insol. org. Ca compounds are attacked by these gases with the production of sol. amidosulphites and carbonates which increase the colour of the juice by 25—30% and diminish its purity by 1—2%. C. RANKEN.

Catalytic action of iron in the discoloration of alkaline sugar solutions. O. SPENGLER and F. TÖDT (Z. Ver. deut. Zucker-Ind., 1931, 81 550—566).—A continuation of a previous investigation (B., 1931, 510) with experiments on the same lines, concerned mainly with the action of KCN and Na_2SO_3 in lessening discoloration of alkaline sucrose solutions on heating. No very general conclusions are drawn. A supposed influence of extent of surface in contact with the air on the amount of discoloration, inferred from experiments with solutions of refined sugars of medium quality, was not observed with the highest grades of refined sugar. J. H. LANE.

Addition of water to [beet-sugar] after-product masseccutes. R. FREUND (Z. Zuckerind. Czechoslov., 1931, 56, 9—12).—Several formulæ are derived for calculating the amount of H_2O to be added to an after-product masseccute in order to obtain, on centrifuging at a given temp., a molasses of given purity and coeff. of supersaturation. J. H. LANE.

Low-purity masseccutes. S. J. SAINT (Trop. Agric., Trinidad, 1931, 8, 3—10).—Considerable inversion of sucrose does not occur during cooling in the crystalliser.

The theory and practice of crystallisation of sucrose from low-purity massecuites are discussed.

CHEMICAL ABSTRACTS.

Scientific control of cane-sugar boiling. J. GUILLAUME (Bull. Assoc. Chim. Sucr., 1931, 48, 308—316).—Thieme (Archief, 34—35) found that the solubility of sucrose in the H_2O present in cane juices is less than in pure H_2O in the ratios (coeffs. of saturation) 0.625, 0.86, and 0.96 for juices of purities 30, 60, and 90%, respectively. These vals. are lower than those for beet juices, which are >1 for purities below 85%. Scientific pan control depends on a knowledge of the coeff. of supersaturation, the calculation of which from Claassen's formula may be simplified so as to depend on 3 vals. only, viz., temp., purity, and Brix, the last of which may be most conveniently determined by means of the pan refractometer (cf. Saint, B., 1931, 476).

J. H. LANE.

Decrease in the losses of sugar in the final molasses. A. MOGILNUI (Sovet. Sakhar, 1930, 1168—1172).—Diminution of pressure in the pans during the first part of the boiling decreases the time of boiling. Injection of sugar powder at 78—82° gives uniformity of crystals. Uniform crystallisation and max. exhaustion of mother-liquor are obtained by continuous flow of feed liquor into the vac. pan and gradual rise of temp. to 83—85°.

CHEMICAL ABSTRACTS.

Utilisation of defecation scum from cane-sugar manufacture. E. SZÉGO (Bull. Assoc. Chim. Sucr., 1931, 48, 378—381).—The moisture content of the filter-pressed defecation scum is reduced from 65% to approx. 12% by heating in a furnace heated by waste gases. An average sample of the desiccated product, which is a suitable feed for cattle, contains moisture 16.20, fats 4.65, mineral matter 15.80, nitrogenous substances 13.98, cellulose 15.22, carbohydrates and non-protein extractives 34.15%.

C. RANKEN.

Conductometric determination of the affining values of raw [beet] sugars. O. SPENGLER and G. GRUNOW (Z. Ver. deut. Zucker-Ind., 1931, 81, 543—549).—A criticism of a recent paper by Šandera and Ružička (B., 1931, 900).

J. H. LANE.

Determination of water in molasses by distillation with specifically heavier liquids. E. THIELEPAPE and A. FULDE (Z. Ver. deut. Zucker-Ind., 1931, 81, 567—579).—Light liquids like xylene are unsuitable, as the molasses tends to cake on the bottom of the distillation flask. This occurs to some extent with C_2HCl_3 , whilst with C_2Cl_4 the high b.p. causes some carbonisation of the molasses. A mixture of 1 vol. of C_2HCl_3 with 2 vols. of C_2Cl_4 , b.p. 112—115°, is satisfactory. Three suitable forms of apparatus were tested for beet molasses, viz., those of Tausz and Rumm (B., 1926, 338), Pritzker and Jungkuz (A., 1929, 1029), and Friedrichs. Results in close agreement with those given by drying on sand at 110° were obtained with all three. The last two, employing 10 g. of molasses, effect the determination in <1 hr., require much less attention than the first, and provide for automatic collection of the distilled H_2O in a measuring tube, whilst the excess of org. liquid returns to the distillation flask. Both these forms of apparatus are commended, but Friedrichs' is preferred. J. H. LANE.

Determination of sugar in apples. F. BOINOT (Bull. Assoc. Chim. Sucr., 1931, 48, 383—388).—In the presence of EtOH the amount of sugar determined by the Clerget inversion method is 6—20% less than that actually present. The diminution is less if the EtOH is removed by low-pressure distillation, and it disappears if a second hydrolysis is effected on the residue of the first after neutralisation followed by evaporation of the EtOH. The loss in sugar is due to the formation of an ethylglucoside by interaction of the EtOH and sugar, with HCl as catalyst.

C. RANKEN.

Compounds of sugar and lime. J. DUBOURG (Bull. Assoc. Chim. Sucr., 1931, 48, 297—306).—Sucrose solutions containing 90, 140, and 200 g./litre were shaken for 3 hr. with fine slaked CaO equiv. to 30, 60, and 90 g. of CaO per litre, at const. temp. of 15°, 40°, 60°, and 80°, and were then filtered and analysed. At const. temp. a sugar solution dissolves more CaO the larger is the excess added, and a solution saturated at low temp. and then heated to 80° retains more CaO in solution than if saturated at 80° in one stage. These anomalous solubility relations are attributed to the undissolved CaO particles becoming encrusted with Ca_3 saccharate, which arrests dissolution of the CaO prematurely. Replacement of the undissolved CaO by a fresh portion enables the solution to dissolve a further quantity. The incrustation occurs more rapidly at high than at low temp. J. H. LANE.

Influence of neutral salts on the acid inversion of sucrose. H. COLIN and A. CHAUDUN (Bull. Assoc. Chim. Sucr., 1931, 48, 369—374).—The velocity of the hydrolysis of sucrose by a strong acid is accelerated by the addition of a neutral salt of the same acid. When a 5% solution of sucrose is hydrolysed by 0.1N-HCl with added KCl or NaCl, the ratio of the hydrolysis const. to that given by HCl alone decreases to <1 as the concentration of the salt is diminished. When the acid and salt have no common ion the ratio is never <1 . Similar results are given by HNO_3 . With strong acids the ratio of the hydrolysis consts. increases with increased concentration of the sugar, whereas with weak acids the ratio decreases. The variation in the p_H of the solutions shows no relation to the ratio of the consts. No satisfactory explanation of the results has been found.

C. RANKEN.

Analysis of starch syrup. A. P. SCHULZ and G. STEINHOFF (Z. Spiritusind., 1931, 54, 198—199).—The moisture content of the syrup is calc. from the d of the syrup (as determined by a modification of the standard method). The syrup is drawn by an air-pump into a pipette from which it is introduced into a pycnometer consisting of a cylindrical, bottle-shaped 50-c.c. flask which is provided with a narrow neck into which is ground a very narrow tapering head. The top of this head serves as the capacity mark and is closed by a small glass cap. The pycnometer (of known H_2O val.) is three quarters filled with syrup and centrifuged to eliminate air bubbles. After weighing, it is filled to the brim with a liquid of known d , e.g., H_2O ; the narrow head is then inserted and after removal of the exuded liquid the completely filled bottle is weighed again and the vol. of the syrup calc. The whole operation is carried out at 20°, the result being given in terms of d_{20}^{20} .

C. RANKEN.

Determination of moisture content of starch products. A. P. SCHULZ and G. STEINHOFF (*Z. Spiritus-ind.*, 1931, 54, 277—278; cf. *B.*, 1931, 901).—Various methods are compared. For potato flours, the most accurate method uses a drying-oven in which a weighed quantity is heated for 1 hr. at 50° and raised within 30 min. to 120°, at which temp. it is kept for 4 hr. Almost equally reliable results are obtained in 45 min. by the Korant apparatus in which 10 g. of the substance are dried on one of the Al trays of the balance by direct electric heating. With syrups, heating for 1 hr. in a vac. is most accurate, and slightly less reliable results can be obtained in 30 min. by the distillation method in which, after addition of a liquid such as $C_2H_2Cl_4$, the H_2O and the added liquid are distilled off. In the two layers which form, the amount of H_2O is easily determined.

C. RANKEN.

Two-effect pressure evaporation with juice-vapour compression. S. TRAUB (*Nauk. Zapiski Tzuk. Prom.*, 1930, 10, 75—85).

Diffusion battery.—See I. **Determining sucrose in beer.**—See XVIII. **Honey.**—See XIX.

PATENTS.

Depuration of liquid [sugar-beet juice]. A. GUADAGNINI (U.S.P. 1,798,792, 31.3.31. Appl., 8.10.23).—To obtain deodorised juices from beets or similar materials, the sliced beets with about 1.2 times their wt. of H_2O are heated in a special autoclave, under 0.5 atm. pressure for $1\frac{1}{2}$ hr., during the second $\frac{1}{2}$ hr. and final $\frac{1}{4}$ hr. of which vapour is continuously blown off, a special superheating coil in the upper part of the autoclave enabling this to be done without reduction of internal pressure.

J. H. LANE.

Production of sugars from cellulosic material. R. GRIESSBACH and E. KOCH, Assrs. to I. G. FARBENIND. A.-G. (U.S.P. 1,793,084, 17.2.31. Appl., 11.10.28. Ger., 19.11.27).—Mixtures of 35—38% HCl with 70—89% H_3PO_4 are employed; e.g., 1 pt. of sawdust is treated with a mixture of 5 pts. of 38% HCl and 2 pts. of 80% H_3PO_4 at 20° for 48 hr., and the separated liquid is freed from HCl in vac. at 40° and from H_3PO_4 as $CaHPO_4$.

J. H. LANE.

Bleaching molasses by means of electrolytic treatment and manufacture of yeast therefrom. J. W. THOMPSON and J. W. HINCHLEY (B.P. 356,703, 2.6.30).—Molasses is diluted, acidified, and bleached in an electrolytic cell between C or other inert electrodes. Beet molasses may be diluted to a sugar content of 15%, treated with 0.5—1% of H_2SO_4 , subjected to a d.c. of 1 amp./sq. ft. until about 60% of the colour has disappeared, and then neutralised, clarified, and used for yeast manufacture.

J. H. LANE.

Apparatus for affining raw sugar. J. WIESNER (B.P. 357,796, 3.10.30. Addn. to B.P. 352,619; *B.*, 1931, 1152).—A modified spreading or spraying member is described, and an alternative arrangement therefor.

B. M. VENABLES.

Manufacture of hydrate dextrose from high-purity solution. INTERNAT. PATENTS DEVELOPMENT Co. (B.P. 354,642, 7.11.30. U.S., 14.11.29).—Dextrose solutions of high purity, e.g., 97%, are conc. to d 1.334—

1.3591, cooled rapidly to about 38°, and then allowed to cool gradually to about 35° during slow agitation while crystallisation occurs, preferably without seeding. Artificial cooling may be employed later to reduce the temp. to about 30° for centrifuging. The low syrup concentration and temp. favour the formation of hydrate crystals, and if some anhyd. crystals are formed at first these become transformed into hydrate later.

J. H. LANE.

Apparatus for separating starch from starch-containing matter by washing out the latter. O. RIEMANN (U.S.P. 1,798,811, 31.3.31. Appl., 24.8.28. Ger., 26.11.27).—A semi-cylindrical, perforated trough has a rotating axial shaft bearing helical conveyor blades and radial arms fitted with brushes and perforated scoops which reach to the walls of the trough. Water is sprayed from above, especially on the brushes and scoops as they ascend and descend, and a long receptacle below the trough receives the washed-out starch suspension.

J. H. LANE.

Manufacture of soluble starch. R. and W. HAAKE (U.S.P. 1,792,088, 10.2.31. Appl., 15.5.28. Ger., 13.10.26).—Ordinary starch (100 kg.) is intimately mixed with a small proportion of conc. alkali hypochlorite solution (12 kg. of conc. NaOCl solution), so that it remains pulverulent. Rise of temp. occurs sufficient to evaporate the excess of moisture from the starch.

J. H. LANE.

Crushing mill. Filtering sugar juice. Boiling viscous solutions.—See I. **Drying of starchy materials.**—See V. **Glycerin.**—See XVIII.

XVIII.—FERMENTATION INDUSTRIES.

Manufacture of absolute alcohol. R. JUMENTIER (*Bull. Assoc. Chim. Sucr.*, 1931, 48, 396—407).—Abs. EtOH may be prepared by direct dehydration of the fermented wort, by dehydration of the resulting phlegms following distillation, or by dehydration of the rectified EtOH following distillation and rectification. The first method, which is superior to the second, shows the lowest consumption of steam, the least waste, and the highest yield. A detailed description is given of how various types of Barbet and Guillaume rectifiers may be converted for the dehydration of rectified EtOH or for the dehydration of the phlegms.

C. RANKEN.

isoPropyl alcohol as denaturant [for ethyl alcohol]. H. GUINOT (*Z. Unters. Lebensm.*, 1931, 62, 330—335).—It is suggested that about 1% of Pr^iOH is suitable since it is cheap, not easily separated, and about 0.05% can be determined reliably in the absence of pyridine by Noetzel's method (*B.*, 1927, 668). It does not occur normally in natural spirits, and though volatile substances reacting with NH_2OH , HCl are sometimes obtained by distillation, these are destroyed by the acid- $K_2Cr_2O_7$ treatment.

J. GRANT.

Analysis of barley husks. L. HEINTZ (*Woch. Brau.*, 1931, 48, 443—446, 449—452).—The constituents of barley husk were separated by the methods used for hops (*B.*, 1931, 941). Resins and tannin were not detected, but a brown H_2O -sol. constituent is discussed as a possible cause of beer turbidities. For its removal the use of CaO in the steep-water is advocated.

F. E. DAY.

Analytical procedure for examination of hops, barley husk, etc. L. HEINTZ (Woch. Brau., 1931, 48, 460—463).—An elaborate technique based on successive extractions with Et_2O , EtOH , H_2O , and 3% aq. NaOH is outlined. In addition to the soft and hard resins, wax, and fatty acids which are the main constituents of the Et_2O extract, 20 other fractions are recognised (cf. B., 1931, 941). F. E. DAY.

Analysis of hops. B. D. HARTONG (Woch. Brau., 1931, 48, 463—464).—The criteria applied to hop tannin by Heintz (B., 1931, 941) are not sp. The only sp. test is adsorption by hide powder, and this, together with its yielding a phlobaphen and its reactions with fused KOH , places it in the group of conjugated tannins (phlobatannins). F. E. DAY.

Metabolism of yeasts in relation to the fermentation of beer. F. WINDISCH (J. Inst. Brew., 1931, 37, 561—571).—Anaerobic cultivation of yeasts stimulates the metabolic functions and not only effects a considerable increase in the fermentation intensity in comparison with aerobic and semi-aerobic growths, but also brings about a corresponding increase of respiration activity. Abundant aeration merely stimulates the reproductive capacity and thus leads to a yield of yeast the individual cells of which have a weakened metabolic energy on account of their forced reproduction. Similarly, yeasts cultivated at a low temp. have the properties of anaerobic yeasts, whilst those cultivated at high temp. show decreased fermentative and respirative capacities. In all cases the energy capacities of the yeasts are calc. on the no. of cells and not on the amount of dry substance. C. RANKEN.

Colour [roasted] malt. F. KUTTER (Woch. Brau., 1931, 48, 439—442).—A burnt, bitter flavour in the beer can be avoided by thoroughly roasting the malt used for colouring, or by adding it to the mash as an extract prepared at a temp. not above 50° . The amounts of extract and colour depend on the time and temp. of extraction. Good-quality roasted wheat malt gives higher extract and colour than does the corresponding grade of roasted barley malt, but they are indistinguishable as regards flavour imparted to beer. F. E. DAY.

Separation of deposit [from worts] on cooler or in back. H. STADLER (Woch. Brau., 1931, 48, 447—449).—There was little difference between the amounts of deposit from two similar worts held in a back for approx. 1.5 and 2.5 hr., respectively. Similar worts held on a flat cooler gave deposits about 7 and 30% greater in 1.5 and 2.5 hr., respectively. F. E. DAY.

Adsorption of beer proteins by various media. H. FINK and W. RIEDEL (Woch. Brau., 1931, 48, 437—439).—Using two preparations of $\text{Al}(\text{OH})_3$, it was found that albumose-N was adsorbed in greater amount than amino-N, and this than peptone-N. Kaolin and kieselguhr are less powerful adsorbents than is $\text{Al}(\text{OH})_3$. F. E. DAY.

Determination of sucrose in beer. S. FIEHE (Z. Unters. Lebensm., 1931, 62, 381—382).—The beer is decolorised with C in the warm and 1 c.c. of clear filtrate heated with 1 c.c. of conc. HCl on the water-bath for 1 min. Any hydroxymethylfurfuraldehyde thus produced from the sucrose is detected by addition of

8 c.c. of diorescinol-free phloroglucinol (6.25 g./litre in 16% HCl) to the cool solution, when a red colour or ppt. results. This may be assessed by comparison with beer containing 1—5% of added sucrose, or determined (cf. B., 1929, 375, 955) by filtration after 24 hr., the washed ppt. being weighed after drying for 3 hr. at 100° and 3 hr. in air. Tabulated vals. of ratios of wts. (in mg.) of phloroglucinol compound: aldehyde (2:2.3, 4:3.3, 5:4.2, 15:7.9, 25:12, and 36:16.3) enable the amount of the latter to be calc. from the appropriate wt. of the former. The method could be applied, probably, to sucrose in malt extract, lactose, and other products free from fructose compounds, and to fructose compounds in rye and wheat flours. J. GRANT.

Evaluation of wines and wine distillates. Comparative experiments with factory and laboratory preparations. H. WÜSTENFELD and C. LUCKOW (Z. Unters. Lebensm., 1931, 62, 303—317).—Comparative analyses have been made of fractions (78—93°) from distillations of 5 wines (Burgundy and Champagne) under distillery conditions, and in a 3-litre tinned-Cu laboratory still. Fraction 1 (78°) was good in flavour, though yeasty, and contained the more volatile aroma-producing substances (furfuraldehyde, esters, aldehydes, etc.); fraction 2 was weak, 3 fairly good, 4 good (less volatile aromatic substances such as acids, 90—93°), whilst 5 was watery. The analyses of the fractions obtained in the laboratory differed from the corresponding factory data, e.g., less EtOH (by 3—9 vol.-%) and aldehydes (by 0—0.02 g./100 c.c.); the former are therefore only of limited value. J. GRANT.

Investigation and evaluation of wine distillates and wine brandies. III. G. BÜTTNER and A. MIERMEISTER (Z. Unters. Lebensm., 1931, 62, 317—330; cf. B., 1930, 527).—On storage in half-filled, corked glass flasks for 18 months in the dark the EtOH in wine distillates containing 64.3, 67.6, and 71.5 vol.-% of EtOH falls about 1% and higher alcohols 80—200 cu. mm., whilst acidity increases 20—80 mg. (as AcOH), esters 500—1300 mg., aldehydes 50—250 mg., and furfuraldehyde 0—0.8 mg., per litre of wine distillate EtOH (cf. B., 1929, 573). Similar changes were observed in each case after dilution to give an EtOH content of about 40 vol.-%. The amounts of refined spirit added (0—50%) to an ordinary and a good-quality Champagne distillate as determined by Mickó's fractional distillation method, by Wüstenfeld's method, and from the analytical data were in good agreement. The full analytical data for 24 suspected and 55 genuine wine brandies and wine distillates are tabulated. J. GRANT.

Detection of [fruit] berry wine in red and dessert wine. C. WILHELM (Z. Unters. Lebensm., 1931, 62, 482—489).—In the author's version of the Stahre-Kunz reaction (A., 1915, ii, 595), 25—100 c.c. of neutralised wine are evaporated to 20 c.c., acidified with 2 c.c. of H_2SO_4 (d 1.18), and 20—75 c.c. of Br -water added till the red colour turns yellow-brown. The mixture is shaken with kieselguhr, diluted to 100 c.c., filtered, 50 c.c. are mixed with 10 c.c. of 50% H_2SO_4 and 3—6 c.c. of 37.5% KBr at 42° , and 5% KMnO_4 is added in slight excess. After 10 min. at 55° cold-saturated FeSO_4 in dil. H_2SO_4 is added till the yellow

colour turns to green-white, and the pentabromoacetone filtered from the cool solution, washed with 1% H_2SO_4 and H_2O , dried in a vac., and weighed, when the factor 0.464 gives citric acid + H_2O (m.p. 73°). Distillation of the filtrate gave no evidence of $COMe_2$ as stated by Woehlk (A., 1902, ii, 364). The max. error for pure citric acid (0.5—2%) was —0.04%; 0—0.5 g./100 c.c. was found in fruit wines and 0—0.03% in genuine grape wines. The method may be used for the qual. detection of 5% of fruit wine in grape wine, but is not recommended for quant. work as only 90% of the citric acid present is determined. J. GRANT.

Detection of "fruit wine" in wine by Werder's method. Preparation of sorbitol hexa-acetate. R. JAHN (Mitt. Lebensm. Hyg., 1931, 22, 92—94; Chem. Zentr., 1931, i, 3186).—Benzylidenesorbitol is preferably boiled with HCl in MeOH, and the resulting sorbitol is acetylated. A. A. ELDRIDGE.

Detection of sorbitol in wine. Quantitative investigations on dibenzylidenesorbitol. B. BLEYER, W. DIEMAIR, and G. LIX (Z. Unters. Lebensm., 1931, 62, 297—303).—Dextrin and/or dextrose (1—5 g.) lower the sorbitol content (0.1 g.), as found by Werder's method, by 40—60%, whilst in the presence of 10 g. of the former the reaction is negative (cf. B., 1930, 737); mannitol (1—50 g./g. of sorbitol) gives a negligible positive error. All such interfering substances may be removed by warming 1 litre of wine with 30 g. of C, 25 c.c. of the clear filtrate being conc. to 4 c.c., precipitated with a 10-fold vol. of MeOH, and filtered after 2 hr. at 0°. Such treatment reduced the sugars (as dextrose) from 0.16 to 0.07%, and also the N content (from 5 to 1.3 mg./100 c.c.). Max. results (98% yield) are obtained by addition to 1 g. of sorbitol (or a syrupy solution) of 0.5 g. of H_2O , 1.5 g. of PhCHO, and 1 g. of 50% H_2SO_4 at 20° (no yield at 90°), the precipitated dibenzylidenesorbitol being filtered next day, washed with 100 c.c. of H_2O and 10 c.c. of 50% EtOH, and dried for 3 hr. at 65° and weighed. Departures from these conditions may give low results owing to the formation of the mono-compound. The use of Merck's carbo medicinalis (up to 100 g./litre) had little or no influence on the results. J. GRANT.

Determination of volatile acid in wine. J. JEANPRÉTRE (Mitt. Lebensm. Hyg., 1931, 22, 94; Chem. Zentr., 1931, i, 3186).—NaCl (10 g.) is added to the wine (50 c.c.), which is then distilled; 90% (68% without NaCl) of the volatile acid passes over in the first 100 c.c. A. A. ELDRIDGE.

Analysis of spirits by fractional distillation. G. BONIFAZI (Mitt. Lebensm. Hyg., 1931, 22, 21—38; Chem. Zentr., 1931, i, 3186).—Characteristic ester ratios for various fractions obtained by "birectification" (Mickó) for kirschwasser are recorded. I vals. for the essential oils are also recorded. A. A. ELDRIDGE.

Analysis of spirituous liquors. T. VON FELLENBERG (Mitt. Lebensm. Hyg., 1931, 22, 1—8; Chem. Zentr., 1931, i, 3186).—The behaviour of various constituents on fractionation of the spirits is recorded in curves. A. A. ELDRIDGE.

Effect of heat on milk catalase.—See XIX.

PATENTS.

Preparation of absolute alcohol and commercially pure powdered hydrated lime. W. H. ENGELS, Assr. to MERCK & Co. (U.S.P. 1,790,907, 3.2.31. Appl., 5.7.27).—Aq. EtOH is stirred and refluxed with slight excess of powdered CaO for 4—6 hr., and after distilling off abs. EtOH the H_2O necessary for complete hydration of the CaO is added. C. HOLLINS.

Manufacture of [*n*]butyl alcohol. K. VIERLING, Assr. to I. G. FARBENIND. A.-G. (U.S.P. 1,802,163, 21.4.31. Appl., 3.12.28. Ger., 27.12.27).—An oily product containing 84% of *n*-BuOH is obtained by fermenting with *Amylobacter* bacteria a mash containing molasses, phosphate, and a H_2O -insol. substance of natural origin containing protein, e.g., malt germs or dried yeast. C. RANKEN.

Manufacture of glycerin by fermentation. IMPERIAL CHEM. INDUSTRIES, LTD., and C. H. LILLY (B.P. 349,192, 18.3.30).—A solution of carbohydrates with added sol. sulphites and bisulphites so that the solution is approx. neutral is fermented as far as desired and made alkaline with soda ash. The volatile products are distilled off (with or without removal of the yeast) and the residual liquid after regeneration with SO_2 is added to a fresh batch of fermenting molasses solution. C. RANKEN.

Production of beverages of reduced alcohol content. H. HEUSER (U.S.P. 1,800,940, 14.4.31. Appl., 26.1.28).—The original beverage is distilled under reduced pressure and the alcoholic vapours are condensed and removed, whilst the aroma-containing vapours are compressed and forced into the cooled de-alcoholised residue of the beverage. C. RANKEN.

Preparation of hop extract and products containing hop extract. E. C. HORST (U.S.P. 1,800,632, 14.4.31. Appl., 3.5.27).—After removal of the volatile oils from the hops by distillation, the bitters, tannins, and foam-producing constituents are extracted from the hop residues by boiling with sugar solution. The liquid is drained from the pulp, conc. to a syrupy consistency, and mixed with the condensed hop oil. C. RANKEN.

Yeast from molasses.—See XVII.

XIX.—FOODS.

Baking temperature of bread. O. B. READ (Proc. Iowa Acad. Sci., 1930, 37, 231—233).—The temp. change and physical changes were followed. Moist starch grains begin to disintegrate at about 75°.

CHEMICAL ABSTRACTS.

Composition of mare's milk. R. G. LINTON (J. Agric. Sci., 1931, 21, 669—688).—The average composition of British mare's milk agrees closely with that of continental animals, except for the ash content (0.51% for British, 0.28% for continental). Light breeds yield milk of lower ash content than heavy breeds. Milk with a high % of fat is unsuitable for foals, which, however, thrive on low-fat milk. The % of lactose is fairly const. Foals do not thrive on milk of low lactose content, but a small excess is not harmful. The milk of aged mares is normal or has a tendency to richness. The colostrum of mares has similar characteristics to that of cows. A. G. POLLARD.

Relation between sugar content, chloride content, and serum refraction of milk. T. SUNDBERG (Z. Unters. Lebensm., 1931, 62, 509—512).—The "osmotic constant" ($K \times 10^4$) of milk as given by $K_{Cl} + K_L = K$ (where K_{Cl} and K_L are mols. of Cl/100 c.c. and lactose/100 c.c., respectively) falls between 188 and 211 (mean 196.4) for the 70 samples examined (Cl 0.085—0.242 g. per 100 c.c.); thence L (= g. of lactose + H_2O per 100 c.c.) = 7.07 — 18Cl. Experiments on mixtures of pure lactose and NaCl gave $n_D^{17.5} = 40.7$ and 18 when Cl and $L = 0$, respectively, n and L being related by a straight line parallel to the line obtained for the milk itself ($L = 0, n = 23; L = 5, n = 39$), the const. difference between the two being due to the other sol. substances present. Schulze's results fall on the latter line, but those obtained from Schulze's modification of Ackermann's table (B., 1929, 955) fall on a line intersecting both of the above lines. J. GRANT.

Kinetics [changes in activity] of milk catalase on heating. A. I. BURSTEIN and F. S. FRUM (Z. Unters. Lebensm., 1931, 62, 489—500).—Mixtures of 60 c.c. of milk with 18 c.c. of a fresh buffer solution (p_H 6.5) were heated under varying conditions of time and temp. and the residual catalase activity ($A\%$) was estimated by addition at 17° of 65 c.c. of H_2O and 15 c.c. of fresh 1% H_2O_2 , the O_2 evolved in 3 hr. at 17° being collected over Hg or H_2O saturated with O_2 and measured. A was calc. from the vol. obtained in a control experiment on 50 c.c. of the unheated milk. Fresh, colostrum-free milk from mastitis-free cows, having an acidity $\geq 20^\circ$ Thörner, gave 3.5—14.5 c.c. of O_2 , and when the acidity was $> 20^\circ$ A was 10—12%. Temp. is a more important factor than time, catalase being inactivated when kept for 20—30 min. at 91°, though (unless inactivation is complete) a gradual recovery occurs on keeping; thus, the activity of pasteurised milk approaches the limits characteristic of fresh milk at a rate which is stimulated by a high room temp. and non-sterile conditions. Milk correctly pasteurised should give more O_2 than milk heated for 30 min. at 100°, but if > 8 c.c. are evolved either (a) the temp. used was too low, (b) the time too short, or (c) the original milk was abnormal. Catalase should be absent from "heated" (100°) and "sterilised" (30 min. at 105—112°) milk. Tables relate A , time, and temp. Current pasteurisation procedures, which range from 20—30 min. at 60—80° to 1 min. at 90°, are reviewed in the light of these results. J. GRANT.

Relative antineuritic potency of certain milk derivatives. G. C. SUPPLEE, O. J. KAHLBERG, G. E. FLANAGAN, and O. D. DOW (J. Dairy Sci., 1931, 14, 447—455).—A H_2O -sol. milk-vitamin concentrate from which fat, casein, albumin, and a substantial portion of the lactose had been removed showed an antineuritic val. of 25%, and desiccated whey solids 10—12%, of that of rice polishings. A. G. POLLARD.

Malt flavour in raw milk produced by a micrococcus. P. H. TRACY and R. J. RAMSEY (J. Dairy Sci., 1931, 14, 457—462).—This flavour in certain milks is associated with the presence of an organism of the *aureus* type and was intensified when bacteria of the *B. subtilis* group were also present. The flavour developed most rapidly in milk stored at 29—38°. A. G. POLLARD.

[Milk]-churn sanitation. H. B. MORRISON, JUN. H. MACY, and W. B. COMBS (J. Dairy Sci., 1931, 14, 404—415).—Treatment of churns with H_2O at 96° for 30 min. satisfactorily removed surface moulds. Solutions of hypochlorites or of chloramine-*T* were ineffective.

A. G. POLLARD.

Solubility of metals in milk. I. Solubility of copper under various conditions. H. T. GEBHARDT and H. H. SOMMER (J. Dairy Sci., 1931, 14, 416—446).—The solubility of Cu in milk was not affected by small changes in p_H and was reduced by large increases in acidity. The solubility was decreased by CO_2 , increased by exposure to air, markedly increased by bubbling O_2 through the milk, and increased by heating up to 70°, above which temp. the solubility declined. The oxidation-reduction potential of milk was related to the rate of dissolution of Cu and to factors influencing this. Up to 65° the oxidation-reduction potential was practically const., but declined at higher temp.

A. G. POLLARD.

Determination of moulds and yeasts in butter.

I. Relation of the p_H of the medium. A. M. WHITE and E. G. HOOD (J. Dairy Sci., 1931, 14, 463—476).—Yeast growth in butter is not appreciably affected by changes in p_H , but bacterial growth is inhibited at p_H 3.4—3.8.

A. G. POLLARD.

Effect of carbonation on bacterial content and keeping quality of dairy products. N. J. PRUCHA, J. M. BRANNON, and H. A. RUEHLE (Ill. Agric. Exp. Sta. Bull., 1931, No. 368, 143—163).—Treatment of milk with CO_2 retards the growth of certain bacteria, the keeping quality being improved at 0—13°, or under pressure at 21°, but not at room temp. Carbonation did not reduce the bacterial content of cream or ice-cream.

CHEMICAL ABSTRACTS.

Changes in the fat of frozen mutton. C. H. LEA (J.S.C.I., 1931, 50, 409—410 τ).—Chemical and flavour tests on carcasses of lamb frozen at -10° for 18 months showed the fat still to be in good condition with its keeping properties at ordinary temp. subsequent to storage unimpaired.

Evaluation of tinned sausages. E. VOLLHASE (Z. Unters. Lebensm., 1931, 62, 343—352).—Methods of manufacture are described and analytical data are tabulated for 48 samples (1928—1930), with special reference to H_2O content. In the determination of non-natural H_2O from the Feder val. (cf. B., 1925, 687) allowance must be made for H_2O held by the solid portion of the sample (analytical data given). The corrected H_2O contents thus obtained enable sausages to be classified into 4 groups. J. GRANT.

Effect of autumn applications of sodium nitrate on the colour, keeping quality, and nitrogen content of apples. W. W. ALDRICH (Maryland Agric. Exp. Sta. Bull., 1931, No. 326, 363—405).—Autumn applications of $NaNO_3$ to orchard soils did not affect the colour or keeping quality of apples. Slight and variable effects resulted from late summer applications, with some varieties. Fruit on treated soil had slightly increased N content which was localised in the seeds. The N of leaves and spurs was increased in a number of cases,

but results were not consistent. The autumn movement of N from leaves to spurs, and also the leaf fall, was retarded by NaNO_3 application.

A. G. POLLARD.

F.p. depression of honey. J. STITZ and B. SZIGVÁRT (*Z. Unters. Lebensm.*, 1931, 62, 506—509).—Comparison of the chemical compositions and f.p. depression (Δ_f) for 10 honeys (Δ_f for 15% solution, 1.42—1.53°; 25%, 2.75—3.15°) shows that Δ_f depends on the nature and amount of the sol. constituents, viz., in order of decreasing importance, dextrose, laevulose, sucrose, dextrin, mineral matter, proteins, and acids. The ratios of glucose to fructose for aq. solutions containing 15% of total sugars (glucose + fructose only) are directly proportional to Δ_f (1.98° for 3:1, 2.21° for 1:3). The Δ_f of 100 g. of 15% honey solution is given approx. by $\Sigma\Delta_f$ of the glucose, fructose, and sucrose present. Cooling curves of honey solutions and data relating Δ_f and concentration (0.6—68%) are given. J. GRANT.

Investigation and evaluation of comb honey. K. BRAUNSDORF (*Z. Unters. Lebensm.*, 1931, 62, 357—364).—Wax is obtained from a honeycomb by draining off the honey and extraction with H_2O , the residue after filtration being melted at 100° and dissolved in CHCl_3 , the filtered solution evaporated, and the residue dried for 2 hr. at 100—110°. The acid val. (A) is determined by titration of a solution in 20 c.c. of 96% EtOH with 0.5N-KOH in EtOH to phenolphthalein, and the ester val. (E) by heating under reflux for 1 hr. (for natural combs) or 4 hr. (artificial combs) with 0.5N-KOH in EtOH, the excess of KOH being titrated. Natural wax gave A 20—21 (artificial 17—20), E 74—76, and sap. val. 94—7 (artificial comb usually gave similar vals., though higher in some cases). Natural honeycomb is thinner and more transparent than the artificial comb; it resembles tissue paper in texture and printed matter may be read through it. Incubated combs become darker in colour according to the degree of incubation, the unincubated ("virgin") wax being pale yellow to grey-white. The combs may also darken slightly in colour on ageing. J. GRANT.

Lime disintegration of the hay of *Miscanthus sinensis*, Anders., and the straw of *Panicum crus-galli*, L., var. *frumentaceum*, Hook. H. IWATA, K. MATSUMOTO, and J. KUSANO (*J. Sci. Agric. Soc. Japan*, 1931, No. 327, 93—100).—Boiling with 1% aq. CaO for 2 hr. increased the digestibility (sheep) by 50% and 40%, and the starch value by 200% and 150%, respectively. CHEMICAL ABSTRACTS.

Possible uses of plant lecithin. G. HENTZE (*Z. Ernähr.*, 1931, 1, 53—61; *Chem. Zentr.*, 1931, i, 3187).—Soya-bean lecithin, used in 20—25% colloidal solution, when employed instead of egg-yolk in foods affords products of similar taste and appearance.

A. A. ELDRIDGE.

Determination of tannin in tea. G. BONIFAZI and E. CAPT (*Mitt. Lebensm. Hyg.*, 1931, 22, 39—42; *Chem. Zentr.*, 1931, i, 3189).—The tannin is precipitated as the Cu compound by a known quantity of a Cu salt, the excess of which is determined volumetrically.

A. A. ELDRIDGE.

Caffeic acid free, and combined as chlorogenic acid, in natural and treated coffee. A. RINCK and E. KAEMPF (*Pharm. Zentr.*, 1931, 72, 690—694; cf. B., 1930, 790).—No chemical evidence could be obtained that a certain coffee prep. (Ideekaffee) is less liable than ordinary coffee to produce undesirable effects supposed to be due to chlorogenic acid. The treated and natural products have almost equal contents of caffetannic acid (10.7% and 10.9%, respectively) and of caffeic acid (1.68% and 1.62%), the latter being present almost entirely as chlorogenic acid in both cases. W. J. BOYD.

Poisoning by cadmium in coffee. C. GRIEBEL and F. WEISS (*Pharm. Zentr.*, 1931, 72, 689—690).—Eleven factory workers were seized with nausea and vomiting shortly after drinking coffee prepared with H_2O boiled in a 50-litre kettle which had been treated with conc. HCl to remove scale. Only the lower part of the inner surface had been cleaned. The coating of the galvanised Fe contained 91.5% Zn and 8.5% Cd. The coffee was faintly acid and contained 0.08% Cd, 0.006% Zn, 0.129% Cl, and 0.25% mineral matter. Although the kettle had been rinsed with alkali followed by hot H_2O , sufficient Zn, Cd, and Cl had been adsorbed by the scale on the upper part of the inside to contaminate the coffee to the extent indicated. W. J. BOYD.

Determination of the husk content of cacao. W. PLÜCKER and A. STEINBUCK (*Z. Unters. Lebensm.*, 1931, 62, 364—370).—The H_2O - and fat-free sample is ground, and 1 g. boiled with 150 c.c. of $N\text{-HNO}_3$ for 15 min., the washed (neutral) residue being then boiled in 5% KOH for 5 min., and the final residue again washed till neutral and bleached with 1 drop of aq. NH_3 and H_2O_2 . H_2O is then added to make 10 g. and the suspension centrifuged, this procedure being repeated and the solid finally stirred to form a suspension, a Pt loopful (15—20 mg.) of which is weighed on a tared microscope slide, air-dried, fixed in a flame, dyed with 0.5% safranin for 5 min., and examined through a drop of dil. glycerin. The slide is ruled in small squares, all of which should contain approx. the same number of stone-cells, and the total number can thus be counted. The results are compared with those obtained by the authors' original method (B., 1926, 105), which is rejected since it gives low results. Agreement with other workers (B., 1926, 605; 1927, 794; 1928, 313) is fairly good for Accra cacao (10×10^6 whole cells and 13.5×10^6 whole + broken cells/g.), but poor for other brands, and an attempt is made to explain the variations. J. GRANT.

Examination of chocolate truffles. A. SIMMER (*Z. Unters. Lebensm.*, 1931, 62, 456—479).—Chocolate truffles should contain cacao-substance and -butter, sugar, and rum or similar flavourings, but no starch, starch syrup, or foreign fats or colours. A detailed scheme for their analysis is given. J. GRANT.

Behaviour of sulphurous acid in fruit and grape juices. A. WIDMER, F. BRAUN, and O. E. KALBERER (*Mitt. Lebensm. Hyg.*, 1931, 22, 42—47; *Chem. Zentr.*, 1931, i, 3185—3186).—Changes in the free SO_2 content of juices treated with NaHSO_3 are tabulated; part is

oxidised to H_2SO_4 and part is evolved with the CO_2 produced by fermentation. A. A. ELDRIDGE.

Use of solid carbon dioxide in cold-storage practice. F. SCHULTZ (Z. Hyg., 1931, 112, 569—575).—The concentration of CO_2 produced in the atm. in and around cold stores using solid CO_2 is examined and conditions for safe working are prescribed.

A. G. POLLARD.

Continuous measurement of p_H values with the hydrogen electrode in the chemistry of foods.

W. KORDATZKI (Z. Unters. Lebensm., 1931, 62, 480—482).—The electrode vessel is a closed tube, narrow at the bottom, the liquid under investigation being fed at about 6 drops/min. through a tube at the top, and the excess removed at a point just below the liquid surface by a side-tube bent to ensure a const. level in the vessel; H_2 supplied through a side-tube at 5 bubbles/sec. saturates the liquid as it passes the Pt electrode. The narrow lower end of the electrode vessel dips into a solution making connexion with the reference electrode and contains KCl (saturated solution and cryst. solid) supported on a porous porcelain plate and in contact with the stationary portion of the sample. Buffer solutions (p_H 2.8—10.1) gave const. results after 15 min., the accuracy compared with an ordinary electrode being 0.04 p_H . The time- p_H (at 25°) curve obtained by means of a self-recording valve potentiometer for the fermentation of 2% lactose at 30° showed the progressive decrease in p_H during 40 hr. to be from 7.16 to 4.73 (accuracy 0.12 p_H). J. GRANT.

Formic, benzoic, and sulphurous acids: specific effects and combinations from the viewpoint of food preservation. H. SERGER and K. CLARCK (Chem.-Ztg., 1931, 55, 838—839).—A discussion of the experiments of previous workers with special reference to the German regulations governing the use of these acids as preservatives for fruit products; the following conclusions are drawn. (1) HCO_2H is a good preservative for fruit juices, less suitable for fruit pulps, and poor for cooked fruit products (e.g., marmalades) unless added to the cooked product, or in large quantities to the unheated marmalade, in order to compensate for volatilisation losses. Moulds are inhibited by 0.9—1.2%, bottom yeasts by 0.8%, and *B. thyrothrix* by 0.8%. (2) $BzOH$ is more suitable for fruit pulps than for juices (1% inhibits fermentation). Its preservative properties are depressed by proteins and enhanced by acidity. (3) H_2SO_3 or $K_2S_2O_5$ inhibits moulds (1:520), yeasts (1:150), and bacteria (1:86), and is suitable for raw fruit, the aroma of which may often be improved. Colour removed by its bleaching effect is often restored on cooking. Mixtures of preservatives may be used in certain cases to obtain a combination of the sp. actions of the constituents. J. GRANT.

Fat from eating chocolate. Sesamé oil in margarine.—See XII. **Defecation scum. Sugar in apples. Moisture in starch products.**—See XVII. **Determining sucrose.**—See XVIII.

PATENTS.

Manufacture and preservation of milk products in which milk is mixed with vegetable fats. R. HELLERUD (B.P. 359,059, 22.7.30. Addn. to B.P.

341,414; B., 1931, 317).—The process of the prior patent is applied to milk obtained by mixing milk powder with H_2O or skimmed milk. E. B. HUGHES.

Adjusting the composition of animal milk to that of woman's milk or to intermediate composition. H. MURSCHAUSER (B.P. 359,791, 11.12.30. Ger., 11.12.29).—Cow's milk or whey is treated with H_2O , fat, and a mixture of albumin, lactose, and various salts, to give products with the composition of human milk or with intermediate compositions. Formulæ are given. E. B. HUGHES.

Curing or smoking of animal or vegetable materials. L. TEITGE (B.P. 359,007, 10.7.30).—The liquid produced by the dry distillation of wood at not above 400° is separated from the tar and freed from other undesirable substances by treatment with $NaHCO_3$ and a little tar. Meat is pickled for a few days in this liquid product diluted with brine, dipped again in the liquid, and heated in an air oven. E. B. HUGHES.

Pectin product. CALIFORNIA FRUIT GROWERS' EXCHANGE (B.P. 359,728, 29.10.30. U.S., 2.11.29).—Dried pectin is prepared containing granules or flakes which pass 50-mesh and are retained by 70-mesh. This pectin without the aid of acid or sugar will disperse easily and quickly in H_2O at 95°. If required, this product may be mixed with sugar or the like and ground to pass 100-mesh. E. B. HUGHES.

Handling and chilling of animal carcasses and parts thereof. SWIFT & Co. (B.P. 360,014, 28.7.30. U.S., 14.8.29).

Manufacture of [three-ply] chewing gum. G. B. MUSTIN (B.P. 359,458, 17.7.30).

Boiling viscous solutions.—See I. **Ornamental paper [for foods]. Foodstuffs containers.**—See V. **Casein size.**—See VI.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Determination of phenolphthalein in presence of caffeine and cinchona alkaloids and anthraquinone-bearing drugs as applied to medicinal tonics. ANON. (Amer. J. Pharm., 1931 103, 609—610).—A method of extracting phenolphthalein from tonics by means of Et_2O in solution acidified with HCl and estimating the amount colorimetrically (ammoniacal alcoholic solution) is given. F. R. SHAW.

Determination of 2-phenylquinoline-4-carboxylic acid (cinchophen). J. A. SANCHEZ (Semana méd., 1931, i, 834—836).—Cinchophen (1% aq. solution) gives white cryst. ppts. with 1% solutions of quinine, sparteine, brucine, and cocaine. The NH_4 salt gives coloured ppts. with salts of heavy metals. For the determination, 0.5 g. dissolved in 80 c.c. of H_2O is treated with 10 drops of aq. NH_3 , the excess of NH_3 is removed by boiling, and the solution diluted to 100 c.c. 10 c.c. are treated with 20 c.c. of 0.1N- $AgNO_3$, diluted to 100 c.c., and filtered. 50 c.c. of the filtrate are treated with 10 c.c. of 0.1N-KCN, 10 c.c. of aq. NH_3 , and 20 drops of 20% KI, and titrated with $AgNO_3$ (1 c.c. 0.1N- $AgNO_3$ = 0.0294 g. of cinchophen). CHEMICAL ABSTRACTS.

***Lytta adspersa*, Klug; cantharidin content and determination of cantharidin.** P. R. COLL (Rev. farm.,

1931, 73, 17—31).—The cantharidin content of the insect is 0.383—0.412%. The finely-powdered material (10 g.) is mixed with tartaric acid (1.5 g.) and COMe_2 (100 c.c.); after 48 hr. the liquid is decanted, the residue being ground with sand and extracted with COMe_2 . The mixed solutions are evaporated below 70°, the residue being dissolved in CHCl_3 (30 c.c.) and treated with Et_2O (60 c.c.) and anhyd. Na_2SO_4 (9 g.). After 2 hr. the mixture is filtered, the residue being washed with $\text{Et}_2\text{O}-\text{CHCl}_3$, and evaporated by heat to 7 g. and afterwards by air. The residue is treated with a mixture of light petroleum (18 c.c.) and abs. EtOH saturated with cantharidin (2 c.c.), shaken during 24 hr., and filtered after 48 hr. The crystals are dissolved in CHCl_3 (40 c.c.), the solution evaporated, and the residue weighed. Alternatively, the residue from CHCl_3 is dissolved in a small quantity of COMe_2 and treated with 300 c.c. of H_2O at 90°. After filtering and acidifying with HCl , the liquid is shaken with CHCl_3 (50 c.c.) and the CHCl_3 solution evaporated. If the cantharidin is not white it is dissolved 3 times in 3 c.c. of 1% KOH , acidified with HCl , and shaken out with 10 c.c. of CHCl_3 . CHEMICAL ABSTRACTS.

Determination of morphine. III. Solubility of morphine in different solvents. H. BAGGESGAARD-RASMUSSEN and F. REIMERS (Dansk Tids. Farm., 1931, 5, 145—160; cf. B., 1928, 836).—Solubilities, at 20°, of morphine in H_2O (0.149 g./1 kg.), aq. solutions of definite p_{H} (6.7—10.3), aq. MeOH , aq. EtOH , and $\text{CHCl}_3-\text{EtOH}$ and $\text{CHCl}_3-\text{Pr}^{\text{OH}}$ mixtures are given.

E. H. SHARPLES.

Procaine borate. G. W. COLLINS (Amer. J. Pharm., 1931, 103, 555—559).—A non-proprietary brand of procaine borate has been examined and found to consist essentially of $\text{C}_6\text{H}_4\cdot\text{NH}_2\cdot\text{COO}\cdot\text{C}_2\text{H}_4\cdot\text{NEt}_2\cdot 5\text{HBO}_2$ with an unnecessary amount of uncombined *p*-aminobenzoylethylaminoethyl alcohol and HBO_2 . The standards required for use of procaine borate as a local anæsthetic are described.

F. R. SHAW.

Nicotine and the denicotinisation of tobacco smoke. I. M. HAHN and O. EHRSIMANN. **II.** O. EHRSIMANN (Z. Hyg., 1931, 112, 680—697, 698—707).—I. Methods for determining nicotine are compared. Charcoal filters activated with Fe compounds considerably reduced the nicotine content of tobacco smoke.

II. The rate of oxidation of nicotine by activated charcoal increased with the nicotine content of the tobacco smoke. A considerable proportion of the nicotine is adsorbed on the charcoal. The rate of O_2 consumption increased with rising temp. and varied with the p_{H} of the material, optimum conditions being in the neighbourhood of the neutral point. The primary product of oxidation is probably nicotine oxide. The oxidation process is retarded by the presence of urethane and of HCN .

A. G. POLLARD.

Accumulation of essential oil in the leaves of peppermint. M. MIKHALOV (Masloboino Zhir. Delo, 1929, No. 11, 63—66).—Peppermint harvested in July contained 2% of oil; that in October, 0.6%. The average yields from year to year follow the mean temp. of the growing season.

CHEMICAL ABSTRACTS.

Essential oil of hyacinth flower. II. L. HOEJENBOS and A. COPPENS (Rec. trav. chim., 1931, 50, 1046—1049).

—By fractional distillation, partial esterification with phthalic anhydride, and hydrolysis the following substances have been isolated and identified in the portion of the oil remaining after treatment with NaOH and NaHSO_3 and subsequent hydrolysis (cf. B., 1931, 863): eugenol, BzOH , $\text{CH}_2\text{Ph}\cdot\text{OH}$, $\text{CH}_2\text{Ph}\cdot\text{OAc}$, dimethylquinol, $\text{CH}_2\text{Ph}\cdot\text{CH}_2\cdot\text{OH}$, cinnamyl alcohol, cinnamaldehyde, $\text{CHPh}\cdot\text{CH}\cdot\text{CHO}$, PhCHO , benzyl benzoate, an *o*-methoxybenzoic ester (probably Me ester), an *N*-methylanthranilic ester, methyleugenol, and *n*-heptyl alcohol. The form, m.p. 97.5—98°, of the diphenylurethane of cinnamyl alcohol described in the lit. appears to be a metastable form, since it is converted by seeding into the stable form, m.p. 103.5—104°. J. W. BAKER.

Determination of alcoholic extract of cinnamon. H. WEISS (Z. Unters. Lebensm., 1931, 62, 500—505).—Analyses (essential oil, EtOH extract, cinnamaldehyde, ash, H_2O , and matter volatile at 100°) of different qualities of Ceylon ("canehl"), Chinese (*Cassia lignea*), and Javan (*C. vera*) cinnamons are tabulated. EtOH extract: (a) 19.7—36.9, by extraction of sample (predried for 2 hr. at 100°) with 90 vol.-% EtOH (Dafert and Miklauz); (b) 18.5—35.6, as (a), but using 95 vol.-% EtOH on the undried sample (Spaeth); (c) 7.3—25.3, sample shaken with 90 vol.-% EtOH at room temp. (Prescher); (d) 6.4—22.6, as (c), but using 95 vol.-% EtOH , and drying the extract at 110° (Winton), whilst for (a) to (c) 100° is the temp. employed. *C. lignea* gave the min. and *C. vera* the max. value. Since the Austrian Codex gives 18% as the min. limit (for 90 vol.-% EtOH), methods (a) or (b) should be used. The ash varies from 2.05 (*C. lignea*) to 5.5% (Ceylon), and 6% is therefore a suitable max. limit.

J. GRANT.

Detecting peroxides in Et_2O .—See III. **Antineuritic potency of milk derivatives.**—See XIX.

PATENTS.

Preparation of [therapeutic] stable supersaturated solutions of calcium gluconate. CHEM. FABR. VORM. SANDOZ (B.P. 359,862, 21.3.31. Ger., 21.3.30. Adn. to B.P. 314,460; B., 1929, 698).—A small amount of Ca mannate is added to the hot Ca gluconate solution before the latter is sealed in ampoules, and the latter are heated several times to 90—100° to destroy any centres of crystallisation.

W. J. WRIGHT.

Preparation of *m*- and *p*-hydroxyphenyl-*N*-methylaminoethanol-1 [β -methylamino- α -*m*- and *p*-hydroxyphenylethyl alcohols]. H. LEGERLOTZ (B.P. 354,226, 25.4.30).—The corresponding hydroxyphenacylmethylamines of B.P. 297,756 (B., 1928, 875) or their *O*-alkyl, -aralkyl, or -acyl derivatives are reduced with H_2 and Pd, PtO , or Ni in absence of alkali to the secondary alcohols, which have analeptic and vasoconstrictor action and are less toxic than is adrenaline. β -Methylamino- α -*m*-hydroxyphenylethyl alcohol, m.p. 184° (B, HCl , m.p. 145°), and the *p*-compound (B, HCl , m.p. 155—156°) are described.

C. HOLLINS.

Physiologically active products from albuminous materials. I. G. FARBENIND. A.-G. (B.P. 359,523, 17.7.30. Ger., 17.7.29).—Remedies for cardiac diseases are manufactured from materials such as serum, blood, glands, skins, etc. by hydrolysing at p_{H} 7—10, treating

the solution with org. H₂O-sol. solvents either during or after hydrolysis, removal of the solvent from the extract, and purification by eliminating lipins by extraction and the unnecessary physiologically active substances by saponification. E. H. SHARPLES.

Preparation of therapeutic substances [from suprarenal glands]. W. B. COFFEY and J. D. HUMBER (B.P. 360,074, 8.8.30. U.S., 12.3.30).—See U.S.P. 1,771,976; B., 1931, 366.

Pyridone derivatives. 5 : 6-Dialkoxy-8-aminoquinolines.—See III.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Direct positive photography by Herschel effect. M. OSHIMA (J. Soc. Chem. Ind., Japan, 1931, 34, 401 B).—A method of photography, in which the negative process is avoided, is described. E. S. HEDGES.

PATENTS.

Production of multicolour screens for colour photography. F. PILLER, JUN. (B.P. 359,757, 19.11.30).—A negative image is obtained, on a plate, of one of the colours of an engraved multi-coloured "taking" screen, by exposure with coloured (*e.g.*, blue) light, in the camera employed for the colour photography; the image will have the optical distortions such a screen produces. A printing block is made from this negative, and paper "viewing" colour screens are printed from it (or several blocks, if necessary for the different colours). The register of a photograph and its "viewing" screen is thus exact. J. LEWKOWITSCH.

Treatment of photographic images and application of this process to kinephonographic films. SOC. INDÉPENDANTE DE TELEGRAPHIE SANS FILS (B.P. 359,631, 28.8.30. Fr., 29.8.29. Cf. B.P. 351,956; B., 1931, 863).—The Ag of the acoustic record is converted into a Cu salt (especially CuCl₂ or CuSO₄), via the ferrocyanides or alkaline or alkaline-earth compounds. Cu salts, like Ba salts, are transparent to visible light and opaque to infra-red rays. J. LEWKOWITSCH.

Reclaiming dyed cellulose nitrate film scrap. KODAK, LTD., Assees. of K. C. D. HICKMAN and W. J. WEYERTS (B.P. 357,943, 22.5.31. U.S., 24.5.30).—After removal of the Ag halide emulsion with hot H₂O, the dyed film is treated with an EtOH solution of an alkali, *e.g.*, NaOH, Na₂CO₃, Na₃PO₄, or Na₂O₂, and is subsequently washed first with EtOH and then with H₂O to remove the hydrolysed portions. F. R. ENNOS.

[Projection of lenticular film copies in] colour photography. C. NORDMANN (B.P. 360,524, 19.8.30. Fr., 19.8.29).

Polymethine dyes. Dyes from heterocyclic N compounds.—See IV. **Polymerised vinyl chloride. Phonographic records.**—See XIII.

XXII.—EXPLOSIVES; MATCHES.

Preparation of stable trinitrocellulose. III. K. HESS and C. TROGUS (Z. angew. Chem., 1931, 44, 825—827; cf. A., 1931, 672).—Nitration of bleached natural

ramie fibre for 16 hr. at 0—2° with mixtures of HNO₃ (*d*¹⁵ 1.52) and H₂SO₄ (*d*¹⁵ 1.8415) reaches a max. (slightly short of the theoretical val.) with 25 wt.-% of HNO₃. X-Ray investigation shows three stages: (I) nitrocellulose + cellulose (0—18% HNO₃); (II) not "recryst." or partly "recryst." trinitrocellulose (18—46% HNO₃), and (III) "recryst." trinitrocellulose (46% HNO₃). Thus alterations in the conditions of nitration produce alterations in the X-ray structure normally produced by stabilisation by means of solvents. Nitration produces also a substance, sol. in EtOH etc., the quantity of which is larger the higher is the H₂SO₄ concentration; trinitrocellulose is stabilised by the removal of this substance, and in accordance with expectation higher HNO₃ concentrations give more easily stabilised products. This is explained by the assumption that during the recrystallisation the sol. substance separates in the interstices between the micelles. Stabilisation thus consists in (*a*) "recrystallisation" and (*b*) removal of the sol. degradation products of cellulose. Optimal technical conditions fall into the first part of stage II, because of the cost of HNO₃, but if more conc. HNO₃ is used, saving in solvent for stabilisation results. R. S. CAHN.

2 : 4 : 6-Trinitro-1 : 3 : 5-triazidobenzene as initiating explosive. O. TUREK (Chim. et Ind., 1931, 26, 781—794).—The practical applicability of the above compound depends on the economic production of trichlorotrinitrobenzene. A method of preparing the latter from C₆H₃Cl₃ in one operation, with a yield of 140%, is described. The azido-compound is prepared according to the process of B.P. 298,981 (B., 1929, 700); its physical properties are given. When loaded into detonators, this compound is liable to become over-pressed and lose its power, but it has a high brisance in the loosely compressed state, 0.01—0.02 g. being sufficient to initiate the detonation of 1 g. of tetryl and of trinitrotoluene, respectively. It should be granulated with nitrocellulose solution. Trinitrotriazidobenzene evolves no N oxides on heating, but liberates N₂. At 25° this loss of N₂ did not exceed 0.6% after 1000 hr.; at 35° the loss was 10 times, and at 50° 100 times, this amount. About 40—75% of detonators containing trinitrotoluene or tetryl with the azido-compound functioned satisfactorily after being stored at 50° for 6 months. Heating at 100° results in a quant. conversion into hexanitrosobenzene. In Pb-block tests, the relative expansions of trinitrotriazidobenzene, tetryl, trinitrotoluene, Hg fulminate, and Pb azide were 90, 70, 60, 23, and 16, respectively, taking pentaerythritol tetranitrate as 100. Comparative effects on Pb plates of these explosives and of hexanitrosobenzene, picryl azide, and *cyclotrimethylenetrinitroamine*, as well as fragmentation tests, are illustrated.

W. J. WRIGHT.

PATENTS.

Priming mixture. J. D. McNUTT, Assr. to WINCHESTER REPEATING ARMS CO. (U.S.P. 1,800,223, 14.4.31. Appl., 21.9.28).—Pb(OH)NO₃ is employed as the chief oxidising agent. The compositions of two suitable mixtures are: Hg fulminate 35, 40; Pb(OH)NO₃

30, 12; Pb(CNS)₂ 12, 10; ground glass 22, 21; gum 1, 1; and Ba(NO₃)₂ 0, 16%, respectively.

W. J. WRIGHT.

Crystallisation of explosives [tetryl] from solvents. D. M. JACKMAN (U.S.P. 1,801,509, 21.4.31. Appl., 24.7.25).—The solution is brought into direct contact with a non-miscible cooling agent, such as H₂O, a thin stream of the hot solution being passed into a large vol. of H₂O when very fine crystals are desired, and the process being reversed if large crystals are to be produced.

W. J. WRIGHT.

Heavy-metal azides.—See VII. **Heat-treating cartridge cases.**—See X.

XXIII.—SANITATION; WATER PURIFICATION.

Aluminium, tin, or tinned-lead tubes for tooth-pastes? H. ZELLNER (Z. Unters. Lebensm., 1931, 62, 370—378).—Toothpaste from (6) tinned-Pb tubes (Pb 94—96, Sn 2.8—5, Sb 0.4—1.5, Cu 0.01—0.07%) contained Pb and Sn in amounts which increased slowly and regularly and in proportion with one another during the first 8 weeks after filling (Pb then 0—5, and Sn 11—50 mg./100 g. of paste), and then rather more rapidly. Paste from (2) Sn tubes (Pb 0.2, Sn 99, Sb 0, and Cu 0.5—1%) contained no Pb and 4.8—6.5 mg. Sn/100 g. after 8 weeks; there was little variation with storage period, and this type of container is recommended. The toxicology of Pb is discussed, and the amounts found in the former pastes are considered undesirable.

J. GRANT.

Detection of magnesium and zinc stearates in cosmetics. C. GRIEBEL (Z. Unters. Lebensm., 1931, 62, 523—524).—The cosmetic (1 g.) is extracted twice under reflux with 10 c.c. of boiling xylene for 1 min., the extracts are filtered hot, and the filtrate and washings evaporated in a weighed crucible. The residual stearate (of Mg and/or Zn) is washed free from fatty matter with Et₂O and weighed, and Mg and/or Zn determined in the residue after ignition.

J. GRANT.

Cause of the "chemical odour" of drinking water. W. UGLOW and M. BOLTIN (Z. Hyg., 1931, 112, 655—659).—The odour of chlorinated phenols produced by chlorination of certain waters is destroyed by the addition of NaOH, aq. NH₃, carbonates, or bicarbonates, but reappears on acidification. Dechlorination with Na₂S₂O₃ or Na₂SO₃ does not render the water odourless.

A. G. POLLARD.

Employment of phosphate in the purification of [boiler] feed-water. H. STÄCKLER (Woch. Brau., 1931, 48, 471—472).—Boiler deposits can be prevented by the addition of phosphate equivalent to 20—25 mg. of P₂O₅ per litre of softened feed-water. In a case quoted, 2—6 kg./100 cu. m. have been used during a year without corrosion or priming. The phosphate should be added uniformly by a suitable feed. At higher concentration, 80—100 mg. of P₂O₅ per litre, phosphates may be used to loosen scale already formed.

F. E. DAY.

Bacterial counts in water. L. N. GURFEIN (Ark. biol. Nauk, 1930, 30, 529—547).—A comparative study of the methods usually employed.

CHEMICAL ABSTRACTS.

Volumetric determination of sulphuric acid in water. B. PASCHKE (Z. Unters. Lebensm., 1931, 62, 378—381).—A vol. of H₂O containing 20—40 mg. of H₂SO₄ is neutralised with 0.1N-HCl (calc. from the carbonate hardness), 1 c.c. added in excess, and the whole evaporated to 35 c.c. A measured amount (excess) of 0.2N-BaCl₂ is then added, the mixture boiled, cooled to 26°, and 8 g. of NaCl, 10 c.c. of 96% EtOH, and 7 drops of fresh 0.25% Na rhodizonate are added, and the mixture titrated, with shaking, with 0.2N-H₂SO₄ till the Ba rhodizonate is completely converted into BaSO₄, when the flocculent red suspension changes through yellow to colourless (cf. A., 1930, 53). Then 8 × c.c. of BaCl₂ used = SO₃ in mg. The results are less than those obtained gravimetrically by 0.7—2.8 mg. for 22—500 mg. SO₃ (17 samples), and are unaffected by the presence of Fe, org. matter, or nitrites.

J. GRANT.

Determination of sulphate ions in water analysis.

E. ROTHENBACH and H. ANTELMANN (Woch. Brau., 1931, 48, 457—460, 467—471).—The literature of the method, depending on iodometric determination of the sol. CrO₄" set free from BaCrO₄, is discussed. BaCrO₄ adsorbs sol. chromates, hence the purest purchased material contains traces which cannot be removed by practicable washing, and the use of excessive amounts may remove CrO₄" from the reaction mixture. Filter-paper adsorbs chromates, and only a single filter must be used in removing the precipitated BaSO₄. To 100 c.c. of H₂O 25 c.c. of a 0.5% solution of purest BaCrO₄ in 0.2N-HCl are added. After keeping for 30 min. at laboratory temp., the solution is made weakly alkaline with NH₃, made up to 200 c.c., and filtered. The liberated sol. chromate is determined iodometrically. The BaCrO₄ solution changes slowly and a blank experiment must frequently be carried out.

F. E. DAY.

Colorimetric determination of iron in drinking and effluent waters by means of sulphosalicylic acid. L. N. LAPIN and W. E. KILL (Z. Hyg., 1931, 112, 719—723).—To a 10-c.c. sample are added 2 c.c. of 2N-NH₄Cl followed by 2N-HCl sufficient to turn Congo paper blue, 2 c.c. of 20% sulphosalicylic acid solution, and 2 c.c. of 10% aq. NH₃. The rose-red coloration produced is compared with that of a standard Fe⁺⁺⁺ solution. Where Fe⁺⁺ and Fe⁺⁺⁺ are present together the above solution is made alkaline with aq. NH₃ and the total Fe determined from the intensity of the yellow-colour (produced by Fe⁺ and Fe⁺⁺⁺ alike). The method is sensitive to 0.2 mg. Fe⁺⁺⁺. Nitrites interfere with the reaction for Fe⁺⁺⁺, but not with the alkaline reaction for total Fe. Neither Ca or Mg salts nor phosphates affect the accuracy of the method.

A. G. POLLARD.

Solid CO₂ in cold-storage practice.—See XIX.

PATENTS.

Air-purifying or filtering device. AIR PURIFIERS, LTD., and A. C. HILLS (B.P. 359,628, 26.8.30).—The impure air is drawn through a cloth filter, corrugated to present a large surface and supported on a wire framework placed in the end of a flared conduit. C. JEPSON.

Removing suspended matter from liquids. Mixing liquids.—See I.