ABSTRACTS

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KEEPING UP WITH CHEMISTRY

De-inking and reprocessing paper accomplished by new method. S. D. WELLS. *Chem. & Met. Eng.*, **40**, 634–7 (Dec., 1933).—Numerous processes for the liberation and removal of the carbon-black pigment are known. Some paper-making plants have used fibrous raw materials from paper stock recovered from publications printed on paper composed of cellulose fibers free from lignin. A much larger tonnage of printed paper contains groundwood pulp, the fibers of which contain some lignocellulose. It is much more difficult to remove printing ink from this type of paper.

A dischargeable printing ink based upon a pigment consisting of the iron lake of hematin has been developed. This ink can be successfully bleached by sulfur dioxide. In some grades of printing paper as high as 80% of the recovered stock can be used to replace a like quantity of virgin pulp. J. W. H.

Jewels of the machine shop. ANON. *Ind. Bull. of Arthur D. Little, Inc.*, **84**, 2–3 (Dec., 1933).—Hard metal compositions as substitutes for drilled diamonds of the black or "carbonado" type are now emerging from the experimental stage to one of great commercial possibilities. The General Electric Company, The Carboloy Company, The Fansteel Products Company, The Ramet Corporation of America, and the Vanadium Alloys Steel Company have entered into a five-party agreement providing for the cross-licensing of products. Tungsten carbide, a hard alloy, was found to be well adapted for cutting hard abrasive materials such as cast iron, ceramics, hard rubber, asbestos, etc. It was not well adapted for the cutting of tough steels, either hardened or annealed. The metal tantalum solved this problem, again in the form of a carbide. These hard metal compositions may be as important to industry as was the production of high-speed steels early in the present century. G. O.

Cashew-nut paint. ANON. *Ind. Bull. of Arthur D. Little, Inc.*, **84**, 4 (Dec., 1933).—Dr. M. T. Harvey has spent years experimenting with the unusual liquid that comes from the pericarp or shell of the cashew nut, adapting it for use as a coating to such an extent that a line of products called Harvels has resulted. The Harvel coating products are not offered as general household varnishes and paints, but as specific coatings to do certain things not satisfactorily done by other paints or varnishes. One important use is the painting of all types of cement surfaces where they are subject to continual wetting. These products are also used for coating metal, wood, concrete, etc., in industrial plants where ordinary paints may not withstand the corrosive agents or influences found in such places. They appear to be well adapted for ship-bottom paint. They have been selected as the ideal coating for wooden laboratory table-tops. Harvel varnish is used on the paper inserts of bottle caps because it can withstand acids, alkalies, alcohol, and oils without softening or wrinkling. It is also useful in baked-on enamels for metals. Special Harvel products have been developed for non-coating uses. One form is used as a binder for the manufacture of heavy-duty brake blocks, such as are used on the Greyhound buses and on large street railway buses. Another form makes possible the public-address-system horns which are said to be the only 100% moisture-resistant horns on the market. The cashew nut grows in a leathery-skinned shell at the end of a swelling on the stem, which looks like a juicy fruit. The apple, as it is called, is not only edible but delicious, if sometimes astringent. It is used by the Brazilians to make their soft drink, cajuda, and also a strongly flavored wine. It belongs to the botanical family, *Anacardiaceæ*, or cashew-sumac group of plants, and is a native of the tropics. G. O.

Recent developments in nitrogen fertilizers. C. L. BURDICK. *Chem. & Met. Eng.*, **40**, 638–41 (Dec., 1933).—Urea is the most recently developed nitrogen fertilizer. The fundamental reaction representing the synthesis is $2NH_3 + CO_2 \rightleftharpoons (NH_3)_2CO_2 \rightleftharpoons (NH_2)_2CO + H_2O$. These reactions do not go to completion in either direction. As a result the product put on the market is a urea-ammonia liquor and runs 32.5% urea, 28.9% ammonia, 18.1% ammonium carbamate, 20.5% water. Total nitrogen is 45.5%. It sells in the same price range as ammonium sulfate. J. W. H.

Materials of construction trends. L. T. WORK. *Chem. & Met. Eng.*, **40**, 628 (Dec., 1933).—Reactions of certain chemicals upon the ordinary materials of construction have caused new materials to be developed. Among the metals are platinum, tantalum, and magnesium; improvement in formulation and fabrication in stainless steels; and alloys for use with hydrochloric acid. Electroplating of protective coatings, and fabrication of two metal layers is much used.

Among the non-metals are a large number of plastics. Laminated wood and impervious textiles are some of the new applications of plastic resins. Clay products are being molded thinner and enamels improved. Pyrex glass is being offered in larger and heavier sizes. J. W. H.

OFHC, etc. ANON. *Ind. Bull. of Arthur D. Little, Inc.*, **85**, 2–3 (Jan., 1934).—Metallurgy appears to have scored another commercial success of possible extended application. The new product is "OFHC," the best known high-conductivity oxygen-free copper, containing no residual deoxidant. The reported advantages are several: greater homogeneity and uniformity than that of ordinary copper, greater ductility, and unusual immunity to the embrittling effects of reducing atmospheres at high temperatures; its performance under repeated stresses appears to be definitely superior.

In the manufacture of ordinary oxygen-free copper the residual oxygen is removed by adding a deoxidant (usually phosphorus) to the ladle, but an excess of deoxidants necessary to remove completely the oxygen present lowers the conductivity of the copper and tends to harden it. "OFHC" does not have to be deoxidized because its manufacture depends upon two elements of precise control to prevent oxidation and assure uniformity. First, the melting of the cathodes is carefully accomplished in an electric furnace under reducing conditions; second, the casting is done in an atmosphere free from oxygen (in vertical water-cooled molds).

The greater ductility of "OFHC" copper permits it to be drawn down without annealing to a greater degree than ordinary tough-pitch copper. Sheets, tubes, and wires made from it tend to be freer from surface defects. Its resistance to alternating stresses qualifies it for manufacture of armature wires, rail bonds, aircraft fuel lines, articles subject to repeated vibration. Its non-embrittling qualities make it useful for chemical equipment and for use in vacuum tubes.

Today there are three types of high-conductivity oxygen-free copper, all depending upon precise metallurgical control. The first is so deoxidized by phosphorus that the amount of phosphorus remaining is too small to affect the copper. The second uses carefully measured quantities of lithium as a deoxidant to get a similar result. The third—more radical than these two methods—is a process to produce a homogeneous mass without melting. This is accomplished by sintering solid particles of cathode copper in a reducing atmosphere followed by extrusion.

At present the price for "OFHC" ranges from $17 to $22 a ton. Possibly the greatest use of some of these coppers will be as premium-priced conductors of exceptional purity. Cables and related electrical products are so much more expensive than the copper they contain that increased purity—permitting less weight or greater capacity—is likely to be worth the cost. Of greater

interest, perhaps, is the application of these close control methods to other metals and to the metal industry generally. G. O.

A starchless potato induced by the introduction of foreign enzymes. R. F. SUIT AND H. HIBBERT. *Science*, **79**, 78–9 (Jan. 26, 1934).—A levan has been obtained by the action of *B. subtilis*. Introducing cultures of these bacteria into young potato plants over a considerable period of time caused them to produce tubers containing levan instead of starch. E. C. K.

The mechanism of the polymerization and depolymerization of olefins. F. C. WHITMORE. *Science*, **79**, 45–7 (Jan. 19, 1934).—The double bond upon "opening" creates a positively and negatively charged ion which may pick up a hydrogen ion leaving a positively charged ion. This may join with the positive valence of other "opened" double bonds, thus making the process continuous. Polymerization is stopped by loss of a hydrogen ion regenerating the conventional double bond. E. C. K.

HISTORICAL AND BIOGRAPHICAL

Richard Kirwan, F.R.S., 1733–1812. W. H. BRINDLEY. *Nature*, **132**, 157–8 (Dec. 23, 1933).—Kirwan, the Irish scientist, studied both chemistry and law and for a number of years practiced at the Irish bar. From 1777–87 he lived in London in close contact with Cavendish, Priestley, Banks, and other eminent men. For reasons of health he then returned to Dublin, where he lived a more retired life.

His many publications covered the fields of chemistry, geology, mineralogy, meteorology, etc., while his "Elements of Mineralogy," 1784, the first systematic treatise on the subject in the English language went through several editions.

A leading exponent of the phlogiston theory, he was at last converted by the arguments of the French school; and this left Priestley as the last defender of the Stahlian theory.

"A true philosopher to the last, caring neither for riches nor for distinctions," he died in Dublin, June 1, 1812. F. B. D.

Scientific centenaries in 1934. E. C. SMITH. *Nature*, **133**, 13–4 (Jan. 6, 1934).—Among the many scientists listed are the following chemists:

GEORG ERNST STAHL (1660–1734), a physician who in 1698 enunciated the phlogiston theory, which held sway for almost a century.

THOMAS HENRY (1734–1816), the secretary and president of the Manchester Literary and Philosophical Society, whose textbook on chemistry was edited by Benjamin Silliman for American use.

DMITRI IVANOWITSCH MENDELÉEFF (1834–1907) brought order among the elements with his periodic table (1869).

CARL SCHORLEMMER (1834–1906), an organic chemist at Owens College, Manchester, England, is known to several generations of American chemists as a co-author of Roscoe and Schorlemmer's *Chemistry*.

Among the American names (non-chemist) cited are:

SAMUEL PIERPONT LANGLEY (1834–1906), a pioneer in aeronautics and secretary of the Smithsonian Institution.

CHARLES AUGUSTUS YOUNG (1834–1908), the astronomer of Princeton University.

MAJOR JOHN WESLEY POWELL (1834–1902) of the U. S. Bureau of Ethnology and the U. S. Geological Survey. F. B. D.

Freshman chemistry in America in 1850. M. J. MCHENRY. *Sch. Sci. & Math.*, **34**, 11–20 (Jan., 1934).—Taking as a basis for his review, textbooks on elementary and theoretical chemistry of the following authors and times: Comstock, 1846; Fownes-Bridge, 1850; Draper, 1853; Gray, 1848; Kane-Draper, 1842; and Silliman, 1846, McHenry very methodically and carefully covers the years 1800 to 1850 as regards the nature of the chemistry teaching and the subject matter. He concludes that the freshman of 1850 had a mass of facts in several fields offered him; that he had some well-defined theories to guide him, and that he was able to pursue a course possessing distinctly modern tendencies. J. H. G.

Chemistry in the pulp and paper industry. F. W. ADAMS. *Rep. New Eng. Assoc. Chem. Teachers*, **35**, 17–21(1933).—Paper making is an art dating into antiquity in its utilization of natural fibers for producing a sheet of paper suitable for writing or printing. The fibrous raw material, such as ramie, various grasses, and later old rags, was beaten to a pulp with water by mortar and pestle. The beating process caused the hydration and fibrillation of the cellulose materials, covering the fibers with a gelatinous layer which on subsequent drying cemented them together into a strong sheet of paper.

Beating was a laborious hand process of low capacity, and the forming of the sheet was a heavy, wet job. In the eighteenth century mechanical developments in the form of the stamp mill and Hollander beater replaced the hand beating.

Due to the development of the Hollander beater and the Fourdrinier machine the demand for paper-making materials was greatly increased and about 1850 chemists started work on the problem of supplying a new fibrous material. Several years later the soda process was developed for producing white pulp from wood. O. C.

ADMINISTRATION PROBLEMS AND DEVICES; CURRICULA

Educational discussion. The colleges and national recovery. R. L. KELLEY. *Bull. Am. Assoc. Univ. Profs.*, **19**, 478–82 (Dec., 1933).—A reprint. The colleges themselves have not recovered. Most of them are dazed by a series of unexpected blows, but most of them are on their feet and are striving to save themselves and to render service to the community. The fact that the colleges may keep clear of the NRA structure is a great gain. It enables them all the more effectively to render service to the government and to the nation. Their first duty is to stick faithfully to their job. A large institution has a recent increase of 2000 students with a budget less than that of the previous year. Of 231 institutions reporting, 185 have been obliged to reduce salaries. In 44, the salaries remain the same, and in 2, salaries have actually been increased since 1929. The NRA aspires to foster fair competition but unfortunately some colleges have been guilty of unsportsmanlike and unprofessional practices, especially in the matter of undercutting the rates of tuition, which, as is well known, are unusually far below the cost of college education. J. H. G.

PROFESSIONAL

Academic freedom and tenure. A committee report. *Bull. Am. Assoc. Univ. Profs.*, **19**, 472–7 (Dec., 1933).—Following complaints of dismissals from the faculty of Texas Christian College, Fort Worth, Texas, the committee interviewed 28 persons, over half of whom were members of the permanent faculty. At Texas Christian College no trouble whatever appears to have arisen respecting academic freedom. The fundamental difficulty respecting tenure was precipitated or at least intensified by the progressive shrinkage of enrolment and removals since 1929. The numerous dismissals of 1933 were preceded by a succession of salary cuts. Since the committee's regional report, some action has been taken with respect to possible beneficial changes in the University's methods, such as reinstatement of some of the dismissed teachers; appointment of a faculty committee, a move which looks forward to an increased faculty participation in the university's affairs; and a revision of the contract form announcing a purpose to retain all members rendering efficient service, promoting them as merit and circumstances warrant and establishing genuine security of tenure and intellectual independence. J. H. G.

New professional responsibilities for chemical engineers. H. C. PARMELEE. *Chem. & Met. Eng.*, **41**, 16–7 (Jan., 1934).—Chemical engineering marches on, professionally as well as technically. Today it is accepted as a distinctive branch of engineering and its exponents are recognized as substantial members of the engineering profession. The American Institute of Chemical Engineers is a member of the Engineers' Council for Professional Development. This council will function through four committees: on student selection and guidance, on engineering schools, on professional training, and on professional recognition. This is the best-coördinated effort thus far made to gain for engineers in the future a group identity that will be recognized not only by the profession but also by the public. J. W. H.

Chemical industry must face new labor problems and policies. E. C. ECKEL. *Chem. & Met. Eng.*, **41**, 14–23 (Jan., 1934).—American chemical industry, in common with all other large-scale industries, is facing serious changes in relation to labor of all kinds. The author believes that in this re-alignment the technical man may find himself "the forgotten man." He advocates a more vigorous and determined policy in this connection and through new organizations, if the already existing professional societies do not quickly grasp the opportunity. J. W. H.