OCCURRENCE OF ACETONE AND SYRINGIC ALDEHYDE AS DEGRADATION PRODUCTS OF LIGNIN SUBSTANCES

Sir:

We wish to report two degradation products obtained from lignin substances. The first, acetone, has been obtained by a stepwise oxidation as well as by ozonization of formic acid spruce lignin and identified as acetone superoxide, dibenzalacetone, and acetone 2,4-dinitrophenylhydrazone, melting points 132.5°, 112°, and 128°, respectively. No lowering of melting point was found after admixture with authentic synthetic samples. The second product, syringic aldehyde, was isolated by the alkaline scission of sulfite liquor obtained from yellow birch wood and identified as follows. *Anal.* (1) Calcd. for $C_9H_{10}O_4$: C, 59.3; H, 5.5; OCH_3, 34.1; mol. wt., 183. Found: C, 59.1; H, 5.6; OCH_3, 33.8; mol. wt. (Rast method), 175.6. (2) M. p. 111.5–112° (corr.). (3) Semicarbazone, m. p. 185–186° (corr.). (4) Deep green coloration with ferric chloride. (5) Crystalline derivative with dimedone. All these properties are in entire agreement with those recorded by McCord, THIS JOURNAL, **53**, 4181 (1931).

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RECEIVED FEBRUARY 25, 1937

NEW BOOKS

An Introduction to the Preparation and Identification of Organic Compounds. By ROBERT D. COGHILL, Assistant Professor of Chemistry, and JULIAN M. STURTEVANT, Instructor in Chemistry, Yale University. McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York, N. Y., 1936. xiii + 226 pp. 14 × 21 cm. Price, $1.75.

The use of typical preparations as a means of introducing students to the theory and practice of laboratory technique in elementary organic chemistry has been recognized as the most feasible approach for the past hundred years. The corresponding employment of systematic methods of organic qualitative analysis as a means of instruction is much more recent, and may perhaps be said to have been initiated about 1900 through the efforts of the late Professor Samuel P. Mulliken at the Massachusetts Institute of Technology. Since the publication of his monumental work, appreciation of the value of this aspect of the subject as a means of instruction has been growing, as evidenced by the appearance of elementary books such as those of Clarke, Kamm, Shriner and Fuson, and others. No institution of learning can claim a first rank course in elementary organic chemical laboratory unless adequate attention is given to the identification as well as to the preparation of simple organic compounds.

Despite the present recognition of the equal importance of the study of both the synthetic and analytical aspects of organic laboratory instruction, there has been a surprising delay in the appearance of a laboratory manual placing both on an equal footing in the same volume. The present book is intended to fill this recognized need.

Apart from the necessary indices, appendices, etc., the 207 actual text pages of the volume are divided among three types of treatment: manipulative operations (both from synthetic and analytical viewpoint), 48 pages; synthetic preparations, 67 pages; and identification of organic compounds, 92 pages.

The synthetic section includes 42 experiments about equally divided between solids and liquids. In addition to many standard preparations included in all laboratory manuals several new selections are offered, including benzene from sodium benzoate, mandelic acid from benzaldehyde, *m*-chloronitrobenzene from *m*-nitroaniline, anthranilic acid from phthalimide, ethyl resorcinol from resorcinol *via* resacetophenone and subsequent Clemmensen reduction, *p*-nitrobenzoyl chloride from the acid and thionyl chloride, *p*-bromophenacyl bromide from bromobenzene *via* *p*-bromoacetophenone, and indigo from benzaldehyde *via* *o*-nitrobenzaldehyde. Each procedure is preceded by a short discussion and followed by questions. Both the manipulative and preparative sections are well written and fully illustrated with diagrams.

The analytical section is based upon a selected list of between three and four hundred of the most common and easily available organic compounds arranged to be identified by a set of tests according to a given key. After a short introductory chapter, the subject is discussed in three chapters entitled, respectively, analytical methods, 21 pages; classified list of compounds, 14 pages; and preparation of derivatives, 49 pages. In the list of compounds it is very unfortunate that the order and group headings reiterating the distinctive characteristics of each part were not carried along in the text, as the present arrangement requires an inconvenient amount of cross references to preceding pages for interpretation of the key. Selections of group tests are generally good, but the experienced analyst

will miss some of the most useful methods, such as the use of the Duclaux number in the characterization of volatile fatty acids, the characterization of phenols by formation of aryloxyacetic acids, etc. The long chapter on derivatives is apparently intended to acquaint the student with a very large number of possible procedures rather than with their several advantages or disadvantages in the rigorous identification of a particular individual compound. Despite the breadth of treatment of this aspect, the text contains only three specific references to the periodical literature: the authors could well have afforded to be a little more helpful in extending the horizon of the better students.

A little knowledge is a dangerous thing. The difficulties of selection for a short treatment of the methods of identification of organic compounds are so severe that the educational world must be not too critical. The authors deserve congratulation on this somewhat daring experiment. It is sincerely to be hoped that the accessibility of this manual will result in immediate attention to the subject in all courses of organic instruction where the analytical aspect is not yet included.

ERNEST H. HUNTRESS

Cours de Chimie Industrielle. Tome III. Metallurgie. (Industrial Chemistry. Vol. III. Metallurgy.) By G. DUPONT, Professor in the Faculty of Sciences of the University of Paris. Gauthier-Villars, Éditeur, 55 Quai des Grands-Augustins, Paris, France, 1936. iii + 357 pp. Illustrated. 16 × 25 cm. Price, 65 francs.

This third volume of Dupont's "Cours de Chimie Industrielle" is a brief (355 pages) and elementary French textbook of metallurgy, including smelting and refining, the laboratory technique of preparation and testing of metals and alloys, and some discussion of the uses of metals and a little statistical information. The elementary character of the discussion is illustrated by the fact that the whole subject of special alloy steels requires only one page with a mention of only nickel, chromium, copper and tungsten as elements which may be added to steel with advantage. In another part of the book the metallurgy of vanadium is disposed of in one-half page which includes the statement "The ferrovanadium is used, in small proportions, for the refining of iron and steel, which results in an appreciable improvement in the mechanical qualities." The cobalt steels are not merely ignored but their industrial significance is denied: "Cobalt has no applications as the metal; its properties are not, from this point of view, very different from those of nickel, and it is much more rare than the latter. On the other hand, cobalt has in its combinations two industrial uses: (1) the manufacture of smalt, silicate of cobalt, a very beautiful blue glass, used as a pigment; (2) the manufacture of various salts of cobalt, used especially as an oxidation catalyst in the drying of oils." The entire invention and development of the cryolite method of making aluminum is ascribed to Héroult, without even a mention of the name of Charles M. Hall.

It seems clear that an experienced metallurgist will have no need to consult this book and that an American student or beginner can find better books in English unless he is primarily interested in improving his knowledge of the French language.

GRINNELL JONES

Gmelins Handbuch der anorganischen Chemie. (Gmelin's Handbook of Inorganic Chemistry.) Edited by R. J. MEYER. Eighth Edition. System-Number 23, **Ammonium,** Parts 1–2. Issued by the Deutsche Chemische Gesellschaft. Verlag Chemie, G. m. b. H., Corneliusstrasse 3, Berlin W 35, Germany, 1936. 602 pp. 17 × 25 cm. Price, RM. 28.00 + 42.25.

The ammonium radical is the only non-elementary ingredient of matter which has been allotted a separate "System-Number" in Gmelin's Handbook. This fact and the 602 pages devoted to this subject reflect the importance of ammonium in inorganic chemistry.

The major part of this volume, as would be expected, is occupied with the physical properties of ammonium salts and their solutions, and is replete with tables and diagrams, so that a wealth of information is presented in small compass and in easily accessible form. The literature has been covered for the first half of the volume to the end of February, and for the second half to the beginning of July, 1936.

It is indeed a great advantage to students of inorganic chemistry to have this mass of information on an important subject so completely and conveniently presented.

ARTHUR B. LAMB

Synthetic Inorganic Chemistry. A Course of Laboratory and Classroom Study for First Year College Students. By ARTHUR A. BLANCHARD, Ph.D., Professor of Inorganic Chemistry, JOSEPH W. PHELAN, S.B., Late Professor of Inorganic Chemistry, and ARTHUR R. DAVIS, Ph.D., Assistant Professor of Chemistry, at the Massachusetts Institute of Technology. Fifth edition. John Wiley and Sons, Inc., 440 Fourth Avenue, New York, N. Y., 1936. xii + 379 pp. 25 figs. 15 × 24 cm. Price, $3.00.

The fact that this book is now in its fifth edition would indicate that it fulfills the purpose stated in its preface, namely, "to meet satisfactorily the problem of first-year college students in chemistry." The present edition differs from the previous ones in that "a very considerable portion of the text has been wholly rewritten and the entire text has been subjected to a revision and rearrangement. Specific new exercises and discussions which have been introduced include such topics as the determinations of vapor density and molecular weight, the standardization of acids and the titration of acids and bases, Faraday's law and the use of the p_H scale of hydrogen-ion concentration. Several new preparations have been introduced and a few of the old ones have been discontinued."

Chapter I includes a number of quantitative experiments such as the determination of the "Weight of a Liter of Oxygen" and the "Volume of Hydrogen Displaced by Zinc." One chapter is devoted entirely to the theory of ionization. The remaining chapters are divided into two parts: the first includes directions for preparing typical compounds of the different groups of elements, while the second describes various experiments to be carried out with these compounds. A rather extended appendix covers the preparation of reagents, a discussion of the electromotive series, and the periodic classification of the elements.

The authors state that "all students entering the Massachusetts Institute of Technology should have met an en-

trance requirement in chemistry. It is very discouraging to such students to be set at once to reviewing what they have already had, however much they may need the review. The nature, and the considerable freedom in the choice, of laboratory work solves this situation in a very satisfactory manner. A review of preparatory school work is of course necessary, but by bringing this in incidentally the sting of it is removed."

Undoubtedly the student who successfully performs the experiments outlined in this text and is able to deduce correct conclusions from his findings will have gained a thorough knowledge of the fundamental principles of chemistry so far as may be expected of first-year college students.

WILLIAM MCPHERSON

BOOKS RECEIVED

January 15, 1937–February 15, 1937

ERNEST BALDWIN. "An Introduction to Comparative Biochemistry." The Macmillan Company, 60 Fifth Avenue, New York, N. Y. 112 pp. $1.50.

GEORGE BARGER. "Organic Chemistry for Medical Students." Second edition. Gurney and Jackson. 33 Paternoster Row, London E. C. 1, England. 251 pp. 10/6 net.

W. FRANKENBURGER. "Katalytische Umsetzungen in homogenen und enzymatischen Systemen." Akademische Verlagsgesellschaft m. b. H., Sternwartenstrasse 8, Leipzig C 1, Germany. 444 pp. RM. 34.80; bound, RM. 36.00.

R. FRICKE AND G. F. HÜTTIG. "Hydroxyde und Oxyhydrate." Band IX, "Handbuch der allgemeinen Chemie," edited by Paul Walden. Akademische Verlagsgesellschaft m. b. H., Sternwartenstrasse 8, Leipzig C 1, Germany. 641 pp. RM. 57; bound, RM. 60.

L. GATTERMANN. "Laboratory Methods of Organic Chemistry." Translated by W. McCartney from the 24th German edition edited by Heinrich Wieland. The Macmillan Company, 60 Fifth Avenue, New York, N. Y. 435 pp. $4.50.

R. W. GURNEY. "Ions in Solution." The Macmillan Company, 60 Fifth Avenue, New York, N. Y. 206 pp. $3.00.

C. C. HEDGES AND H. R. BRAYTON. "Laboratory Manual of Inorganic Chemistry and Elementary Qualitative Analysis." Revised edition. D. C. Heath and Company, 285 Columbus Ave., Boston, Mass. 271 pp. $1.48.

CARL OPPENHEIMER. "Die Fermente und ihre Wirkungen. Supplement, Lieferung 6." W. Junk Verlag, Scheveningsche Weg 74, Den Haag, Holland. 160 pp. Dutch fl. 10.

JOSEPH ROSIN. "Reagent Chemicals and Standards, with Methods of Assaying and Testing Them." D. Van Nostrand Company, Inc., 250 Fourth Avenue, New York, N. Y. 530 pp. $6.00.

HENRY C. SHERMAN. "Chemistry of Food and Nutrition." Fifth edition. The Macmillan Company, 60 Fifth Avenue, New York, N. Y. 640 pp. $3.00.

FILEMON TANCHOCO. "Physical Chemistry." Benipayo Press, Manila, Philippine Islands. 87 pp.

HENRY TAUBER. "Enzyme Chemistry." John Wiley and Sons, Inc., 440 Fourth Ave., New York, N. Y. 243 pp. $3.00.

HUGH S. TAYLOR AND H. AUSTIN TAYLOR. "Elementary Physical Chemistry." Second Edition. D. Van Nostrand Company, Inc., 250 Fourth Avenue, New York, N. Y. 664 pp. $3.75.

WAYNE E. WHITE. "Specific Tests for Use in the 'Qual.' Course." Obtainable from the Author, 1611 New Hampshire St., Lawrence, Kansas. 14 pp. $0.25.

LUDWIG VANINO, Editor. "Handbuch der präparativen Chemie. Ein Hilfsbuch für das Arbeiten im chemischen Laboratorium. II Band. Organischer Teil." Verlag von Ferdinand Enke, Hasenbergsteige 3, Stuttgart W, Germany. 887 pp. RM. 45; bound, RM. 48.

L. ZECHMEISTER AND L. v. CHOLNOKY. "Die chromatographische Adsorptionsmethode. Grundlagen, Methodik, Anwendungen." Verlag von Julius Springer, Schottengasse 4, Wien I, Austria. 231 pp. RM. 14.40.

"British Chemicals and their Manufacturers." The Official Directory of the Association of British Chemical Manufacturers. Published by and available only from the Association, 166 Piccadilly, London W 1, England. 466 pp. Gratis to genuine purchasers of chemicals.

"Statistical Appendix to Minerals Yearbook, 1935." U. S. Bureau of Mines. Superintendent of Documents, Government Printing Office, Washington, D. C. 486 pp. $1.25.