has gone thoroughly through the literature and coordinated almost 600 references to cover the topic and to assist the reader more easily to understand the excellent presentation of the effect of the many reaction variables.

Although only 68 pages (Chapter X) are devoted to the oxidation of cellulose, oxycellulose, the fractionation of oxycellulose, the method of preparation, the mechanisms involved and various other aspects of these topics, this coverage presents an adequate summary of the present status of these subjects.

In the following three chapters (XI, XII, XIII), the decomposition of cellulose by acids, heat and by biological processes, respectively, are studied. The author follows similar patterns in each case. First he handles hydrocellulose, its fractionation, its formation, rate of formation and properties, and then takes up the formation of special products produced under unique conditions—such as cellobiose, glucose, etc., giving due and adequate consideration to the factors and conditions involved.

The chapter on the thermal decomposition and destructive distillation of cellulose is perhaps the least adequate of the book in view of the industrial significance of this topic. However, a more adequate treatment would have materially lengthened the book, and this topic forms the subject of several existing and adequate treatises. Noteworthy is the addition of a special treatment on the "Hydrogenation of Cellulose"—appearing for the first time in a textbook, so far as this reviewer is aware. Here is a field in its infancy. As yet the literature is mostly in the form of patents of very conflicting specifications and claims.

Chapters on the chain structure and the molecular weight of cellulose, respectively, conclude the book with an exposition of some of the laboratory techniques employed in these fields.

The book fulfills the promise of the author's preface, "emphasis has been laid on the scientific aspect rather than on the practical application of cellulose chemistry, . . . the book may be regarded as a textbook . . . (for) a student who is looking for guidance in his studies and who expects to find an unbroken and coherent treatise, rather than a number of individual and loosely connected chapters."

Some lack of clarity is occasionally encountered. An example or two will suffice. On page 552 the author postulates the formation of levoglucosan from cellulose on distilling in vacuo, as arising from the dehydration of glucose, which presumably is formed as a primary product. Some source of water must be available to produce the glucose, and this may, of course, come from the pyrolysis of another part of the cellulose molecule. However, the author fails to provide a source of moisture and leaves the reader somewhat puzzled to formulate the entire process which the author has in mind. Again, on page 146, data are presented which might be misleading. The percentage of cotton linters dissolved is based upon a total of 2 grams of cellulose exposed to the action of the hydroxide solution. The data are correct, but the uninformed reader might assume from the table that weak copper solutions were capable of dissolving high concentrations of cotton. Fortunately, such instances are relatively rare.

Certainly, "Cellulose Chemistry" is a helpful addition to the library of the scholar, to those who practice the chemistry of cellulose in industry and in research activities, and above all, to the advanced student who, by Dr. Heuser's coherent and systematic presentation of the topics, can be guided in his studies to an understanding of a difficult field of chemistry.

The printing and general format are good. Sized paper is used and space is well conserved in accord with W.P.B. restrictions.

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SOLID ADSORBENTS

Bibliography of Solid Adsorbents. An Annotated Bibliographic Survey of the Scientific Literature on Bone Char, Activated Carbons, and Other Technical Solid Adsorbents for the Years 1900 to 1942 Inclusive. By VICTOR R. DEITZ. A contribution from the United States Cane Sugar Refiners and Bone Char Manufacturers, and the National Bureau of Standards. $7 \times 10\frac{1}{4}$ in. lxxxi + 877 pp. Bound in black cloth, with gold lettering and red back title bands. Washington. 1944.

DON'T gather from the subsidiary title of this very important publication that it is of interest only to the sugar refiner. Far from it. For you are more intimately and more immediately concerned than perhaps you suspect. In fact, your life may depend upon the efficiency of the activated carbon in the cannister attached to your gas mask, as supplied by the Chemical Warfare Service of the United States Army. Further, solvent-recovery adsorbents play a leading role in many organic chemical industries. Large amounts of expensive solvents are recovered through the use of activated charcoal, and the resultant economy makes possible otherwise unprofitable processes. In the packaging of goods for storage or shipment, moisture adsorbents provide protection against mold, mildew and corrosion. The purification of water, refining of petroleum products, agricultural uses, biochemical, medical and pharmaceutical applications, as well as applications to foods, wines, liquors,

soaps, fats, edible oils and to a host of other commodities, give some idea of the extent of the field surveyed; and in addition, the theoretical side is by no means ignored. Unfortunately, as the author points out, the outbreak of World War II has made it practically impossible to obtain a complete coverage of adsorbents of foreign manufacture.

This bibliography, compiled by Mr. Deitz as research associate at the National Bureau of Standards, for the U. S. Cane Sugar Refiners, is a masterpiece of thorough, careful and painstaking labor, and an excellent example of how such a task should be undertaken and carried through. It has no rivals in its field, and is clearly indispensable to all chemists interested in solid adsorbents, a subject which, directly or indirectly, concerns a large proportion of the profession.

Its industrial sponsors are twelve of our leading sugar-refining corporations and four outstanding chemical firms. The research committee by whom it is published, and of which James M. Brown is chairman, is made up of one representative from the National Bureau of Standards (Bates) and eight from industry. The volume is dedicated to Frederick John Bates, chief of the Optics Division of the Polarimetry Section of the National Bureau of Standards and president of the International Commission for Uniform Methods of Sugar Analysis, under whose personal supervision and direction, and in whose section, the experimental work was carried out by a staff of research associates.

As explained by Director Lyman J. Briggs in a foreword, this publication constitutes the beginning of a broad program of basic research in the study of sugar-refining problems.

After a "History of Commercial Adsorbents in Relation to the Sugar Refining Industry," including a descriptive list of some 165 solid adsorbents, there follow chapters on I, Adsorption of Gases and Vapors on Solid Adsorbents (196 pp.); II, Adsorption from Solutions on Solid Adsorbents (152 pp.); III, Thermal Effects in Adsorption Processes (26 pp.); IV, Theories of Adsorption (58 pp.); V, Refining of Sugars and Other Applications of Adsorbents (256 pp.); VI, General Information on Adsorbents and Special Methods of Investigation (80 pp.); and VII, Preparation of Carbon Adsorbents (38 pp.). These chapters give classified citations to 6,002 original articles. The abstract which follows every entry has been prepared from either the original article, *Chemical Abstracts, British Chemical Abstracts, Journal of the Society of Chemical Industry Abstracts, Journal of the Chemical Society Abstracts, Science Abstracts* or the *Chemisches Zentralblatt,* and the abstract reference follows each journal reference.

The sources of the bibliography are given, with a key to periodical abbreviations, an author index, a subject index and a list of the abbreviations used in the abstract text complete the volume. Attractive in appearance, with excellent paper and press work, fundamentally important in its content, with its subject-matter well organized, clearly and compactly presented, it will be a conspicuously valuable addition to any chemical library.

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SPECIAL ARTICLES

PREVENTION AND TREATMENT OF d-TUBOCURARINE POISONING

IT is generally considered that the anticholinesterases, *e.g.,* physostigmine and neostigmine, antidote curare poisoning[1]; in appropriate doses they reestablish the electrical excitability of the motor nerves of curarized animals. It is also well known that both of these drugs in larger doses have a peripheral paralyzing action which differs from curare in that it is not annulled by potassium.[2] After administration of epinephrin to the partially curarized or curarized-neostigminized cat muscle (Rosenblueth, Lindsley and Morison) an indirect activation of the muscle caused a marked transitory increase in electric and mechanical responses. Following curare administration, epinephrin had a negligible effect on the response to direct stimulation of the cat muscle.[3] It has also been ascertained that the contractility of the frog gastrocnemius muscle is slightly increased by treatment with a 0.1 per cent. ephedrine solution (antioxidase?).[4]

The purpose of the study was to find methods by which paralysis and death of the intact animal by the newly introduced active curare principle, d-tubocurarine chloride, could be prevented.

EXPERIMENTAL

Rabbits were used for these experiments, and all injections were given into the marginal ear vein. d-tubocurarine chloride,[5,6] dissolved in water with chlorobutanol added as a preservative, was used in

[1] J. Pál, *Centralbl. f. Physiol.,* 10: 18, 1900.
[2] A. Schweitzer and S. Wright, *Jour. Physiol.,* 89: 384, 1937.
[3] A. Rosenblueth, D. B. Lindsley and R. S. Morison, *Am. Jour. Physiol.,* 115: 53, 1936.
[4] H. Kreitmair, *München. Med. Wchnschr.,* 74: 190, 1927.
[5] The supply of d-tubocurarine chloride by Dr. H. Sid-