

Emil Fischer's work in the sugar group shows that prussic acid when added to various aldoses often gives a decided preponderance of one of the two isomers theoretically possible. Similarly the benzoic acid rearrangement, which also depends upon an addition of active carbon monoxide to various aldoses,¹ often proceeds asymmetrically.

We are thus able to understand, in a strikingly simple way, why various enzymes can convert the sugars into optically active destruction products such as *d*- or *l*-lactic acid, etc., etc. Finally we may ask ourselves whether the two unlike valences of carbon are positively and negatively charged. It is impossible to answer this question with certainty at the present time; it is my conviction, however, that the peculiar ease with which carbon forms chains of great complexity and stability, as well as the fact that the vast majority of the carbon compounds are non-ionizable substances whose reactions proceed mainly in the manner indicated above,² must be attributed to the non-equivalence of the four valences of the carbon atom; furthermore the existence of various compounds containing bivalent carbon can also be readily understood on this basis.

NEW BOOKS.

Immunochemistry. The Application of the Principles of Physical Chemistry to the Study of the Biological Antibodies. By SVANTE ARRHENIUS. The Macmillan Company. Price, \$1.60.

The preface of this book states that the contents contain a summary of six lectures on the immunity reactions, delivered at the University of California during the summer of 1904, amplified by the addition of new matter covering the subject to the date of publication. No information is given as to whether this is a translation of the German edition, or conversely; but as the German edition preceded the American by several months the latter is presumably a translation, which assumption is supported by the occasional occurrence of characteristic German forms of construction.

Under the title of "Immuno-chemistry" (a useful term which this book will probably cause to be adopted into the vocabulary of the "immunologist") Arrhenius gathers much of the literature bearing upon the studies that have so far been made of the chemical nature of the reactions of immunity, but most of the space is devoted to discussion and interpretation of the results so far obtained by the application of the methods of physical chemistry to the problems of immunity. As by far the greater part of this work has been done by, or under the direction of the author or his colleague, Dr. Madsen, the "Immuno-chemistry" partakes largely of the nature of a monograph upon the physical chemistry of immunity reactions; consequently a review of the book almost necessarily resolves itself into a criticism of the value of the in-

¹ Cf. *Ann.*, 357, 231-3.

² See THIS JOURNAL, 26, 1577.

vestigations upon the physical chemistry of the immunity reactions that are therein recorded. Certainly when a physical chemist of the pre-eminent standing of Prof. Arrhenius collaborates with so experienced an investigator of the problems of immunity as Prof. Madsen, the outcome of their labors is sure to receive most respectful consideration, and whether one does or does not agree with all their conclusions, none will deny that they have opened an almost untouched field of research to general investigation. The results and hypotheses produced by their work and recorded in collected form in this book are certain to stimulate a great amount of research and controversy, which are bound to be fruitful whether or not they confirm the conclusions of Arrhenius; therefore the actual value of this book is certain to be very great, and it constitutes a welcome addition to the literature of immunity. As to the actual significance of the results so far obtained through the study of immunity reactions by the methods of physical chemistry, there is room for difference of opinion. Already many of the conclusions expressed in this book, and previously published in special periodicals, have been sharply attacked; and in the opinion of the reviewer these attacks have been justified, for there is no question that among the many investigations recorded are to be found serious errors of experiment and of interpretation. To discuss the specific points of Arrhenius's work that have been found open to attack would require more space than can well be allotted to a book review, but it may be stated that the chief source of error would seem to lie in the enormous disparity that exists between the very exact *methods* of physical chemistry and the very uncertain *materials* of immunology, which makes the application of one to the other a very hazardous procedure.

Only the investigations of numerous workers through a long period of time can finally decide the actual value of the work done and the conclusions reached by Arrhenius and Madsen and their adherents, but whether supported or not, its stimulating influence is certain to have a profound effect upon the future development of our knowledge of this all-important subject of immunity. As the authorized exposition of this work, Arrhenius's "Immuno-chemistry" will of necessity stand as a classic in the literature of immunity, and to pick at the faults of style and rhetoric would be trivial; to attempt to judge its actual present worth or to predict future valuation would be presumptuous. Its usefulness is assured, and it will be read eagerly, and *very* critically, by every student and investigator of the processes of immunity. It is unfortunate that the exigencies of the subject are such that the book will be read understandingly by but a very limited number of scientists; the unavoidable use of the complicated terminology of immunity will stand in the way of the chemist, except in those sections devoted to the sta

physical chemistry of enzyme reactions, where there is gathered much valuable material; on the other hand, the constant and necessary use of mathematical expression will be a serious obstacle, unfortunately, to many immunologists.

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RECENT PUBLICATIONS.

ANDRÉS, L. E.: *Zelluloid und seine Verarbeitung*. Wien: 1908. gr. 8. 374 ss. M. 6.

BAKER, T. THORNE: *The Spectroscope: ITS USES IN GENERAL ANALYTICAL CHEMISTRY: an intermediate text-book for practical chemists*. New York: William Wood & Co. 1908. 8vo. \$1.75.

BERTHELOT, M., ET JUNGFLIECH, E.: *Traité élémentaire de Chimie Organique*. 4^e d. Vol. I. Paris 1907. L'ouvrage complet. 2 vols. 1904-1907. 2252 pp. M. 42.

BLOCHMANN, R.: *Luft, Wasser, Licht und Wärme*. 9 Vorträge aus dem Gebiet der Experimentalchemie. 3 Auflage. Leipzig: 1907. gr. 8. 149 ss. M. 1.

COHEN, E.: *Das Lachgas*. Eine chemisch-kultur-historische Studie. Leipzig: 1907. M. 3,60.

CONDUCHIE, A.: *Contribution a l'étude des Oxyurées et Carbamidoximes*. Paris: 1907. 141 pp. M. 4.

FARADAY, M.: *Chemical History of a Candle*. New Edition. London: 1907. 1 S.

HAMMARSTEN, OLOF.: *Text-book of Physiological Chemistry*. Authorized translation from the author's enlarged and revised 6th German edition, by J. A. Mandel. New York: John Wiley & Sons. 1908. \$4.

Handbuch der angewandten physikalischen Chemie in Einzeldarstellungen. Herausgegeben von G. Bredig. Band VIII. Leipzig: 1907. gr. 8. 204 ss. M. 9. Inhalt: Müller, A. Allgemeine Chemie der Kolloide.

HAWK, P. B.: *Practical Physiological Chemistry*. London: 1907. 16 s. 6 pp.

HILDEBRANDT, H.: *Neuere Arzneimittel. Beziehungen zwischen deren chemischen Konstitution und pharmakologischen Wirkung*. Leipzig: 1907. gr. 8. 168 ss. M. 4,20.

JÜPTNER, HANNS VON.: *Lehrbuch der chemische Technologie den Energien*. III Bd. Die chemische Technologie d. strahlenden u. d. elektrischen Energie. Leipzig: 1908. M. 10.

KRAUS, K.: *Experimentierkunde*. Anleitung zu physikalischen und chemischen Versuchen an Volks- und Bürger-schulen. Wien: 1907. 360 ss. M. 4,20.

LEWIS, E. T.: *Inorganic Chemistry*. New York: G. P. Putnam's Sons. 1908. 8vo. 424 pp. \$1.25.

MOYE, A.: *Die Gewinnung und die Verwendung des Gipses*. (Bibliothek der gesamten Technik, 72 Bd.) Hanover, 1908. M. 2,40.

OSTWALD, W.: *Prinzipien der Chemie*. Eine Einleitung in alle chemischen Lehrbücher. Leipzig: 1907. M. 8,80.

ROLOFF, M.: *Grundriss der physikalischen Chemie*. Leipzig: 1907. gr. 8. M. 5.

SCHULZ, F. N.: *Praktikum der physiologischen Chemie*. Kurzes Repetitorium. 3 Aufl. Jena: 1908. M. 2,50.

Spektraltafel nach der Originalzeichnung von G. Kirchhoff und R. Bunsen. Neue Auflage. Wien: 1907. M. 6.