whether the ring of methyl isorhamnoside, and therefore, that of the methyl glucosides, have the 1,5 structure.

Summary

A summary of the evidence from the methylation studies of Purdie, Irvine and their students shows that the position of the ring in the α- and β-methyl glucosides is limited to 1,4 and 1,5. The recent proof from the methylation studies of the St. Andrews school that methyl xyloside, arabinoside and galactoside possess 1,5 rings leads to a proof from rotatory relations, which is now presented, that the α- and β-methyl glucosides and β-methyl isorhamnoside possess a 1,4 ring and that the rings of the mannose and rhamnose series, which were provisionally designated 1,A, 1,B and 1,C in the preceding article are, respectively, 1,5, 1,4 and 1,3. In the postscript it is shown that Hirst and Macbeth's recent proof of the 1,5-ring structure of methyl rhamnoside (1,A) supplies the basis for an independent corroborative proof of the present classifications in the mannose and rhamnose series. The proof of the 1,4-ring structure of the methyl glucosides is in disagreement with Charlton, Haworth and Peat's recent conclusion, from a different type of evidence, that they possess a 1,5 ring.

WASHINGTON, D. C.

NEW BOOKS

Fundamentals of Physical Chemistry, for Students of Chemistry and Related Sciences. By DR. ARNOLD EUCKEN, Professor of Physical Chemistry in the Technischen Hochschule, Breslau, Germany. Translated and adapted from the second German edition by ERIC R. JETTE, Ph.D., Instructor in Chemistry, and VICTOR K. LAMER, Ph.D., Assistant Professor of Chemistry, Columbia University. International Chemical Series, H. P. TALBOT, Ph.D., Sc.D., Consulting Editor. McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York, 1925. xxiii + 699 pp. 99 figs. 21 × 14 cm. Price $5.50.

The subject matter of this treatise is presented in four sections, as follows: Mathematical-Physical Introduction; Physical Thermodynamics; Chemical Thermodynamics, including Electrochemistry; The Structure of Matter.

The first of these sections appears to reflect the feeling that it is necessary to defend the use of mathematics in physical chemistry. The material it contains is well chosen and well presented, but it is not likely to assist those who are deficient or interest those who are not. One wonders whether it might not be possible to make use of mathematics wherever it is advantageous to do so, without apology or explanation.

"Thermodynamics," in the titles of the second and third sections, is evidently intended in a more inclusive sense than is usual. Actually, the kinetic theory and the quantum theory are used extensively in the interpretation of phenomena relating to ideal solids, liquids and perfect

and imperfect gases. Indeed, these treatments consitute one of the features distinguishing the work and are to be especially commended in principle. The thermodynamics itself is largely "classical" in character. It is solid enough in the main and reasonably complete, though not always very inspiring. The presence of "null point energies" and the clumsy "chemical constants" will, no doubt, prove objectionable to some readers. In the third section the conscientious work of the translators is especially evident, for instance, in their revision of the chapter on solutions and in the inclusion of the theory of complete ionization of strong electrolytes.

An idea of the scope of the last section may be given by citing some of its principal subdivisions. Among these are The Disintegration of Atoms, Energy Exchange in Atomic and Molecular Processes, and The Linkage of Atoms. Under the second of these topics one finds outlined, for example, the application of the quantum theory to atomic and molecular spectra and black body radiation. The treatment is necessarily condensed in these sections, and many chemists would perhaps prefer different emphasis in the discussion of atomic linkage.

The book appears particularly suited for reference and study by advanced students. The great variety of material, the diversity of method in its presentation, and the frequent notes and references all contribute to this end. The same features produce an atmosphere of discontinuity which may prove confusing to beginners. Nevertheless, within its field it is undoubtedly one of the best of the current texts.

E. D. EASTMAN

Leitfaden der Kolloidchemie für Biologen und Mediziner: Eine Einführung in die allgemeine Physiologie, Pathologie, Pharmakologie. (Manual of Colloid Chemistry for Biologists and Physicians. Applications to General Physiology, Pathology, Pharmacology.) By Dr. HANS HANDOVSKY, Privatdozent in Pharmacology at the University of Göttingen. Second revised edition. Theodor Steinkopff, Dresden and Leipzig, 1925. xvi + 265 pp. 36 figs. 23.5 × 16 cm. Price, bound, 14 M.; unbound, 12 M.

Within recent years students of the biological and medical sciences have realized as never before their need for an adequate understanding of the physical sciences. Many of them haveattempted to bolster up their knowledge of physics and chemistry, and more especially colloid chemistry, and they have painfully attempted to follow the advances of subjects none too familiar to them.

As an aid to these eager seekers for knowledge, there have been published from time to time outline books or short cuts which are intended to guide the biologist through the mazes of a strange science. These short cuts, either published separately or as parts of larger biological works, are sometimes more difficult for the biologist than the authoritative treatises they attempt to simplify. Instead of being written in words of one syllable,

they give a summary in highly condensed form of the most involved and the most abstruse subjects. Sometimes, moreover, they confuse the scientifically trained biologist by citing proofs and arguments which are really not proofs at all and which merely serve to bewilder him. Apparently at times an author is more concerned with demonstrating his acquaintance with the complexities of a subject than he is in bringing out the easier aspects of the science to his unfortunate readers. I am not sure that Handovsky has avoided all of these faults, although he has avoided some of them. Unless his book is translated it could scarcely be read rapidly by American readers, who would face the added difficulty of a foreign language.

It should be pointed out that there are some advantages in the short-cut method. Certainly it is a time-saver for the hurried scientist. Of all the divisions of physical science, the biologist is most deeply interested in colloid chemistry. But this is a huge subject; much of it is relatively unimportant for the worker in biological science. A book of colloid chemistry written by a biologist for biologists can stress those portions of the subject which are of especial value in the study of life processes.

This is exactly what Handovsky has attempted to do, and on the whole he has chosen his material wisely. In his discussion of colloid chemistry he has perhaps been influenced most by the ideas of Wolfgang Ostwald, but he has not confined his attention to any one source. Zsigmondy, Pauli and Loeb are often cited, and there is an occasional mention of Freundlich. In addition there are numerous references to recent work on colloid chemistry.

The fact that Handovsky's book has gone through two editions in the short space of three years is good evidence that it is being widely read, at least in German speaking countries. To the biologist its particular appeal lies in the fact that it makes frequent application of the principles of colloid chemistry to various biological phenomena.

L. V. HEILBRUNN

Das Kolloide Gold. (**Colloidal Gold.**) By R. ZSIGMONDY and P. A. THIESSEN, Göttingen. Akademische Verlagsgesellschaft m. b. H., Leipzig, 1925. x + 229 pp. 11 figs. 21.5 × 15 cm.

This is Vol. I of "Kolloidforschung in Einzeldarstellungen," a new series of small specialized treatises in colloid chemistry edited by Professor R. Zsigmondy. As one might imagine, a 229-page discussion of colloidal gold should be fairly complete. This volume will be found valuable to chemists and physicists interested in colloids. The reviewer makes one adverse criticism, however, since he failed to find mention of the important chemical principle developed by Beans and Eastlack (THIS JOURNAL, 1915) concerning the nature of gold hydrosols made by the electric arc dispersion method.

ARTHUR W. THOMAS

Modern Astrophysics. By HERBERT DINGLE, Assistant Professor of Astrophysics at the Imperial College of Science and Technology, London. The Macmillan Company, New York, 1924. xxviii + 420 pp. xlvi plates; 33 figs. 22.5 × 14 cm. Price $8.50.

The question as to what is physics and what chemistry has long been the occasion of lively argument between the physicist and the chemist. Astrophysics, as it is here presented by Herbert Dingle, might well be subject to the same controversy. Certainly, "stellar chemistry" would be an equally apt description of many portions of this interesting volume.

The book affords a comprehensive review of our present knowledge of the physics and, let us say, the chemistry of the sun and stars. Since most of this knowledge is derived from a study of spectra, the first chapters are devoted to spectroscopy. There follows a discussion of the characteristics of the stars, such as their spectra, temperatures, masses, velocities, distribution and evolution. Then come chapters on the different varieties of celestial bodies, the sun, stars, nebulae and star clusters. Finally, there are stimulating chapters on The Universe: As it is; As it was; As it will be.

The author has achieved the most difficult of accomplishments for works of this kind; he has made the book sufficiently comprehensive and thorough to be of interest, I feel sure, at least as a review of our present knowledge, to the practical, professional astrophysicist; at the same time, he has presented the subject so clearly and simply, and with such liveliness that it can be read with pleasure and satisfaction by the intelligent layman. Best of all, the author has not dodged an issue because it is difficult of presentation, nor has he indulged in the cheap devices of exaggeration.

Something of the deeper motivation of the book can be gathered from the following excerpt from the preface:

"An attempt has been made also to convey indirectly to the reader something of the emotions of the practical worker—something of the strange mixture of enthusiasm and wonder, assurance and distrust, eagerness and fear; of amazement at the splendor of his achievements, and humiliation at their meanness; of delight in his knowledge, and disgust at his ignorance; of confidence for the future, and shuddering at its difficulties; in short, of the 'divine despair,' that agitates the breast of the modern astrophysicist when he surveys the untrodden land into which he has pierced."

All told, we can commend this book to any chemist who wishes to acquire a comprehensive picture of the status of this stimulating and inspiring science.

ARTHUR B. LAMB