

REVIEWS

A New Physical Chemistry*

Physical Chemistry may be defined as a consideration and interpretation of the facts of chemistry in the light of physical principles. An exposition of the relevant physical principles followed by an application of the same to specific chemical themes should accordingly form the plan of any rational treatise on the subject. The kinetic theory of gases and the principles of thermodynamics formed the common ground between physics and chemistry till some two or three decades ago. The remarkable developments which have taken place of recent years in atomic physics have, however, tended to bring physics and chemistry into much closer union at the present time. We may specially mention here the interpretation of atomic structure on the basis of the spectroscopic evidence, the elucidation of molecular structure by studies on band-spectra, infra-red absorption and light scattering, and the analysis of crystal structure by studies on X-ray and electron diffraction. The development of the new quantum mechanics has also made possible an understanding of the nature of the atomic forces operative in chemical reactions. We have not yet reached the stage when theoretical chemistry may be described as a branch of mathematical physics, but we are certainly tending in that direction. It is, therefore, only appropriate that the coming generation of physical chemists should realise the situation and make themselves familiar with the newer physical ideas and mathematical methods before they become "too old to learn". Only thus can they hope to really understand their subject or to make any contributions to it.

The treatise under review will undoubtedly assist in giving the new orientation desired for the teaching of physical chemistry to the rising generation. It may be a shock to the orthodox physical chemist to find a treatise on his subject which leaves out the theory of solutions, ignores colloid chemistry and even makes no mention of the phase-rule. But such omissions could scarcely be avoided if room were to be found for developing the foundations on which could be based a rational treatment of chemical thermo-dynamics, chemical equilibria and chemical kinetics.

As remarked by the author in his Preface, "the book is complete in itself; it does not expect of the student that he shall have at his elbow a number of other books. All theorems are derived; no proof is taken for granted". These are valuable features which will be greatly appreciated by teacher and student alike.

The book is very heartily commended.

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* *Physical Chemistry—An Introduction*. By Dr. E. A. Moelwin-Hughes. (Cambridge University Press), 1940. Pp. viii + 660. Price 45s/h.

Advances in Enzymology, Vol. I. Edited by F. F. Nord and C. H. Werkman. (Interscience Publishers, Inc., New York), 1941. Pp. x + 433. Price \$5.50.

Early in 1939, it was learnt that Professor Nord chose to leave his country and that the University of Fordham had extended its hospitality to the illustrious founder and editor of *Ergebnisse der Enzymforschung*. His friends the world over were expecting that he would organise the publication of another series.

The present volume marks the commencement of the expected series and is intended to be of "service to those investigators who are devoting their efforts to extending our knowledge" in the field of enzymes and related subjects. The scope of this series is sufficiently broadbased to include critical reviews on proteins, viruses, photosynthesis and differs in this respect from the series, the *Ergebnisse der Enzymforschung* whose eighth, and we believe, the last volume, was published early in 1939; the series has apparently suspended its publication, presumably on account of the distractions and privations incidental to modern wars which render the peaceful pursuit of fundamental research difficult if not impossible.

The volume consists of ten contributions; the appropriateness of prefacing the series with a provocative review on protein structure is realised if attention is called to the impressive assemblage of "active proteins" which have been isolated during the last decade in a state of integral purity and crystallinity. Although the nature of the prosthetic group of several of the dehydrogenases, has been largely elucidated, practically nothing is known about the corresponding apodehydrogenase and the virus proteins. The next phase of development in the field of oxidation and reduction enzymes and viruses will lie in the elucidation of the nature of the active groups characterising these "active" proteins. Bull's discussion on protein structure which draws pointed attention to the several shortcomings in the present theory of protein structure, is most opportune; it will serve to focus attention on the several obscure points and stimulate further work in this important field.

The second contribution by Holzapfel relates to a consideration of the physicochemical behaviour of plant viruses in relation to their activity. Bergman and Fruton have discussed the specificity of proteinases, a subject to which they have made fundamental contributions. The phosphorylations which precede the step-wise fission of carbohydrates, the intermolecular transfer of hydrogen and the transportation of entire groups or radicles from one molecule to another, are all coupled with the energy changes associated with the phosphate bond. In an informative article on the metabolic generation and utilisation of phosphate bond energy, Lipmann has surveyed the subject of the energetics of cell metabolism in relation to the role played by