mixtures; also of the relations between composition and chemical properties. A further part will include the laws of "diluted matter," in the form of gas, or in solution; also electrochemistry. And a final part will treat of colloidal solutions and the chemical action of radiations.

Judging from the present volume, the work when completed will be one of great interest; for, although in the part before us there is a good deal which for the chemist can only be regarded as good discipline, there are also, here and there, many passages which are suggestive and stimulating; none the less so for the fact that the author's reasoning does not always carry conviction with it. Such is, for instance, that in which an attempt is made to give a more imaginable form to the idea of changes of entropy (Chapter V); and that in which the ordinary idea of forms of energy is discussed (Chapter IV).

The contents of the present volume will be sufficiently indicated by giving the headings of the nine chapters which compose it: I, The notion of force; II. The factors of action; III, The principle of equivalence and the notion of energy; IV, Rôle of the factors of action in the production of changes; V. The principle of evolution; VI, Characteristics of stable equilibrium; VII, Pure substances and laws of combination; VIII, Chemical potential; IX. The phase rule. It will be seen that the later chapters have a much more chemical complexion than the earlier ones; nevertheless the treatment throughout is abstract and mathematical, and will not appeal at all to those chemists to whom the calculus is a stumbling-block. To others this work will hardly fail to be interesting. A. P. SAUNDERS.

DETERMINATION OF RADICALS IN CARBON COMPOUNDS. BY H. MEYER. Authorized translation by J. BISHOP TINGLE. Second edition rewritten. New York: John Wiley and Sons. London: Chapman and Hall. xii + 162 pp. 12mo. Cloth. Price, $1.00.

The first edition of this little book was reviewed in this Journal, **22**, 50, and is already favorably known to organic chemists. The present edition contains over 20 per cent. of new matter, including several cuts. The author has cooperated with the translator in the work of revision. S. P. MULLIKEN.

LOIS GÉNÉRALES DE L'ACTION DES DIASTASES. PAR VICTOR HENRI. Paris: Published by Librairie Scientifique, A. Hermann.

This is a well-printed book of 129 pages devoted to a discussion of the general laws of the action of the diastases.

In the study of the general phenomena of the life of organisms, two groups of theories have been proposed. The theories of the first group regard the vital manifestations as being due to physical and chemical actions only. The theories of the other group admit the existence of forces or energies extra-chemical, so-called vital forces. Since all experimental work with organisms of this kind must be based on physical and chemical principles there is no possibility of demonstrating, by experiment, the value of the theories of the second group. It is self-evident that any so-called vital force is beyond the power of experimental research. The work of Mr. Henri, of course, is based upon the assumption that the theories of the first group are the true ones, and he undertakes the study of the general laws of diastatic actions in their chemical and physical relations. The work is confined to the discussion of three diastases only, namely, invertine, emulsine and amylase. These three diastases have the advantage of lending themselves to experimental study more easily than the other members of the group. While the work is confined almost exclusively to the study of the influence of temperature upon diastatic action it seems possible to base upon it a general theory of diastatic action completely in harmony with the laws of general chemistry.

The work consists of an introduction of twenty-five pages, giving the state of our actual knowledge of catalytic action. The first chapter, eighteen pages, is a historical résumé of the laws of the action of diastases. The second chapter, thirty-three pages, is devoted to the experimental study of invertine. The third chapter, thirteen pages, is devoted to a discussion of the theory of the action of invertine. The fourth chapter, six pages, is devoted to the study of the action of emulsine. The fifth chapter, ten pages, is devoted to the study of the action of amylase upon starch.

The chemical reactions which take place under the influence of these ferments are discussed mathematically and chemically, and this discussion will be a great help to those chemists who desire to apply mathematical formula to chemical processes. The study of catalytic action shows that there are various forms of activity, namely: first, catalysis produced by the simple presence of the ferment; second, autocatalysis; third, formation of intermediate combinations which are produced very rapidly; fourth, intermediate combinations which are produced slowly; fifth, the action of the catalyzing agent upon a series of successive reactions.

In the development of the third class of reactions mentioned above, the theory of E. Fisher is cited. It shows that there is a constant relation existing between the diastase and the chemical constitution of the bodies which are transformed by it. Fisher's theory also holds that, for instance, in the inversion of cane-sugar, there is an actual chemical compound at first formed between the ferment and the sugar, and by the subsequent breaking up of this compound there are formed the invert sugar on the one hand, while the diastase is regenerated on the other. This little work will undoubtedly be of great interest and benefit to those who are pursuing the study of catalytic reactions from theoretical and mathematical points of view. H. W. WILEY.

THE PRINCIPLES OF ANIMAL NUTRITION, WITH SPECIAL REFERENCE TO THE NUTRITION OF FARM ANIMALS. BY HENRY PRENTISS ARMSBY, PH.D., Director of the Pennsylvania State College Agricultural Experiment Station; Expert in Animal Nutrition, United States Department of Agriculture. New York: John Wiley and Sons. 1903. Cloth. 614 pp. Price, $4.00.

The scope of this very readable work is much broader than the second part of the title might suggest to the casual reader, since the various discussions in it apply in most cases to man as well as to the lower animals. From the preface it appears that the substance of the book was first presented to the public as a course of lectures delivered at the Graduate Summer School of Agriculture in Columbus, Ohio, in 1902; in its present expanded form it covers the whole subject in a more systematic manner than would be possible in a course of lectures and is especially characterized by very full references to the original literature.

The general subject is presented under two heads which lead to a division of the book into two parts: 1, The income and expenditure of matter; 2, the income and expenditure of energy. In Part I, which is largely chemical, there are found very clear descriptions of the early experiments of Liebig, Pettenkofer, C. Voit and other pioneer investigators in this field, and also the recent and more exact studies of the modern workers. Chapter V, 92 pages, of this part of the book deals with the question of the relations of metabolism to the food supply and it would not be easy to find a more intelligible or concise presentation of a subject on which the literature has grown to be enormous. This chapter will prove of value to the physiologist or physiological chemist for general