A committee of the American Institute of Chemical Engineering has attempted to set out the relative weighting of the several major subjects which should be taught; it is of interest that in a four-year course it gives 28 per cent to chemistry, 12 per cent to chemical engineering, and 14 per cent to other engineering. The book before us aims at teaching the 'elements' of chemical engineering along the lines indicated. It overlaps to some extent the pioneer work on the "Principles" by Walker, Lewis, and McAdams, which, however, is too advanced for beginners; so there is ample room for the work of Badger and McCabe. Both authors are so well known in their profession that there is no fear that they will have shirked their task. The book is blessed by A. D. Little, who contributes a very practical introduction containing much sound advice. If the chemical engineer will teach manufacturers, as Dr. Baekeland puts it, to "make their blunders on the small scale and make their profits on the large scale", then new inventions will be more often a source of profit to those who finance them. E. F. A.

Modern Views on Magnetism.

Magnetic Phenomena: an Elementary Treatise. By Prof. Samuel Robinson Williams. (International Series in Physics.) Pp. xxii + 230. (New York: McGraw-Hill Book Co., Inc.; London: McGraw-Hill Publishing Co., Ltd., 1931.) 15*s.* net.

THIS is the fourth volume of the series. The three which preceded it dealt with subjects in advanced physics. In the first of these, which discussed the most recent of the recent advances, it was a matter for thankfulness to find that the title "The New Physics" never once appeared. It is probably due to the much greater popular interest which is taken in scientific subjects in the present century, as compared with that taken in the past century, that the phrase has now come into very frequent use. Yet in the past century great and even revolutionary advances, without which the now recent advances could scarcely have matured, were made in physics. Nevertheless, these were spoken of with reticence as 'recent advances in physical science', though time has placed them as the greatest at that date since Newton's day. There is only one physics developing continuously as time progresses. Had Newton been asked if his Laws were observed in sub-atomic dynamics, he would very certainly have said that he had no data on which to found an answer.

The universe of molar physics is entirely untouched by the discovery of the electron, and that is the main subject matter of elementary physics. Similarly, it is untouched by the quantum and by relativity. But the supposed inversion of all physics, which has been impressed on the popular mind, has induced an expectation of inverted textbooks.

A glance at Prof. Williams's textbook dispels fear on this point. The electron appears in a few sentences only; the magneton, even, in a page or two only; the quantum in one paragraph; and relativity not at all. Yet the book is thoroughly up to date and modern. The treatment is fresh. This appears even in the titles of chapters, and in their arrangement. 'Magneto-magnetics' instead of 'magnetism' may seem peculiar. That chapter occupies, as it ought, about half the book. 'Magneto-mechanics', 'magneto-thermics', etc., are expressive. The student who uses the book will find fresh breezes blowing through it, and will be led up to the mountain tops, or at least see them temptingly in the distance. It is a book for a learner who wishes to go far.

One sentence may be quoted: "There is no physical existence of these [magnetic] lines of force" (p. 6). Here the author is pointing out, quite necessarily, that there is no terminal magnetic charge corresponding to electric charge in the case of electric lines of force. But reference to the closed electric lines of force which surround the line of motion of a magnetic pole would be useful. Faraday and Maxwell regarded both sets as having real physical existence in the ether. Probably the author does so also; and so would Newton have done. Yet those mathematicians who pay attention to formalism alone, and those philosophers who pay attention to idealism alone, deny physical existence to the ether itself because it is not required for the expression of the formal relationships given in the modern physical equations. Newton's famous dictum, given by him as an *experimentalist*, *Hypotheses non fingo*, tends to be regarded as an absolute dictum applicable even to modern physical theory, and the abolishment of the ether. But Newton's dictum, given by him as a *theorist*, was this, "that one body may act upon another at a distance through a *vacuum*, without the mediation of anything else, by and through which their action and force may be conveyed from one to another, is to me so great an absurdity, that I believe no man who has in philosophical matters a competent faculty of thinking, can ever fall into it".

W. PEDDIE.

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