space than is at my disposal, so that a review of these advances as well as those very important ones resulting from the application of physical chemistry to biology must be postponed to some future date, at which time the many errors of omission of which I am conscious may, I hope, be amended.

WASHINGTON, D. C.

NEW BOOKS.

Einführung in die Chemie. Ein Lehrbuch für höhere Lehranstalten und zum Selbstunterricht. By WILHELM OSTWALD, Stuttgart, 1910: Franckh'sche Verlagshandlung. pp. 238; 74 illustrations in the text. Cloth, 3 Marks net.

In this textbook it is the main object of Professor Ostwald to educate the student to "chemical thinking," to supply a basis for chemical understanding and to deepen the logical analysis of the chemical phenomena. Contrary to the methods pursued in most other textbooks, Professor Ostwald prefers to give only the data absolutely necessary for the understanding of the scientific consequences and to describe only the phenomena absolutely essential for grasping the real educational value of chemistry.

This is quite a new departure, since in most of the textbooks such a lot of material is presented, that the students get the impression that by learning the contents of the respective book he will know all about chemistry. Ostwald's book, on the contrary, incites to further thinking and impresses the student with what may be called scientific modesty. The first five chapters contain a discussion of matter, mixtures, physical transformations, solutions and chemical processes. Chapters 6 to 13 describe the metallic and non-metallic elements and compounds in a clear and concise, *i. e.*, really Ostwaldian manner. The book will prove as useful to the teacher as to the student. OSKAR NAGEL.

Introduction to Physical Chemistry. By HARRY C. JONES, Professor of Physical Chemistry in the Johns Hopkins University. New York: The Macmillan Co. 1910. xv + 279 pp. Price, $1.60 net.

So far as we know, this is the most recent work from Prof. Jones' pen. Using 'recent' as he uses it, however, we could not feel secure in this statement. "Quite recently" on p. 47 refers to 1895, and on p. 113 to 1899. The epoch of writing may, however, perhaps be fixed from internal evidence for (p. 136) 'Berthelot's experimental work has continued up to the present' and "van't Hoff's paper on the subject of solid solutions appeared about eleven years ago." The purpose of the book is sufficiently obvious from the title. Symptoms of adaptations from the author's larger works appear at times rather prominently. Thus we find, on p. 67, two liquids becoming miscible in all proportions, "as we have just seen." We have not, however, seen it in the present volume.

Again, we are told, on p. 26, that the author will call the temperature coefficient of gases "B." Having mentally agreed to this and assimilated the significance of "B," we read on in expectation. "B," however, fails to put in any further appearance. But we must not be too disappointed, for this is an optimistic book We find the author taking a characteristically optimistic view of the agreement of results "found" with those calculated by theory on p. 61. Here we notice divergencies of 10 per cent. and more in the square of a quantity calculated from measurements of absolute boiling point and of densities at 0°, both of which quantities are customarily measured with concordance of well within half a per cent. by different observers. The agreement is, nevertheless, stated to be "almost within the limits of experimental error." Optimism is a good fault, and is well in keeping with the vigor and freshness that characterizes much of the exposition. No book is without its *corrigenda*, and the following are among points that might perhaps receive attention. For the atomic weight of radium read 226.4, not 225 (p. 11), and 226.7, not 227.7 (p. 151). These are misquoted from the sources given. This element suffers again in being omitted from the table of the periodic law (p. 13). Mass is "the only property of substances that remains unchanged in chemical reaction" (p. 1). Surely orthophosphoric acid can be titrated with phenolphthalein as indicator (p. 112). As far as one can gather from p. 129, the equivalent concentration of hydrogen ion in pure water at 18° is 0.68. On p. 196, water is the strongest dissociant known; but, on p. 194, water stood second to liquid hydrocyanic acid. "Compounds of uranium when exposed to light" emit radiation—is true but perhaps misleading, while "this property is possessed by metallic uranium to from three to four times the extent that it is manifested by the salts" seems to miss the main point of interest. "The definition of an atom as an individual particle of matter shows that fractions of atoms cannot exist" (p. 8). "When barium sulphate and sodium carbonate were pressed together and the pressure removed, the transformation continued, and in seven days amounted to from 73 to 80 per cent." The "73 to 80" is circumstantial, and adds realism; but how thick were the layers? Socratic method is antiquated and slow, else many a beginner might ask ingenuously, "What is intrinsic energy?" (p. 133). Nowadays, one must hurry on and catch the meaning subconsciously as the discussion proceeds.

It is probably difficult for the author to view his subject continuously from the introductory level; and, in writing, it must be tiresome to recall the precise state of ignorance of his reader. Perhaps for this reason we find, for example, Ostwald's dilution law, the isohydric principle, etc., discussed before chemical equilibrium; the theory of indicators before hydrolytic dissociation, etc. There are no forward references. The

beginner will doubtless be willing to admit his own obtuseness, but he will be disconcerted.

The book is very free from typographical errors and is, of course, excellently produced. There are 31 efficient diagrams and figures in the text. Though the pedagogy is a weak feature, the style has a refreshing air of activity and modernness, while the matter selected is generally accurate and always interesting. We feel certain, however, that this is not yet the ideal "Introduction to Physical Chemistry." Let the Quest continue. ALAN W. C. MENZIES.

Analyse der Silikat—und Karbonat Gesteine. Von W. F. HILLEBRAND. Deutsche Ausgabe von ERNST WILKE-DÖRFURT. Leipzig: von Wilhelm Engelmann, 1910.

This volume in its German dress contains numerous additions made by its author to previous editions. The fact that German students have recognized its merits and want it in their own language reflects great honor upon its author. Years ago, within the knowledge of some of us, the Fatherland was the seat of most thorough training in mineral analysis. To-day, however, as evidenced by the rich fund of reliable information in this special publication and in other similar publications, America may justly lay claim to this position.

The careful perusal of its pages proved most refreshing to the reviewer, and if he may be allowed a word of advice to students of chemistry, it would be: Study the contents of this book; put to test the methods and experiences therein described. A vast fund of new knowledge will be the reward, a deeper respect for analytical methods and their significance and value will be engendered, while the feeling of contempt so frequently manifested for the work of the mineral analyst will absolutely disappear, and a wider and wholesomer view of the whole field of chemical science will result. Teachers of more advanced students in analysis will realize the greatest pleasure and profit in the consideration of the many topics of this volume in their seminars. EDGAR F. SMITH.

Das Radium und die Farben. PROFESSOR DR. C. DÖLTER, Vorstand des Mineralogischen Institutes der Universität Wien. Verlag von Theodor Steinkopf, Dresden. 1910. pp. 133. Preis, geb. M. 5.

The discovery of radium and a recognition of the complex influences of its several forms of energy have aroused unusual interest for several reasons, but mainly, because, first, radium salts, in their decomposition produce canal and cathode (magneto- or electro-magneto-deflectable) and gamma (Röntgen) rays, exert specific, analytic and synthetic influences, physical, chemical and physiological, which might in a large sense be grouped under the head of chemical; second, when all that is positively known of these influences is applied to the world's history, petrographical and geological, a revision of previous ideas of changes that have taken place and calculations as to the age of the earth have become necessary.