

Table II shows the acid value of the crude fat of fowls of varied history. In a number of cases several analyses have been made of the same lot of fowls at different periods. These experiments show a progressive increase in the acid value as the time lengthens, and they also show that the more perfect the prompt removal of the animal heat, the lower the acidity. The figures are also sufficiently delicate to show the difference between birds dry-air-chilled, and chilled with water and ice, all other conditions being the same. This fact is of service in determining the best methods for the handling of poultry intended for food and is being used in the examination of market poultry dressed and transported and stored in various ways.

It has been stated that in the fresh chickens the subcutaneous fat tends toward a slightly higher acidity than does that of the gizzard. In the aging chicken, on the contrary, the visceral fat is distinctly more acid and is a better indicator of the condition of the rest of the bird.

Conclusions.

The acidity of the crude fat of chickens is an excellent indicator of their freshness. The results obtained on the crude material are more reliable than after extraction with fat solvents. The acidity of the visceral fat increases with length of keeping time or bad handling more markedly than does the subcutaneous fat.

NEW BOOKS.

The Fundamental Principles of Chemistry. *An Introduction to All Textbooks of Chemistry.* By WILHELM OSTWALD. Authorized translation by HARRY W. MORSE. 341 pp. Longmans, Green & Co. Price, \$2.25.

This book is a departure from conventional standards, but readers who are familiar with the author's writings will recognize that it is a natural development of ideas which he has long been known to hold. A chemistry has been worked out "in the form of a rational scientific system without bringing in the properties of individual substances." The fundamental concepts and principles of the science are presented in a logical order and "as free as possible from irrelevant additions." The author considers that the development of the methodical side of chemistry has been greatly retarded on account of the fundamental error of using hypothetical assumptions as an aid to experimental work. The end sought "is the discovery of final truths and the relations between them,—. This does not mean the setting up of analogies and hypotheses, but the careful analysis of concepts and indication of the general facts of experience from which they are derived."

The selection of material and the order in which it is presented is shown by the following list of chapters:

I. Bodies, substances, and properties. II. The three states. III. Mixtures, solutions, and pure substances. IV. Change of state and equilibrium. The equilibria (*a*) liquid-gas, (*b*) solid-liquid, (*c*) between the three states, and (*d*) solid-solid. V. Solutions. VI. Elements and compounds. VII. The law of combining weights. VIII. Colligative properties. IX. Reaction velocity and equilibrium. X. Isomerism. XI. The ions.

A striking feature of the book is the simple and successful development at a very early stage of the phase rule and of methods of graphical representation. One-component systems are treated in a comprehensive manner in Chapter IV, and a more general conception of the phase rule is given in V in connection with two-component systems. In Chapter VI there is presented a new method of representing in a line diagram the composition of a two-component system at constant temperature and pressure. When composition is plotted in a horizontal direction, the field of existence of each phase may be represented by a single horizontal line. Gas, liquid, and solid phases are distinguished by using dotted lines, ordinary lines, and heavy lines, respectively. The overlapping of two lines represents the co-existence of two phases.

The treatment of chemical processes in the narrower sense, and the definition of elements are dealt with in Chapter VI, and are introduced by a discussion of hylotropy and the methods of identifying a pure substance. The value of the phase relations in deciding whether a compound is formed in a binary system is determined by making a systematic classification of all possible combinations of phases, and of the new combinations obtained when a compound is formed. In this chapter, also, a proof is given of the law of constant proportions with which two substances (elements or compounds) combine to form a compound pure substance; and upon this law is based (Chapter VII) the law of combining weights, and the proof of the law of rational multiples.

In a book of this nature it is not to be expected that the readers will in all cases agree with the author's method of treatment. Many will object to the tacit treatment of the atomic theory as an "irrelevant addition" to chemistry. Some may question the validity of the "law of nature" relating to the formation of metastable substances (page 92): "Those forms appear first which are more stable than the form just left, but which are the least stable among all the possible stable forms."

It is evident at once, from the nature and scope of the book, that the sub-title is somewhat misleading. The author, however, does not expect this book to be used by a beginner. He is in fact "quite of the opinion that a close personal acquaintance with a considerable number of important and characteristic substances is and always must be the fundament of all instruction in Chemistry."

This book will be of great value to the teacher, and to every chemist who has attempted to examine for himself the basis of laws and theories frequently accepted as established or self-evident. W. C. BRAY.

Elementary Modern Chemistry. By WILHELM OSTWALD, Emeritus Professor of Chemistry in the University of Leipzig and HARRY W. MORSE, Instructor in Physics in Harvard University. x+291 pages. Ginn & Company. Price, \$1.00.

A text-book in elementary chemistry written by a former professor of chemistry in one of the great German universities in collaboration with an instructor in physics in one of the great American universities would naturally command the attention of those engaged in teaching this subject. While there is a general belief, perhaps more or less unwarranted, that it is a difficult undertaking for one not engaged in teaching chemistry under the conditions which exist in secondary schools to write a text on that subject, nevertheless it is always of great interest to learn the views of others, especially of one whose achievements in chemistry have gained for him the Nobel prize. The nature of Ostwald's "die Schule der Chemie" published in 1903 would naturally lead one to believe that his ideas upon the methods of teaching elementary chemistry were entirely different from the methods in general use in the United States. In Ostwald and Morse's text, however, no such extremely radical difference from prevailing methods is to be found. In general the book not only looks, but for the most part reads, like many of the well-known modern texts on elementary chemistry. Since one of the authors is a physical chemist and the other an instructor in physics, naturally the subject is approached from a physico-chemical standpoint. For example, the subject of "phases" is introduced in the first chapter (page 5) and is followed in the text by other physico-chemical conceptions. Accordingly one looks in vain for any mention of such old and familiar terms as "physical" and "chemical changes." Even the term "valence" is conspicuous by its absence.

As was to be expected the subject is presented in an attractive form. While the text proper contains only 278 pages, printed in large type and including nearly 200 experiments and one hundred figures, it contains a fairly comprehensive discussion of such fundamentals of chemistry as the average student can grasp. More attention is devoted to the general laws and less to the application of chemical processes than is generally customary in an elementary text. The book would be of little value except when used under the direction of a competent teacher well versed in the modern conceptions of chemistry. With such a person as a teacher it should prove an acceptable one for students who expect to continue the subject.

WILLIAM MCPHERSON.

Recent Advances in Physical and Inorganic Chemistry. By A. W. STEWART, D.Sc.,