As was expected, no arsenic was eliminated at any time in the feces. The arsenic that was not eliminated was absorbed rapidly by the tissues.

The elimination ceased to be quantitative so far as the Koch-Norton method was concerned, when about 71% of the arsenic had been eliminated.

Our results indicate that, when arsenic is not fed in sufficient amount to disturb metabolism, it is eliminated in about 15 days.

Although the total weight of muscle was not known, the analyses show that the muscles retained the largest amount of arsenic in grams.

In the case where the dog was killed 24 hours after feeding, the arsenic was found in the largest quantity in the muscle, liver and intestine, in their respective order. The same holds true after an elimination of 21 days has taken place.

When the dog was killed 24 hours after administration of the poison, the blood holds fourth place and the skin fifth place in retention of the drug. After an elimination of 21 days they have had sufficient time to eliminate the arsenic to the point where it could not be determined by this method.

Another interesting fact is brought forth in the table on grams of arsenic retained, namely that the heart, although one of the smaller and least heavy organs, holds sixth place 24 hours after feeding and fourth place at the end of 21 days.

The spleen, spinal cord, lung and kidney are lowest in grams of arsenic retained in both cases. Of course the last mentioned organs hold higher positions in the percentage table but owing to their small weight they do not play an important part in the storing up of the drug in the system.

The tendency of the blood and the skin is to eliminate the poison as rapidly as possible.

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NEW BOOKS.

Vom Kohlenstoff. Vorlesungenen über die Grundlagen der reinen und angewandten Chemie. By HENRI LECHATELIER. Translated by Barschall with a preface by F. Haber. Halle: W. Knapp, 1913. xiv + 324 pp. Price M. 18.

This interesting volume is a translation of the first eighteen lectures of LeChatelier's course in general (*i. e.*, physical) chemistry. They appeared in French in 1908, and the changes from original are very few in number.

In his preface, the author calls attention to the difference between the traditional modes of instruction in physics and in chemistry. In the former science, we deal with facts that can be generalized, and omit the details concerning single substances. We teach the laws and relations, and omit the numerical values of densities, specific heats, and other constants.

Perhaps the tendency to abstractness is carried too far, but the strictly scientific character of the method of instruction is on this account all the more prominent. In chemistry, the opposite course is pursued. Individual experiments, specific reactions, densities and colors of substances, yields, methods of analysis, and technical processes follow one another in endless profusion. The lecture is filled with priceless raw materials for making a science, but the science remains unmade. Chemical dynamics may be discussed, but it is not permitted to overflow its own chapter and affect the dogmatic and scrappy treatment of the other topics.

The author remarks that these methods of instruction in inorganic chemistry have remained unchanged for seventy-five years. This was, and is still doubtless true of France, Germany, and Great Britain. But in the United States the adjustment to a more rational plan had been in progress for many years, and after 1905 began to spread very rapidly.

As we read, we get the impression that we are about to enjoy the perusal of a work on chemistry, constructed on the physics model, yet intended for beginners. But the author, after all, does not attempt this difficult feat.

The lectures are evidently intended for advanced students. They constitute a brief treatise on the modern principles of chemistry. They differ from other similar treatises in that the subject is developed in connection with a systematic study of carbon and its inorganic compounds, and is ingeniously interwoven with the descriptive matter. Special attention is given also to the industrial processes into which carbon and its simpler compounds enter. Thus, Moissan's experiments on the artificial preparation of the diamond lead to the discussion of the electric furnace. The various commercial uses of this furnace are described in some detail as they occur. The diamond also introduces color and brilliance, and their physical causes, the relative transparence of diamonds and lead glass for X-rays and the recognition thereby of genuine stones, and the theory of hardness and the methods of measuring it. Hardness, in turn, leads to a statement of the laws of equivalent and additive qualities. The former, like temperatures and hardnesses, can be compared and reproduced, but not measured. The latter, like weights, are additive and can therefore be measured. Similarly the densities of the three varieties of carbon suggest a discussion of the variability of constants like the densities, elasticities, and tenacities of metals when the specimens have been treated in different ways. This illustration is sufficient to show the plan on which the whole subject is worked out. The style is clear, and the treatment suggestive and interesting, as well as novel. ALEXANDER SMITH.

Handbuch der Mineralchemie. DOELTER, *et al.* Pts. 3 and 4, Vol. II. Bogen (21–40). Theodor Steinkopff, Dresden and Leipzig. Price, M. 6.50 each.

Herein are treated those minerals of which the meta- and orthosilicates of magnesium, calcium and iron are regarded as the chief constituents.

The strictly chemical knowledge is confined almost entirely to analyses and natural alterations of the minerals. The mass of complex analyses of substances, like the pyroxenes and the amphiboles especially, may well stagger the chemist who is unfamiliar with mineralogy. Questions of formulas and constitution lead only to bewilderment. One feels that the ground must be cleared and drained before this virgin field can be satisfactorily cultivated. The subject is necessarily treated much in the manner of the mineralogist. However, the arrangement is more strictly chemical, the paragenesis is given in greater detail, formulas and constitution are more fully discussed and the most recent data are given. The discussion on p. 635 of Pt. 4 shows how far we are today from a proper understanding of the relations of the numerous constituents in the amphiboles and how important to this understanding synthetic investigations must be. Some inexcusable inconsistencies are found in these pages. For instance, the melting points of tremolites and other amphiboles are given on p. 633, pt. 4, while on p. 635 it is stated that amphiboles are transformed into pyroxenes without melting. On pp. 451 and 457, pt. 3, Doelter doubts the results of other investigators on the transformation of calcium meta-silicate (at 1190°), and remarks that natural wollastonite (the lower form of this silicate) may be heated to 1240° at least, *if it is heated very slowly and for a long time.* These conditions, of course, favor the change at the lowest possible temperature. Here as in previous "hefts" of this book misprints are not uncommon. Slight errors in the spelling of authors' names are of no great consequence, but errors in numerical data which I have noticed in several instances are much more serious. It is to be hoped that mistakes in data and references are unusual, since the chief value of the books rests on these.

The same. Pt. 2, Vol. III. Bogen (11–20). Price, M. 6.50. The contents of this "heft" possesses great variety and more chemical data than the above. Minerals containing the rare elements of the third, fourth and fifth groups of the periodic system are considered, together with a good deal on analytical procedure. Native tin, lead, their oxides and the thorium minerals are included. In connection with the last is a section on radioactivity and its significance for mineral chemistry by St. Meyer, of Vienna. The natural nitrates, especially Chili saltpeter, their occurrence, composition and theories concerning their formation are discussed, and a considerable body of physico-chemical data is given. The phosphates also are begun in this "heft." E. T. ALLEN.

Quantitative Chemical Analysis. Adapted for Use in the Laboratories of Colleges and Technical Institutes. By FRANK CLOWES, D. Sc. Lond., and J. BERNARD COLEMAN, A. R. C. Sc. Dublin. 10th ed. 577 pp. P. Blakiston's Son & Co., Philadelphia. 1914. Price, $3.50 net.

The present edition of this text has been carefully revised and certain

new matter introduced "which includes a new form of oven for drying at constant temperature; the analysis of commercial aluminum and bauxite; additional methods for the estimation of titanium in iron ores, of phosphorus and manganese in iron and steel, and of moisture in coal; and a recent method by Blichfeldt for the detection and estimation of foreign fats in butter."

The text is comprehensive in its scope. After a discussion of the technique of chemical analysis and a presentation of the standard methods of gravimetric and volumetric analysis, a large number of technical procedures are given in detail. These include the analysis of such materials as the most important minerals and ores, alloys, water, fuels, foods, oils and fats, soap and gases.

The directions are clear and concise, without having been too much curtailed, and are preceded by a discussion of the principles involved in the method. The printing and the illustrations are good, and the text free from typographical errors.

The omission of several methods of analysis that have become standard, is unfortunate. Among these are the modified Kjeldahl method for use in the presence of nitrates, the colorimetric determination of titanium, volumetric methods for the determination of phosphorus in iron and steel, and the use of the Orsat apparatus.

Many teachers will object to writing "Am" for the ammonium radical in the formulas of ammonium hydroxide and ammonium salts.

For use in American laboratories the bibliography could be profitably extended, particularly with reference to some of the bulletins of the United States Government.

These are minor details, however; the text is an excellent one for the teacher, the student, or the analyst. That it has found a place among the standard works on quantitative analysis is evidenced by the appearance of three editions during the last four years. JAMES H. WALTON, JR.

Chemistry, Inorganic and Organic. By CHARLES LOUDON BLOXAM. Tenth edition, rewritten and revised by A. G. BLOXAM AND S. J. LEWIS. Philadelphia: P. Blakiston's Son & Co. pp. xii + 878, 24.5 × 15 cm. Price, $5.50 net.

All chemists will welcome the appearance of the tenth, revised, enlarged, and largely rewritten edition of this well known book. The number of pages remains the same, but the type-page has been enlarged so that the amount of reading matter is twenty-eight per cent. greater. The book as it now stands contains introductory matter (13 pp.) which is very condensed, non-metallic elements (280 pp.), general principles and physical chemistry (60 pp.), metallic elements (180 pp.), organic chemistry (285 pp.) and index (56 pp.). No other work on the science embraces, in one volume, information which is so varied, so well proportioned and so complete. The names of the revisers guarantee due attention to processes and prin-

ciples of technical interest, while modern views have not been neglected. The book will be found to offer a valuable work of reference alike for teachers, students, and industrial chemists.

In the descriptive portions, many of the less common compounds are discussed, as well as the well known ones. In the theoretical portion the modern principles are set forth briefly but clearly. The organic section constitutes, in itself, an admirable elementary treatise on the subject. In the latter, aromatic and fatty compounds are treated together, general matters such as boiling points, freezing points and specific volumes of the various series of compounds receive attention, and special topics such as the constitution of benzene and stereoisomerism are discussed fully.

There are some features which one would have wished to see improved. Valency is first stated to be a form of chemical energy, although later the correct view is presented. Chlorine-water bleaches even in the dark "because the coloring matter, being ready to combine with the oxygen, exerts attraction on the oxygen of the water, etc.," and not because it contains hypochlorous acid whether it is illuminated or not. That chlorine, hydrogen chloride, and other substances form hydrates is mentioned in each case under the physical properties. That the vapor of the calomel has been shown to consist wholly of mercury and mercuric chloride seems to have escaped notice. Slight blemishes like this, however, are more than offset by the much more numerous instances in which the sound views and recent results are given. The chief fault is the common one, namely that the principles are confined to their special section and do not affect the systematic treatment. Thus, complex ions are discussed (p. 331) and reference is made to cobalt compounds (p. 458). But on the latter page, the formulas given indicate nothing more definite than ammonia of crystallization. Similarly, under potassium ferrocyanide, which is treated in the organic section, the only reactions discussed are those which might characterize a double salt, and under cuprous chloride we learn that it dissolves in solutions of alkali chlorides giving soluble double chlorides such as CuCl, 2KCl. The uninstructed reader is little likely to get correct views from such antiquated and largely misleading ways of presenting the facts. ALEXANDER SMITH.

A New Era in Chemistry. By HARRY C. JONES. New York: D. Van Nostrand Company, 1913. pp. xii + 326. 14 × 20 cm. Price, $2.00 net.

The new era referred to in this title begins with 1887, the year of the appearance of the first volume of the *Zeitschrift für physikalische Chemie*, and the scope of the work can best be indicated by quoting the titles of its twelve chapters: Condition of chemistry in 1887; development of the law of mass action; the energy changes that take place in chemical reactions; van't Hoff, LeBel and Guye and the origin of stereochemistry;

the phase rule of Willard Gibbs; chemical dynamics of van't Hoff and chemical equilibrium of Le Chatelier; the role of osmotic pressure in the analogy between solutions and gases; Arrhenius and the theory of electrolytic dissociation; the solvate theory of solution and the importance of solutions for science in general; the work of Wilhelm Ostwald in inaugurating the new era in chemistry; investigations by the students and coworkers of Wilhelm Ostwald; the electron and radiochemistry.

This is a very readable book, the style being somewhat conversational, like that of a lecturer talking in a friendly way to a small class. Some of the evils of this style are occasionally noticeable in the way of repetitions, more necessary in lecture notes than in a printed book; but this makes the reading the more easy. One is occasionally roused to refocus one's consciousness, however, as when the eye encounters a paragraph on p. 253, whose first sentence reads: "Osmotic pressure is the cause of diffusion;" and whose last sentence runs: "Set these [lead cylinders] aside for a few years, when it was found that the gold had penetrated the lead to a depth of several millimeters." But in general the reading is perfectly comfortable, and those who would cavil at questions of emphasis or sins of omission should remember that everyone is entitled to his own viewpoint. One of many possible suggestions would be that it might be helpful to introduce the idea of concentration in dealing with the law of mass action.

The contents are necessarily a little too technical to appeal to the general reader or even to the beginner in chemistry without some previous knowledge of the subjects dealt with; but the book should be useful to those more advanced and discriminating students of chemistry who would willingly be reminded, informally and with not too much effort on their own part, of a number of things that they studied in their more formal text-books; and to such students the book may be recommended.

ALAN W. C. MENZIES.

The Use and Care of a Balance. PETER J. KAYSER. The Chemical Publishing Co Easton, 1913. 42 pp. Price, 75 cents.

The author of this little book has had fourteen years of experience in making and adjusting analytical weights under an eminent maker, and ten years' experience in visiting laboratories as an adjuster of balances and weights. He carefully describes the process of setting up a new balance for use, and of testing zero point, equality of arms, and sensitiveness. Instructions are then given for the improvement of a balance whose adjustment has become imperfect through use, as far as this can be undertaken by the owner without recourse to the maker. A few pages are devoted to the care and verification of weights.

The book is likely to be useful in laboratories, both commercial and educational, and may be commended to such. EDWARD W. MORLEY.