on one form than on the other at temperatures obtained by a mixture of carbon dioxide and acetone. This leaves much to be desired in the way of characterizing the keto form.

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NEW BOOKS.

The Chemistry of the Radio-Elements. Part II. By FREDERICK SODDY. Longmans, Green & Company. 44 pp. Price, $1.75.

The second part of Soddy's well-known book deals with the radio-elements and the periodic law. In the first chapter he brings the several theories discussed in Part I, up to date, and then goes into a somewhat detailed discussion of the work of A. S. Russell, K. Fajans and A. Fleck on isotopes or the chemically nonseparable elements. It is shown that when an α-particle is expelled it carried with it two atomic charges of positive electricity, and the expulsion of these two positive charges from the atom affects the valency of the product exactly as in ordinary electro-chemical changes of valency. In the case of β-particle, which is a negative electron, the loss of this single atomic charge of negative electricity increases the positive valency of the product by one. In other words, the expulsion of an α-particle causes the element to shift its position in the periodic table by two places in the direction of diminishing mass so that the product is in the family next but one; the loss of a β-particle, however, causes the element to shift its position in the periodic table by one place in the opposite direction to that for an α-ray change. A loss of one α- and two β-particles, therefore, brings the product back into the same family as the parent. These elements are found to be nonseparable chemically, and are called *isotopes*. In general terms, "whenever two or more radio-elements fall into the same place in the periodic table, then independently of all considerations as to the atomic mass, the nature of the parent element and the sequence of changes in which they result, the elements in question are chemically nonseparable and identical." It is shown that this identity probably extends to the spectrum reactions and all physical properties with the exception of mass.

The final products of the disintegration of the thorium and uranium series fall in Group IV, Family B, and have atomic weights very close to that of lead. These elements are, therefore isotopes and are chemically nonseparable. In addition, they are isotopic with Radium B, Thorium B, Actinium B and Radium D. The possibility, therefore, of lead being a mixture of two or more chemically nonseparable elements is a pertinent one. T. W. Richards and Max Lembert have recently determined the atomic weight of lead obtained from radioactive minerals, and find the atomic weight to vary from 206.40 to 206.86, a very considerable variation from the atomic weight of ordinary lead, *viz.*, 207.15. Soddy, working

independently with lead from Ceylon thorite, obtained on three determinations the figures 208.5, 208.4, 208.3. These definite confirmations of the theory are intensely interesting.

The work is well written, and should be read by every chemist.

R. B. MOORE.

Oedema and Nephritis. A Critical, Experimental and Clinical Study of the Physiology and Pathology of Water Absorption in the Living Organism. By MARTIN H. FISCHER, Eichberg Professor of Physiology in the University of Cincinnati. Second and Enlarged Edition. Pages x + 695. John Wiley and Sons, Inc. Price, $5.00.

Although Fischer states that edema and nephritis are problems of colloid chemistry, this book from the chemical standpoint is of interest only to those who are closely associated with biological work.

The first edition received so much adverse criticism that the author advises the interested reader to examine the evidence away from the noise of the pleading attorneys. With this advice in mind, it is yet hard for the reader to dismiss the feeling that the evidence in favor of his theory is presented in attorney-like fashion and that both sides are perhaps not equally well presented.

The retention of water in the tissues in cases of edema and nephritis, he states, is due to an abnormal production or accumulation of acids in the tissues. This increases the hydration capacity of the colloids and this is the explanation of edema. Nephritis is an edema of the kidney, glaucoma an edema of the eye, uremia an edema of the nervous tissues. He is aware that other substances than acids may be a cause of water retention, but in life he thinks these are of minor importance. Among such bodies are pyridine, certain amines, urea, and alkalies. In addition to edema and nephritis Fischer would explain absorption and excretion largely by a changing acid content of the tissues.

The evidence presented in favor of his theory is both experimental and clinical. Many test-tube experiments are cited to show the influence of alkalies and especially acids on the swelling of gelatin and fibrin and the influence of salts in diminishing this hydration. This forms the basis of the treatment which he recommends in certain cases of water retention in the body. At the same time he assures some of his critics that "These long suffering and mutilated materials" are not identical with, and are far less sensitive to the action of acids than the body proteins. The reasons for his treatment are discussed at length and his test-tube experiments are amply supported by work on animals and by clinical observations.

Much of the work upon which the theory rests has been severely criticised. The test-tube experiments speak equally well in favor of either alkalies or acids; but Fischer considers the conditions of life such that an increase in alkalinity of the body must be a rare occurrence, while acidosis is rather frequent. If Fischer's explanation of the facts is accepted, his

theory rests on a firm foundation. A successful explanation of facts, however, is not proof of the validity of an hypothesis, for we know that certain facts can be explained equally well by conflicting hypotheses. Some of the criticisms directed against his work bear out this statement.

His explanation of the edema in frog experiments (pp. 175, *et seq.*) is not accepted by McClendon (*Z. physik-chem. Biologie*, Bd. I., s. 169). McClendon gives experiments to prove that a living frog will absorb more water than a dead one and that the effect of the stoppage of circulation is to decrease rather than increase the absorption of water. Only after the tissues have long been dead will acidosis increase absorption. Finally, osmotic pressure will explain the whole water absorption. All this is contrary to Fischer's teaching, and to one who has not worked on either side of the question, the explanation is adequate.

Numerous other objections have been raised. Many of these Fischer has answered either in the book or in papers to which he gives references. The most important of these have been brought forth by Moore, and by Henderson and his collaborators. Henderson states that the acid concentration required to satisfy Fischer's theory can never be reached in the living body. From the clinical side the sharpest criticism is presented by the reviewer of the first edition of the book in the "Archives of Internal Medicine," Vol. 9, page 637.

His replies to these criticisms cannot be considered as on a par with his original presentation and betray an irritability and a use of sarcasm undesirable in a scientific discussion.

The results of the application of Fischer's treatment of edema and nephritis have been severely criticised and as warmly praised. Some believe it productive of human suffering and injury; others have found it almost a panacea. In this dilemma Fischer advises the physician to treat his nephritic cases by the old approved methods. If in spite of this he thinks death imminent, Fischer's treatment, which consists of alkali, salt and glucose, may be tried. If the patient dies, the expected will have happened; if he lives, it proves nothing but may encourage a repetition of the experiment. This he thinks is all that is necessary.

The book as a whole is extremely interesting and the presentation clear. The theory advocated is simple and explains many things for which we have no other explanation. Whether or not the theory deserves the wide application Fischer gives requires corroboration. It emphasizes the great importance of the colloids in physiology and pathology and will stimulate work in this field. The work yet necessary for the acceptance or rejection of the theory will be directly responsible for a better knowledge of edema and related problems. It is worthy of the attention of all interested in biological or medical work.

HUGH MCGUIGAN.