Book Reviews

Complex Compounds of Transuranium Elements. By A. D. GELMAN, A. I. MOSKVIN, L. M. ZAITSEV, and M. P. MEFOD'EVA. Translated from Russian by C. N. Turton and T. I. Turton, Consultants Bureau, New York, N. Y., 1962. 195 pp. 16 × 23.5 cm. Price, $12.50.

As the result of a relatively large scale production program in the U. S. Atomic Energy Commission, the transuranium elements from $Z = 93$ to $Z = 99$ should be much more easily available to inorganic chemists in the next few years. Since Russian chemists have been active in research on the aqueous chemistry of these elements, this book is a timely report on the present knowledge in the area. The authors have done a satisfactory, though not complete job of referring to western work. However, the major value of the book lies in the inclusion of data tables, graphs, spectra, etc., from Soviet research which are less readily available to chemists in the United States. Separate chapters discuss the complexation in aqueous solutions of neptunium, plutonium, and the transplutonium elements in their various oxidation states by inorganic and organic ligands. Short sections at the end of the chapters on neptunium and plutonium deal with the isolation of complex compounds of these elements; however, throughout the book the emphasis is placed on the complex species present in aqueous solutions. A final chapter rather briefly reviews the application of complexes in the separation of the transuranium elements.

The quality of Russian work in this area of chemistry is good and, in general, has had a more basic orientation than much of the western research. The major defect in this book is the almost total absence of critical evaluation. The data are reported without discussion either as to the value or the fundamental implications. A second but not unrelated defect is the lack of any discussion on similar research with corresponding lanthanide elements. The lanthanide–actinide analogy is such a dominant feature of the chemistry of the trivalent ions that the chemist studying actinide complexes must be mindful of its implications. Despite these omissions, this book is recommended, since it makes apparent the vast amount of research which is still to be done on these elements. The quality of the translation is exceptionally good and the errors both in printing and in statement by the authors are few and minor.

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Chrom, Teil A Lieferung 1, System-Nummer 52, 8 Auflage, Gmelins Handbuch der Anorganischen Chemie. [Chromium, Part A Section 1, System Number 52, 8th Edition, Gmelins Handbook of Inorganic Chemistry.] Verlag Chemie, G.m.b.H., Weinheim/Bergstrasse, 1962. xx + 418 pp. 17 × 24.5 cm. In German. Price, $79.00.

The appearance of each new portion of the Gmelin Handbuch is welcomed by many persons. Previous complimentary remarks will apply equally to this first part of the chromium volume, which is devoted mainly to the geology of chromium, the technology of the element and its compounds, and the physical properties of the metal, plus a brief historical survey and an excellent ten pages on physiological effects. As in earlier volumes, the organization is extremely systematic and lucid, and the Table of Contents gratifying thorough; in addition, English marginal titles have been inserted.

According to the publisher, the literature has been completely reviewed through 1949, but beyond that, only in some instances. To point out that certain portions (notably Physiology and most of Geology) are much more up-to-date than others is more a tribute to a few of the compilers than a criticism of the rest. However, parts of the 95-page Technology section seem to contain very few references from even the 1940's. Additionally (and recognizing that the separate portions of a group effort will reflect varying degrees of completeness at cut-off time, and that much new information must be omitted) it is to be regretted that old attitudes as well as old ideas survive in a few places. Thus, for example, the 1924 report that the role of sulfuric acid in the electrolytic reduction of chromic acid (p. 218[1]) is to cause formation of $Cr_2(SO_4)_3$ could at least have been modified in the light of elementary coordination chemistry, if not wholly replaced by the more specific interpretations of Knorr and others.

In any case, the pointing out of minor faults in so large a work ought to be accompanied by liberal praise for the value of the product: certainly the stated aim of the Gmelin Institute, "to evaluate in retrospect the entire subject matter from the point of view of modern knowledge, and to extract from the obsolete material the kernel which can be of value to us today," continues to be met in each succeeding volume.

(1) This is not the least modern section.

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Infrared Spectra of Inorganic and Coordination Compounds. By K. NAKAMOTO. John Wiley and Sons, Inc., 605 Third Avenue, New York 16, N. Y., 1963. xii + 302 pp. 14.5 × 23 cm. Price, $9.50.

Although newer spectroscopic tools have captured the limelight in recent years, infrared spectroscopy continues to provide much useful information to the chemist. The literature of infrared spectroscopy therefore continues to grow at a rapid pace. Nakamoto's book provides a comprehensive guide to this literature for a fairly well defined area of chemical interest.

The book is in four parts. Part I, "Theory of Normal Vibrations," is too highly condensed to be very useful. The tenor of much of the material in these 65 pages is somewhat out of keeping with that of the book as a whole. There is a real need (which Professor Nakamoto is admirably qualified to answer) for a thorough and candid discussion of the capabilities and limitations of normal coordinate analysis. It is all very well to explain the principles invoking in carrying out a normal coordinate analysis, but what do the results mean? How realistic are the potential energy functions employed? How sensitive are the calculated frequencies to the choice of force constants? What is the basis for comparison of observed and calculated spectra? Should one employ observed or harmonic oscillator-adjusted frequencies in such comparisons? What are the effects of Fermi resonance? These and many other questions are relevant to an intelligent interpretation of the results of normal coordinate analysis, but they are not discussed from a critical point of view in this book. The great majority of chemists who make use of the infrared literature will never carry out a normal coordinate analysis, but they should be able in some measure to critically evaluate the results of such studies.

The considerable value of Nakamoto's book rests largely on Parts II and III, in which the infrared literature of inorganic and coordination compounds is thoroughly reviewed. Nearly a thousand references are given for these two parts.

On the whole the reporting is concise and accurate. A few erroneous statements occur here and there. For example, the statement regarding cyclopropane on p. 229 is precisely what the