

Book reviews

Lanthanide and Actinide Chemistry and Spectroscopy; edited by Norman M. Edelstein, ACS Symposium Series 131, American Chemical Society, Washington, D.C., 1980, vii + 472 pp, \$40.00.

This volume is based on a symposium sponsored by the Division of Inorganic Chemistry at the 178th meeting of the American Chemical Society in Washington, D.C., September 10–13, 1979.

The twenty chapters in this volume are grouped into three main sub-headings: organoactinide and organolanthanide chemistry; complex chemistry, thermodynamic properties, and transcurium chemistry; and electronic structure and spectroscopy.

The first six chapters present an excellent review of the very active organoactinide and organolanthanide research over the past decade, concentrating on the more recent results of the past three or four years. T.J. Marks, J.M. Manriquez, P.J. Fagen, V.W. Day, C.S. Day, and S.H. Vollmer provide a comprehensive review of their recent results on the carbonylation chemistry of bis(pentamethylcyclopentadienyl)thorium and uranium hydrocarbyl and dialkyl amide complexes. This is followed by a chapter by R.A. Anderson in which he discusses the recent work of his group on the bis(trimethylsilyl) amide complexes of the lanthanides and actinides. The alkyl and hydride derivatives of these complexes are interesting with the hydride complex $[(\text{Me}_3\text{Si})_2\text{N}]_3\text{MH}$ ($\text{M} = \text{Th}$ or U) being particularly fascinating. This complex has the ability to exchange all fiftyfive hydrogen atoms with deuterium under one atmosphere of deuterium pressure at room temperature in pentane. R.D. Fischer and G. Bielang discuss the preparation and properties of novel mixed-ligand organolanthanide complexes prepared by reaction of the cyclopentadienyl lanthanide compounds with weakly acidic compounds such as acetylenes. A short article by T. Miyamoto and M. Tsutsui on *f*-orbital participation in the bonding of *f*-block elements is followed by a chapter entitled "Cyclooctatetraeneactinide(IV) bisborohydrides" by J.P. Solar, A. Streitwieser, Jr., and N.M. Edelstein. This section is completed with a very thorough discussion of the NMR spectra of uranocenes by W.D. Luke and A. Streitwieser, Jr.

The next section begins with a chapter by K.N. Raymond and coworkers entitled "Specific Sequestering Agents for Actinides" in which they discuss actinide catecholates and hydroxamates. G.R. Choppin writes a short chapter entitled "Inner- vs. Outer-Sphere Complexation of Lanthanide(III) and Actinide(III) Ions" which is followed by two chapters discussing the actinide elements themselves. The latter of these discusses the vapor pressure of the elements and the difficulties involved in obtaining precise thermodynamic values for the elements. The section concludes with a chapter by J.K. Peterson on the techniques of microchemistry for transcurium elements and one by E.K. Hulet on the chemistry of the heaviest actinides.

The final section begins with a short chapter by B.R. Judd entitled

“Hypersensitive Transitions in *f*-Electron Systems”. A chapter by M.J. Weber on “Lanthanide and Actinide Lasers” surveys the lanthanide and actinide ions and transitions involved which have been used or may be used for lasers. R.G. Denning and co-workers present detailed single crystal polarized electronic spectra of the uranyl ion and conclude that both *f* and *d* orbitals participate in the actinyl bond. R.H. Banks and N.M. Edelstein discuss the physical and optical properties of the borohydrides of Pa, Np and Pu which is followed by a chapter by J.P. Hessler and W. T. Carnall entitled “Optical Properties of Actinide and Lanthanide Ions”. R.T. Paine and M.S. Kite, in a short chapter, discuss the photochemistry of uranium compounds. A very powerful technique for determining important physical properties of heavy atoms including ionization potentials, energy levels, lifetimes of levels and other properties, is discussed in a chapter entitled “Multistep Laser Photoionization of the Lanthanides and Actinides” by E.F. Worden and J.G. Conway. The volume concludes with a short chapter by B.W. Veal and D.J. Lam entitled “Photoelectron Spectra of Actinide Compounds”.

As stated in the preface, the purpose of this volume is to “introduce the nonspecialist chemist to recent trends in lanthanide and actinide chemistry and spectroscopy, to summarize this work, and to identify directions for future study”. This book admirably meets this goal. One caveat, the book was reproduced by photographing chapters sent in by the authors. Unfortunately, some chapters contain a frustrating number of typographical errors.

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NMR Spectroscopy. An Introduction. H. Günther, Wiley, Chichester, 1980, xiv + 436 pages, £7.95.

This is a translation of a 1973 text published in German, with some additions intended to cover later developments up to 1979. The additions do not greatly alter the balance of the book, however, which is principally concerned with the methods of ^1H NMR spectroscopy as applied to organic molecules. There is no significant treatment of organometallic or inorganic molecules (ca. 1 page) and the coverage of ^{13}C NMR spectra amounts to only 25 pages of text at the end of the book.

The account of ^1H NMR spectroscopy is quite detailed, the explanations are clear, and the significant portions of many of the diagrams are usefully highlighted in red. Whilst, therefore, the book can be recommended as an excellent introduction to ^1H NMR spectroscopy for students of organic chemistry, additional sources would be required to cover present day applications of NMR methods.

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