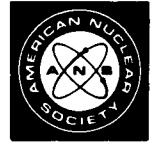


BOOK REVIEW

Selection of books for review is based on the editor's opinions regarding possible reader interest and on the availability of the book to the editor. Occasional selections may include books on topics somewhat peripheral to the subject matter ordinarily considered acceptable.



The Elements Beyond Uranium

Authors Glenn T. Seaborg and Walter D. Loveland
Publisher John Wiley & Sons, Inc. New York (1990)
Price \$59.95
Reviewer Charles W. Maynard

The senior author has written several books on the same or closely related subjects, and it is reasonable to say that he should and does have it right by now. This excellent and comprehensive discussion of the transuranium elements lies somewhere between a monograph and a full-blown treatise on the subject. The breadth of coverage and relatively high technical level will make one part or another difficult for most readers. At the same time, this breadth and depth make this a very worthwhile addition to the library of anyone working with these materials, whether a basic scientist or a specialist in nuclear fuels and waste.

Following a brief introductory chapter, the second chapter is devoted to the history of the discoveries of these nuclides and the pioneering experiments. This is very well done as would be expected given the authors close association with this original work. Everyone should enjoy this chapter, and careful attention has been given to inclusion of all contributors to the work.

Chapter 3 is devoted to the chemistry of these elements, and the role of the inner electron shells in determining the chemical properties is brought out for the actinides. Some of the discussions on the experimental techniques and special chemical features of these elements will probably be difficult for the nonchemist. A final section is devoted to the transactinides.

The next chapter is devoted to the nuclear properties of the heavy elements with emphasis on stability questions. This is of interest in knowing which isotopes will be stable and the modes of decay. A better than usual discussion of fission is given to enable a richer discussion of spontaneous fission which along with alpha decay limits the domain of the n - z plane of interest.

Chapter 5 is a relatively short one devoted to the experimental techniques that have been developed to work with the small quantities of materials and the short lifetimes of many of these elements. Chapter 6 is also devoted to experimental techniques that are useful in the production of heavy elements. While at first produced in nuclear reactors with large neutron fluxes, the emphasis has shifted to heavy-ion accelerators.

Chapter 7 discusses the very fascinating topic of super-heavy elements. There has been reason to believe that there would be a region in the n - z plane above the range now found where the nuclei might again be relatively stable. This island would be of great interest if it exists. The problem is one of production; since a steady addition of nucleons passes through an unstable zone, production will require heavy elements synthesis by use of large nuclei.

The next two chapters consist of a short discussion of the abundance of actinides and transactinides in nature, followed by a chapter discussing practical applications. These are both abbreviated and require further reading in the references to the astrophysical and nuclear engineering literature.

The book closes with a chapter of reflections and an appendix of useful tables of data not readily available in easily accessible sources.

Charles W. Maynard (PhD, applied physics, Harvard University, 1957) is Professor-Emeritus of Nuclear Engineering and Engineering Physics at the University of Wisconsin-Madison. His research interests are radiation transport, nuclear data, and fusion neutronics.