BOOK REVIEWS

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

Title Physics and Chemistry of Fission (Proceedings of the Second IAEA Conference, Vienna, July 28-August 1, 1969)

Publisher Unipub, Inc.

Pages 983

Price $25.00

Reviewer Joel H. Ferziger

Fission physics has made great strides in the last few years and the Proceedings under review provide an excellent summary of what has been accomplished. The fifty or so papers published in this volume are divided into eight subject groups and are, in the main, devoted to the attempt to understand in detail the nature of the fission process and to explain some of the unusual features observed experimentally. The mix of theoretical and experimental papers is excellent.

By far the most important advance in fission physics in the last ten years is Strutinsky's introduction in 1968 of the idea that the fission barrier is double humped. (Actually it may have three or more humps.) This unusual barrier results from the effects of nuclear shape on the shell structure of the nucleus. As the nucleus deforms, it successively passes through configurations for which its nucleon complement is magic and others for which it is nonmagic. Shell effects modulate the liquid drop potential barrier in such a way as to produce the double-humped potential. This model has been able to explain many data that could not be explained by earlier models. Included in this category are isomeric fission, dependence of fission cross section on energy, variation of the fission width from resonance to resonance, and a number of others. The review papers of Strutinsky and Pauli and of Lynn in this volume provide a review of this work that is easily read by the nonspecialist.

Aside from their importance in basic physics, these advances may well have an effect on the methods of fast reactor calculation. It appears that at least some of the simple methods by which fission resonances are handled will require modification; the effect will probably be felt most in the calculation of Doppler coefficients. Naturally, the effects are not likely to be large but, on the other hand, there is no reason to expect them to be negligible.

A number of other papers in this volume provide new data that should be of interest to reactor designers. These appear in Sections F (Prompt Neutrons and Gamma Rays), G (Delayed Neutrons and Gamma Rays), and H (Energy, Mass and Charge Distribution). While many of these papers contain work undertaken to supply data to aid in systematizing what is known about fission, several contain data with direct application in reactor design.

To sum up, this is a book for the specialist and, in view of its high price, cannot be recommended to everyone with an interest in reactor physics. It should, however, be in the library of every company and university with an interest in the field.

Joel H. Ferziger received his PhD from the University of Michigan in 1962 and has been at Stanford University since 1961; he is currently associate professor of nuclear engineering. In collaboration with his students he has worked on theoretical problems in nuclear reactor physics, neutron transport theory, radiative transfer, and nuclear physics. He has also been a consultant on fast reactor physics and nuclear physics for General Electric Company.

Title Large Radiation Sources for Industrial Processes

Editor International Atomic Energy Agency, Vienna, 1969

Publisher Unipub, Inc., 1970

Pages 693 + front and rear material

Price $19.00

Reviewer E. Alfred Burrill

This book is essentially the full Proceedings (including discussions and concluding remarks) of a Symposium on the Utilization of Large Radiation Sources and Accelerators in Industrial Processing, held by the IAEA in Munich, August 18-22, 1969. Two previous meetings on the same general subject had been sponsored by the IAEA in Warsaw (1959) and in Salzburg (1963).

The title of this volume is not an accurate abbreviation of the full title of the Symposium, because most of the papers describe developments in radiation-induced processes, and only about 20% of the papers are chiefly concerned with radiation sources or irradiation systems for pilot-plant or production-line use. The 49 papers are divided into 4 main topics:

	Papers
Chemical synthesis	8
Polymerization and the modification of polymers	31
Dosimetry	5
Engineering	5

It is difficult to prepare a meaningful review of any Symposium; one has to have participated directly. Furthermore, there is usually only a skeletal continuity to the program, and there are often many gaps in the scope of the information that is presented. This particular Symposium was characterized, in a few well chosen concluding remarks by Joseph Silverman, University of Maryland, as "the most realistic group I have ever encountered at a radiation processing meeting . . . When a speaker has been optimistic, he has been challenged from the floor, specifically on matters of cost and feasibility . . ." Indeed, the published discussions to the papers provide valuable additional insight to the progress and problems in this specialized field, and the lively tempo of the Symposium can be discerned in these informal remarks. The multilingual reader will also benefit from those reports that are published in French and Russian.

As a staunch defender of electron accelerators, I have to take issue with Silverman's criticism that "they are still inadequate as radiation tools," although I must admit that I found little in the Proceedings of the Symposium to rebut his words. It is indeed unfortunate that there are so few published details on the long-term performance of electron accelerators in production use. These data certainly exist, but in some cases at least they are considered as proprietary information.

Rather than to comment individually on the reports on so many varieties of radiation-induced processes, I prefer to generalize by saying there is in these Proceedings a wealth of interesting (and sometimes provocative) data and commentary for the industrial-process engineer as well as for the radiation chemist.

E. Alfred Burrill has recently become vice president of Accelerators, Inc., Austin, Texas, after a two-year period as an independent consultant. Prior to 1969, he had been a vice president of High Voltage Engineering Corporation, with which he had been affiliated since 1947. He has been involved, since 1939, in the development of particle accelerators and their applications in research, medicine, and industry. A member of several scientific and technical societies, he is currently a member of the Board of Directors of the American Nuclear Society and a member (past chairman) of the ANS Publications Committee. His BS degree (in physics and chemistry) was won from Massachusetts Institute of Technology in 1943.

Title Handbook of Atomic Elements

Author R. A. Williams

Publisher Philosophical Library, Inc.

Pages 125

Price $6.00

Reviewer Adrian H. Daane

This is a book containing one page of data on selected properties for each of "the atomic elements" (supposedly omitting the non-atomic elements). It provides little or no information not available in the many other handbooks already published, although the arrangement may be more convenient for some purposes. A brief examination of the book found the following points which raise questions about the general value of the publication:

1. The number of protons and number of electrons are tabulated for each element as items of data, an unnecessary semi-redundancy.
2. The choice of 30°C for the standard state seems strange.
3. The hexagonal unit cell (p. 116) is incorrect.

Although a random checking of some of the specific values of some of the data found them correct, the work does not seem such that it can be recommended for the $6 price when everyone is forced to carefully budget expenditures for one's professional library. Of even more concern is the fact that this represents a cluttering of the literature by an uncritical publisher.

Adrian H. Daane received his BS from the University of Florida in 1941, then worked in the Manhattan Project on uranium metallurgy and alloy systems at Iowa State University. Upon receiving his PhD from Iowa State University in 1950 he became member of its Department of Chemistry and of the U.S. Atomic Energy Commission's Ames Laboratory. In 1963 he was appointed head of the Department of Chemistry at Kansas State University. His research interests are the preparation of rare-earth metals, the properties of these metals, and the vapor pressures of metals and alloy systems.

Title Peaceful Uses of Atomic Energy in Africa

Editor International Atomic Agency and the Nuclear Science Commission of the Democratic Republic of the Congo

Publisher Unipub, Inc.

Pages 574 + front and rear material

Price $16.00

Reviewer David M. Richman

It has long been my view that the publication of the proceedings of a symposium, except when the subject is limited and the papers provide complete and up-to-date coverage, is anticlimactic; the value of a symposium comes from the interaction among its participants and what they derive from it. The proceedings normally have limited value and any major scientific contributions are ultimately published in scientific journals that receive much wider dissemination.

There is, I have happily discovered, another aspect to the publication of proceedings of symposia. It is in the recording of problems and the grouping together of approaches to their solutions. *Peaceful Uses of Atomic Energy in Africa* is an important contribution to recording such problems and the evolution of