

and engineering curricula lack knowledge of these techniques. The reasons are that college faculties are not very interested or informed in the subject, and curricula are already quite full in terms of credit hours, if not in substantial content.

According to the authors, the present volume is intended to serve as a text for a two-semester course for engineering students. There is awareness on their part that not many curricula can be that liberal with time, and so the possibility is held out that portions of the book can be useful for a one-semester course, or even to be a source of topics to incorporate in other courses.

The book brings together considerable information of value to a research worker in this field. Judged on the basis of its stated objectives, however, it lacks organization and content of the kind that most engineering students would find palatable. It is not an engineering text, or designed to offer topics in a way that can be easily assimilated in other courses. One does not gain the impression that it represents the distillation of engineering experience in the field. Possibly one weakness of the book (still having in mind the typical engineering or science student) is that it contains much material of a kind that is better given in less-detailed form.

About a third of the book is devoted to topics that acquaint the reader with atomic and nuclear physics, properties and sources of radiation, radiation detection systems, and problems of safe use of radioactive materials. The treatment is quite conventional. Radio-tracer principles, techniques and application to engineering research and applications take up nearly another fourth of the book. Gauging by use of radiation penetration and radiation scattering take up most of the remainder of the volume, with one chapter devoted to radiography. In most cases, the reader must turn for details of techniques to other books the authors list as references. I hope my impression that not too many engineers will take advantage of the book is in error, because some text material for their use is sorely needed, especially if it could be made available at half the cost of this volume. (A question that puzzles

me is why a book written at the expense of the USAEC, with all royalties going to the government, should be so expensive. Can this be due to the excessive red tape that becomes involved when government agencies take over the publication business?)

*Dr. V. Lawrence Parsegian of Rensselaer Polytechnic holds the distinguished Chair of Rensselaer Professor, to which he was appointed in 1961 following seven years as Dean of Engineering at that institution. His earlier experience included 13 years in industry and nearly 5 years with the USAEC. While his efforts are devoted largely to developing new approaches for teaching science, he remains sensitive and responsive to questions of atomic energy policy affecting the role of government agencies, universities, and industry.*

#### ISOTOPE RECIPES

*Title* Manual of Radioisotope Production

*Editors* C. C. Evans, C. Holley, and R. Hara

*Publisher* International Atomic Energy Agency, Vienna, 1966

*Pages* 446

*Price* \$9.50

*Reviewer* J. C. Charlton

Possibly no one, other than reviewers, will attempt to read this book from cover to cover. Essentially it is a cookery book of radioisotope production written by a committee of expert radioisotope chefs. It can be dipped into for general advice on radioisotope production or for specific advice on an individual production problem.

To the newcomer to the field, there is much sound advice in the first part of the book (about 100 pages). Special attention is paid to the questions of what radioisotope production should be attempted at a new center, what buildings and facilities are necessary, and how the staff should be trained. There are

detailed accounts of many individual techniques, such as dispensing, assaying, and quality control, all evidently written against a background of practical experience.

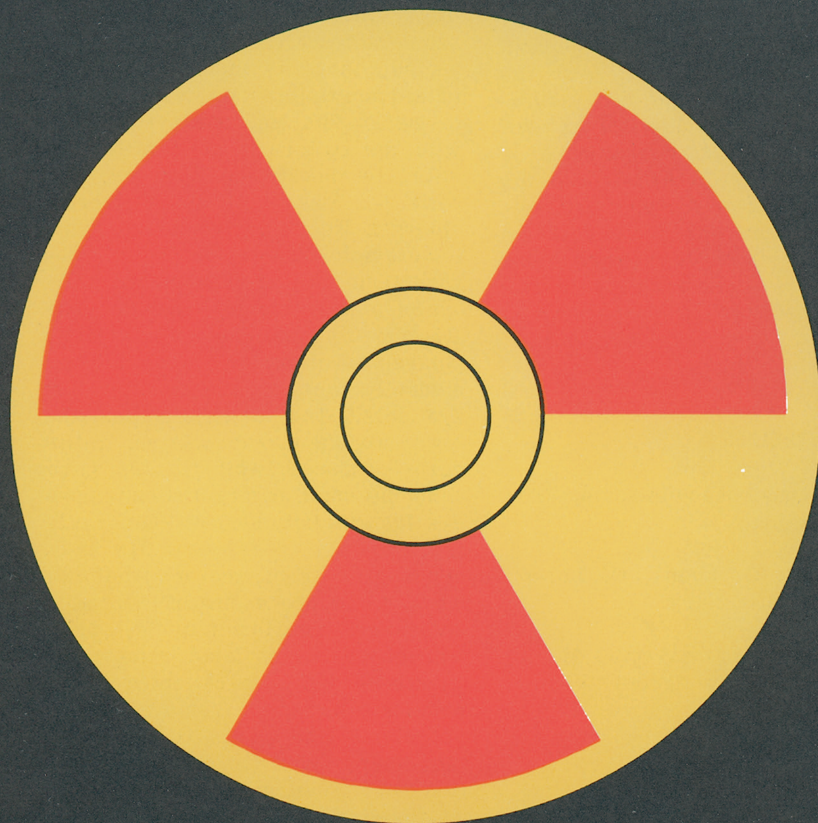
The second and larger part of the book, about 350 pages, is concerned with procedures for the production of 15 major radioisotopes. In some cases there are a dozen or more procedures, each contributed by a different laboratory, for the same radionuclide. As might be expected, there is much duplication, indeed multiplication. It is difficult to justify this, and one sympathizes with the editors in an international effort of this type. However, with patience, a great deal of interest emerges from this treatment. Why, for example, do some producers prepare their  $^{51}\text{Cr}$  from enriched  $^{50}\text{Cr}$ , while others employ the Szilard-Chalmers process on natural potassium chromate? The answer evidently lies in the neutron flux available. The higher the flux, the lower are the target costs per millicurie produced, while at the same time the smaller target volume lowers the irradiation costs. Other differences are due possibly to a combination of chance and tradition. Thus, in the processing of irradiated potassium chloride for  $^{35}\text{S}$ , about half of the users favor removal of potassium ion on a cation exchange column followed by removal of hydrochloric acid by distillation, while the others favor the direct separation on an alumina column.

An interesting handling technique is provided by the Israeli method for large-scale  $^{24}\text{Na}$  production, in which a lead-shielded processing vessel of plastic is lowered into the swimming-pool reactor and the irradiated ampoule dropped in. After removal from the reactor, the water is pumped out and dilute acid added to dissolve the irradiation unit, giving the product solution directly in its transport container.

Each individual radionuclide section is provided with an excellent collection of general information on nuclear properties, applications, radiological protection, assay, and survey of production processes. These can be warmly recommended to readers at all levels of experience.

As in so many publications in this field, insufficient attention has been

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paid to nomenclature. Perhaps it is too much to ask that the term "radioisotope" should not be employed where radionuclide is meant, but the use of the term "radiochemical purity" where "radioisotope purity" (strictly "radionuclidic purity") is meant should not escape attention in future editions.

At times the book suffers from lack of a clear objective and is torn between advice for the real beginner and an exchange of information among the sophisticated. However, in the nature of things, a polished production could not be expected and the book will more than justify its price in providing a wealth of information to a wide spectrum of users.

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### BOOK ANNOUNCEMENTS

Although the following books will not be reviewed, they may be of interest to some of our readers:

- Electronic Counting Circuits*, J. B. Dance, American Elsevier, 1967, 390 pp, \$16.75
- A World of Nuclear Powers?*, Alastair Buchan, Ed., Prentice-Hall, 1966, ix + 176, \$3.95
- Table of Isotopes*, 6th ed., C. M. Lederer, J. M. Hollander, and I. Perlman, John Wiley, 1967, xii + 594, \$7.95
- American Men of Science*, Vol. V (P-Sr), 11th ed., R. R. Bowker, 1967, viii + 1079, \$25.00
- Handbook of Telemetry and Remote Control*, Elliot L. Gruenberg, Ed.-in-chief, McGraw-Hill, 1967, xii + 1298, \$35.00