NUCLEAR SCIENCE AND ENGINEERING: 18, 293-292 (1964)

Book Reviews

Encyclopedia of X-Rays and Gamma Rays. Edited by George L. Clark. Reinhold, New York, 1963. 1177 pp. $35.00.

"Come, come and sit you down; you shall not budge; you go not till I set you up a glass, where you may see the inmost part of you." With this quotation from Shakespeare (*Hamlet*, Act II, Scene IV) the editor introduces his closing remark in the preface. He points out that nearly three hundred years after the words were written, the process which had been only a figure of speech became literally possible as diagnostic radiography. He then expresses his hope that this encyclopedia will become the best "glass" of all. If his hope should not be realized to the fullest extent, he may at least rest assured that the encyclopedia will certainly be *among* the best of the "glasses"–those that make the inmost part of the whole, broad field of X- and Gamma-ray technology visible to a broad spectrum of readers. The 361 articles in the Encyclopedia cover the field from Absorptiometry and Absorption Coefficients to Wavelength Tables and Weathering of Soil Minerals.

There is an irrisistible urge to compare the Encyclopedia with the editor's previous masterpiece because, in a sense, the Encyclopedia is the fifth edition of his *Applied X-Rays*. Since the field has expanded so phenomenally the author felt compelled to become an editor for this "Fifth Edition" and to call on the services of some three hundred assistants. This brought about a complete change in format. The chapters are replaced by an alphabetical arrangement of articles.

The Encyclopedia covers every branch of X-ray science listed in *Applied X-Rays, Fourth Edition*, pages 18 and 19, and also covers gamma rays. Compared to *Applied X-Rays*, the composition of the Encyclopedia is influenced by two aspects of the growth of the field of X-ray technology. In addition to the sheer volume of work and information now included in the field, the stature of the field has developed so that a significantly different type of treatment is needed from that of 1927, 1932, 1940, or even 1955. In 1927, it was necessary to present a book that was essentially a missionary endeavor. As the message of the value of applied X-rays became familiar to an increasingly large number of investigators, the need for missionary work decreased, and the need for a comprehensive and profound treatise increased. Appropriately, the Encyclopedia is considerably larger and covers the subjects in more detail and is more completely documented than *Applied X-Rays*.

The Encyclopedia is, of course, much more than a revision of *Applied X-Rays*; it is really a new type of treatise in the field, and needs to be evaluated on its own merits. It is the only single-volume source of information on the whole field of X- and Gamma-rays. The minimum collection that could cover such a broad range of subjects in this field in any reasonable depth would probably be about a score of the books in print on the various specialized parts of the field. But this would not replace the Encyclopedia entirely because it includes descriptions of numerous applications that could otherwise be found only in the original literature. The Encyclopedia therefore fills a need of small libraries, small groups, and individuals who would like to have summary material readily available, but who cannot depend on access to a large collection of literature. It also serves a need for those who may have access to a well stocked library, but are interested in summaries of topics for which they do not have time to search the literature. The extensive documentation in the Encyclopedia makes the step toward more detailed study of any particular topic an easy one.

There is a pattern that is repeated frequently throughout the Encyclopedia. On many topics there are several articles. Usually, one or more of the articles is devoted primarily to the more fundamental parts of the subject, and the others discuss typical applications. An example of this plan is found in the first seven articles which are on absorption and its applications to analysis. Throughout the Encyclopedia the articles are well chosen; there is an abundance of cross references, and there is a comprehensive index.

Probably the book's most significant limitation is its price, even though it is really a bargain in relation to its contents. In this day of specialization there will undoubtedly be many who will have difficulty justifying an expenditure of this magnitude for a book whose contribution will be more in breadth than in depth. This, however, is primarily a problem for market analysts and sales depart-

ments. The typography and binding are of high quality, but the book is not without errors in typography and assembly. There are a few work-ups, missing letters, and the like—but very few. It is impossible to tell which "E. Schwartz" wrote which article (cf. pp. x, 324, and 855). There is some overlapping and repetition among some of the articles. This cannot be avoided unless the editor deprives the authors of a degree of individuality. There is also the inevitable lack of overall organization which is an unavoidable premium paid for the benefits of an encyclopedia. Finally, in view of the publishers' statement in his prospectus: "the world's foremost authorities on radiation science . . ." are the authors of this encyclopedia, one cannot help noting that several of these foremost authorities are among the missing. Although it would have been nice to hear from them, their fields have been adequately covered by some who may be considered as lesser lights, but none the less competent.

" . . . a glass, where you may see the inmost part . . ." The editor has collected articles covering an extensive variety of subjects within the field. He has chosen the articles and authors to cover both theory and applications. He has arranged the material in a manner that makes it readily accessible. His "glass" is a good one. We share his hope that it will prove to be the best glass of all.

A. C. Eckert

Allison Division
General Motors Corp.
Indianapolis 6, Indiana

About the Reviewer: A. C. Eckert is now in the Research Activity at Allison where he is concerned with energy-conversion problems. His graduate work at the University of Illinois was in analytical chemistry and X-ray diffraction, and about half of his subsequent time has been spent in these fields. His graduate research was on carbon blacks, and his subsequent experience included some graduate teaching on the side. The remaining time has been spent on such excursions as gas flow problems, technical personnel administration, and electrochemistry—particularly related to liquid-metal fused-salt systems.

Radioactive Dating. Proceedings of a Symposium held in Athens, 19 - 23 November 1962, jointly sponsored by the International Atomic Energy Agency and the International Council of Scientific Unions through the Joint Commission on Applied Radioactivity; published by the International Atomic Energy Agency, Vienna and distributed by the National Agency for International Publications, Inc., and UNESCO Publications Center, 317 East 34th Street, New York 16, New York, (1963) 440 pages, $8.50.

This book reviews present radioactive dating techniques through a series of thirty-one papers presented at the Athens Conference in November 1962. A good fraction of the leaders in the field were present and all of the papers have an authoritative ring.

Radioactivity has always been useful for dating, as has been clear from the beginning of the first decade of this century. But this application has gradually developed and been proliferated to the point that there are now many clocks and many techniques available. Although most of the thirty-one papers presented in this volume are research papers, they nevertheless give an up-to-the-minute view and presentation of the techniques—at least to the informed reader. The book is divided into four sections—the first on methodology and the last three on applications, first to geochemistry and geophysics, secondly to geology, and finally to meteorites. The methodology section has a paper on the half-life of C^{14}, another on counter techniques, a third on the rhenium-osmium clock, etc., all by leaders in the field. In the applications section for geochemistry, there's a very interesting paper on the natural variations in the ratio of U^{234} to U^{238} by D. L. Thurber, one on geochronology with Pb^{210} by E. D. Goldberg, another on the use of disequilibrium and thorium isotopes by R. Coulomb and associates, one on the long- and short-term geophysical processes using natural radioactivity by Lal of India and his associates, and two papers on radiocarbon dating and atmospheric circulation—one on radiocarbon dating of the ocean and another on measurement of atmospheric circulation by means of radiocarbon. In the applications to geology section and in the meteorite section, a dozen important papers are given.

A volume of this sort probably will be short-lived in terms of its timeliness, but it certainly will remain a valuable reference book for a number of years, for materials are collected here which are widely disseminated in the literature and several of them have not been published as yet. It, like the symposium it sprang from, brought together the daters and let them talk and work together for several days—so in reading this volume one is brought up-to-date. It is a kind of review in the sense that even though the papers are largely research papers they do make a good attempt to bring the reader in on the current status of the research.

Perhaps a word or two should be said about