

Volume II consider pathologic studies of neutron-irradiated animals. In the remainder of Volume II, the papers deal with relative biological effectiveness of neutrons as evaluated by different biologic tests, and discussions of a panel on biophysical considerations in neutron experimentation.

Biological effects of neutrons (and protons) are not as well understood as are effects of x and gamma rays. Neutron generators are not as numerous or accessible as are x and gamma sources; the dosimetry of neutrons is more complex and the entire field is a newer one. It is known that the mechanisms of energy transfer to tissues from neutrons may account for the greater biologic effectiveness of neutrons of certain energies and for their relative independence of oxygen, dose rate or frequency of exposure.

This symposium represents an up-to-date review of the field together with a few papers on application of neutron radiation to agriculture, genetics, and cancer therapy. The development of newer and more efficient neutron generators, the development of a more quantitative cellular radiobiology, and the recent interest in solar flares, etc. make this subject a very timely one. The book will be of interest to the experienced investigator as well as being a good guide for those who are contemplating research in this field.

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About the Reviewer: Titus C. Evans is Managing Editor of the journal Radiation Research and has had experience in research on biological effects of neutrons at the Radiological Research Laboratory of the College of Physicians and Surgeons, Columbia University; and at the Radiation Research Laboratory of the University of Iowa, Iowa City, Iowa.

Industrial Uses of Large Radiation Sources. Vols I and II, Conference Proceedings, Salzburg, 27-31 May 1963. IAEA Publication, available from National Agency for International Publications, Inc., New York, New York. Vol I, 420 pp. \$8.50; Vol II, 326 pp. \$7.00.

As a collection of papers presented at a conference, the subject work does not lend itself to a true book review. A summary of major topics and general background, however, is appropriate.

The International Atomic Energy Agency organized the conference as an extension to the first

international scientific meeting on the use of large radiation sources, held in Warsaw in 1959. Approximately 250 scientists from many countries attended to hear and discuss the 40 papers presented. The three headings under which papers were presented are: Research on applications of potential industry use; Radioisotope power sources; and Experience, operation and economics.

Vol I contains 25 papers presented as a part of the first group. Subjects include the synthesis of chemical compounds, copolymerization reactions, and applications of radiation in the textile industry and in the rubber industry. Papers were presented by representatives of the United States, France, Russia, Italy, Japan, Belgium, Federal Republic of Germany, United Kingdom, Poland and Hungary.

Vol II concludes those papers in group one, as well as those in groups two and three. The list of conference attendees, as well as various author indices, appear at the conclusion of the volume.

There are only two papers in group two, radioisotope power sources. Both are contributions of the United States.

Group three presentations are contributions from the United States, Russia, Denmark and the United Kingdom. Operations include both isotopic and machine sources of radiation. Apparently much interest was focused on this group, since actual operating experience with large-scale radiation sources, integrated in full-scale manufacturing processes, could be evaluated.

In general, papers are presented in the language of the country in which the work was sponsored. Each paper, however, is abstracted in English, French, Russian and Spanish.

The objective of the conference was to bring together scientists and information about radiation programs, in order to ultimately promote greater use of radiation in modern manufacturing processes. Making the printed proceedings available will certainly contribute further to that objective.

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About the Reviewer: Mr. Dietz has contributed the next review also, and his vital statistics follow his second review.

Massive Radiation Techniques. edited by Sidney Jefferson; John Wiley and Sons, Inc., New York, New York (1964), 324 + VII pp. \$11.50.

Dr. Jefferson and his associates at the Wantage Research Laboratory, UK, have done an exceptional job in assessing the potentials of large-scale

radiation processing applications. The information recounted has been gleaned from years of personal experience in the field, together with an appraisal and summary of the most-current literature available.

The uses of high-energy electrons, x-rays and gamma radiation in both existing and near-commercial process radiation applications are thoroughly explored. User experience, where applicable, gives an added authenticity to the vast potentials of radiation processing.

Following introductory chapters on the general interaction of radiation with matter and the biological effects of massive radiation doses in relation to agriculture problems, a number of specific applications are discussed. Included are the sterilization of medical equipment and pharmaceuticals, food irradiation, insect control, and chemical applications. Each chapter is superbly backed by good references that number in the hundreds.

A discussion of existing radiation sources and techniques applicable to both machine and isotopic radiation completes the presentation.

The book would appear to be especially applicable to industry management, wherein radiation processing may play an important role. At the same time, the subject areas are so well referenced that technical personnel would also find this book highly worthwhile. It is the type of publication that is essential in passing on to the user industry of radiation applications that research which shows special promise in aiding industry.

A gap between the presentation of this material and a decision to use radiation processing exists in the area of irradiator design, although some competence in this area is now developing. Several US, Canadian and UK engineering firms are

beginning to familiarize themselves with processes applicable to radiation processing, so that a complete integrated processing facility can be proposed, rather than just an irradiation step.

In the fast-growing field of process radiation, Dr. Jefferson's book will soon be out-of-date. Additional commercial applications are in existence in the food irradiation, chemical processing, and medical supply sterilization fields. The discussion of these existing applications, which indicates acceptance of radiation applications by both producer and public, is quite important to the more widespread use of radiation as a processing tool.

Massive Radiation Techniques is an easy book to read, and is to be highly recommended to those in both scientific and management positions wherein radiation may have a role. Its title is more aptly "Commercial Radiation Applications," although this in itself certainly does not detract from its over-all value.

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About the Reviewer: George Dietz is the Chief, Facilities Engineering Section, Division of Isotopes Development, US Atomic Energy Commission. He joined the USAEC approximately five years ago, as the Army's liaison officer to the Commission during the initiation of the AEC's Food Irradiation Program and construction of the US Army Radiation Laboratory, Natick, Massachusetts. Since then, his primary efforts of interest have been in the development of process radiation applications and in the design and construction of radiation facilities relating thereto.