Chapter 5 on diffusion theory. In addition, the authors must be commended for the inclusion of a number of interesting applications (for example, the kinetics of a circulating fuel reactor), and despite the many omissions of analytical techniques, the inclusion of others not generally found in textbooks, as, for example, the Russian approach to heterogeneous reactor calculations.

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Applied Gamma-Ray Spectrometry. Edited by C. E. CROUTHAMEL. Pergamon, New York, 1960. 443 pp., $6.50.

This book is the second volume of an International Series of Monographs on Analytical Chemistry. While it is addressed chiefly to the analytical chemists, it will be of interest to anyone involved in the measurement of gamma-ray spectra from radioactive isotopes. Actually, the book is devoted almost entirely to the theory and application of scintillation counters to gamma-ray spectroscopy; a brief section on proportional counters is included but better discussions of this topic can be found in other works.

The book is divided into two parts. The first 155 pages are largely descriptive and consist of four chapters. The first chapter, "Intrinsic Variables," is one of the best condensed discussions of decay schemes and the interaction of radiation with matter that has come to this reviewer's attention. The second chapter, labeled "Extrinsic Variables," deals chiefly with the processes that take place in converting a gamma photon into a voltage pulse. It is apparent that Messrs. Managan and Crouthamel, the authors, have given a great deal of thought to all the factors that enter into obtaining good resolution in a spectrometer. It is unfortunate that the recent work by R. B. Murray was not available, for it would have done much toward clearing up the mystery of the lower limit on resolution. Actually, the authors must be somewhat psychic for they state "A possible explanation lies in the conversion variance (gamma-ray energy into photons) resulting from nonlinearity in NaI(Tl) scintillator." A smattering of electronic circuitry also appears in Chapter 2, which leads this reviewer to conclude that electronics is not the forte of the authors. Chapter 3, though brief, is devoted to the calibration of the detectors. Chapter 4 on "Specific Applications" is addressed chiefly to the analytical chemists and will, I am sure, be required reading by any student entering the field. I was startled by Table 4-5 which lists the isotopic concentration of U^{235} occurring in "natural" uranium as 0.39%. Of course, the original analysis was done with depleted uranium.

The major part of the book, and undoubtedly the part that will appeal most strongly to analytical chemists, is that comprising the four appendixes. A list of the titles and page lengths of each follows:

I. X-ray Critical Absorption and Emission Energies in kev—4 pages
II. A Compilation of Gamma-ray Spectra—150 pages
III. Intrinsic Efficiencies of Right Cylindrical Sodium-Iodide Crystals—27 pages
IV. Photon Energy, Atomic Number, and Half-Life Sequences of the Nuclides—95 pages

Appendix II consists of hundreds of scintillation spectra which were obtained at Argonne National Laboratory with a 4 × 4 in. NaI(Tl) crystal spectrometer. The first spectrum is that of Be^7, the last that of Am^{241}. While these spectra will be most valuable to anyone trying to identify an unknown isotope, the analyst must recognize that unless his spectrometer also uses a 4 × 4 in. crystal of similar resolving power, the spectrum that he observes will be different from that shown in Appendix II. Also, many spectroscopists prefer the use of semilogarithmic plots and will therefore refer to Heath's "Gamma-Ray Spectrum Catalogue" for their own use.

Anyone who has ever observed a gamma ray and wondered what it might be coming from will recognize the value of Appendix IV, which catalogues all of the known gamma rays in a table of increasing gamma ray energies. (It has been pointed out to me that there is a misplaced decimal point in the value of the Ce^{145} gamma-ray energy.)

The index at the end of the book is too brief (one page) but this is more than compensated for by the complete set of references. The editor and publisher are to be commended for listing the references throughout the text rather than putting them at the end of the chapter.

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Fast Neutron Physics. Part I: Techniques. Edited by J. B. MARION AND J. L. FOWLER. Interscience, New York, 1960. 983 pp., $29.00.

This volume together with the forthcoming Part II (Experiments and Theory) covers the broad field of fast neutron physics. These two volumes give comprehensive treatments of topics in this rapidly expanding field of research. They should serve as a most valuable reference both to the research scientists in this field as well as to reactor engineers, health physicists, and all others who work with neutrons. The topics which are covered in Part I are (I) Neutron Sources, (II) Recoil Detection Methods, (III) Detection by Neutron-Induced Methods, and (IV) Special Techniques and Problems. Each of these sections has a number of subsections written by specialists in the field.

Section I contains comprehensive information about radioactive neutron sources and detailed information on monoenergetic neutrons from charged particle reactions. Section II gives an excellent coverage of recoil counters, recoil detection by scintillators, and recoil telescopes as well as the older methods of detection: photographic plates and the cloud chamber. Section III includes treatises on flat response counters (long counters), helium-3 neutron spectrometers, gaseous scintillation detectors, and fission detectors. The last section includes topics of a rather diverse nature but of considerable interest and importance: time-of-flight techniques, neutron flux measurements, neutron collimination and shielding, fast neutron dosimetry, fast neutron radiation hazards, and computer techniques.

This reference book should prove indispensable to those working with fast neutrons particularly since this collection of the latest technical information includes much data that that have not been published previously.

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