

Radiation Protection in the Health Sciences

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Radiation Protection in the Health Sciences is a textbook on the basic principles and practices of radiation protection, primarily as it pertains to the health care fields of radiology and nuclear medicine (although not to the exclusion of other industries, such as nuclear power.) Although I have not seen the first edition, this second edition is presumably the result of both solicited critiques of the first edition and updated information on the field.

The book begins with an introduction to the basic physics of radiation protection, such as the types of radiation encountered (α , β , γ , x-ray, and neutron), their origin (e.g., radioactive decay), and their interaction with matter (mechanisms, ionization, and linear energy transfer). This introduction is followed by a chapter describing the devices used by radiologic health practitioners to detect such radiation (ionization chambers, Geiger counters, and scintillation and solid-state detectors). The next 2 chapters define the various radiation protection units (exposure, kerma, relative biological effectiveness, and absorbed and effective dose) and their relationship to each other and then discuss the biologic effects of radiation and associated regulatory dose limits. (I consider a discussion of the meaning of the various units of radiation measurement of particular importance, because these are often a source of confusion and misuse by those who are only infrequently involved in radiation protection issues.) Attention is then turned to measuring the exposure from radiation sources with survey and calibration instruments and both short-term (e.g., pocket dosimeter) and long-term (e.g., thermoluminescent dosimeter) personnel monitors. The next 4 chapters are on the concepts and practice of protection from radiation. The well-established radiation protection principles of time, distance, and shielding are introduced first. This chapter is followed by information on occupational exposure (both external and internal) to x-ray-producing devices, as well as on sealed and unsealed radionuclide sources and their control (what the authors call “good working habits”); a

description of laws on the use of radioactive material (from licensing to waste disposal); and a more in-depth discussion of the principles and methods of shielding from external sources of radiation (e.g., primary barriers, scattered and leakage radiation, and collimation). The book ends with chapters on dose calculations for internalized radionuclides and external photons. Because the textbook is intended for use in an instructional setting, each chapter ends with a set of review questions and problems to solve.

The book includes appendices on physics units, the relationship between the roentgen and the rad, and logarithms; an exhaustive 36-page glossary of relevant terms; and a list of references, answers to the chapter problems, and an alphabetic index. Printed on the inside of the front and back covers, respectively, are a list and periodic chart of the elements. A problem solutions manual is also provided. What I found to be particularly interesting was the detailed, 4-level table of contents that functions as an index for rapidly finding a wide variety of information by topic (e.g., Digital Ionization Chamber Monitors, Recommendations for Effective Dose Limitations, Half-Value Layer, and Use of the MIRD Tables).

I believe *Radiation Protection in the Health Sciences* is most appropriate either for an introductory health or medical physics course on radiation protection or for training radiology and nuclear medicine technologists and residents in the radiation protection aspects of their respective vocations. The authors refer the reader to other sources in the list of references for more in-depth discussions on various topics of interest. This book can also be used by technologists, physicians, and physicists for self-study or as a quick reference for basic information on radiation protection (a purpose for which I have already used it on several occasions).

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