



## Journal of Radiological Protection

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### BOOK REVIEW

# The Radiochemical Manual

J A B Gibson

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Abstract

This manual is modelled on the second edition of *The Radiochemical Manual* published by The Radiochemical Centre, Amersham, in 1966 some 33 years ago! The National Measurements System Policy Unit, within the UK Department of Trade and Industry, recognised the need for a new publication to replace the Amersham document and this manual is the result. The objective for AEA Technology was to build upon the Amersham document and update and expand the information for all users of radionuclides. A key feature of the manual is the nuclear data table that covers nearly 300 radionuclides. Contributors to the new document come from a range of disciplines and it has been comprehensively refereed at all stages of production. In the manual, the legislative basis for radiological protection is defined. The development of standards based upon ICRP recommendations and European Directives and their use in UK regulations is examined from the current standpoint and for the future.

There is an extensive glossary of technical terms and acronyms with details of selected information sources available on the Internet. The definition of Kerma on page xxii is incorrect in that it should only include the charged particles released in an interaction and not photon radiation. Dosemeter and dosimeter are used interchangeably in the document but the former is preferred. Chapter 1 is an introduction to the history of the use of radioactivity and to the basic nuclear physics needed to understand the decay of radionuclides. Their measurement is described in chapter 2, which gives an introduction to the interactions of radiation with matter and an outline of the different types of radiation detector and dosimeter. Some details are incorrect in that, on page 43 it is stated that the 'intensity of the scintillation, hence the electronic pulse height, is proportional to the energy of the radiation deposited in the scintillator solution'. This only applies to particles with a low rate of energy deposition. The heart of the manual is in chapter 3, which gives a description of the radiochemical analysis laboratory. Safety and good housekeeping are well covered and there is a comprehensive guide to analysis procedures and counting methods. Also, mass spectrometry and neutron activation analysis are covered with an introduction to data handling (the fourth equation on page 87 is incorrect) and the use of standards and reference materials. Quality assurance and accreditation are well addressed in this chapter. The production of radionuclides is addressed briefly in chapter 4. Their application in industry, environmental studies and medicine is considered in chapter 5. The applications cover some nine separate industries from

mining to printing and environment uses from food technology to space research. The extensive list of radiopharmaceuticals indicates the importance of radionuclides in medicine and medical research. There is a misleading statement in section 5.4.1 in that the implication is that it is the half-life of the parent that governs the time for secular equilibrium to be achieved when it is the half-life of the daughter that is relevant. The meaning of the curves in figure 5.6 needs to be explained.

Radiological protection is addressed in chapters 6 and is a very necessary part of the use and analysis of radioactivity. This chapter is based upon the latest ICRP recommendations and EC Directives and so it will be applicable well into the next decade. Legislation, licensing, transport and the disposal of radioactive waste are covered in chapter 7, which is based upon current legislation and may need review in the year 2000. It may be anticipated that the nuclear data table in chapter 8 will be the most used part of the document once the basics are understood. Finally, there are two appendices giving selected isotopic abundances for elements and radioactive isotopes and the Periodic Table. It should be noted that element 78 is Pt and the electron configuration is incorrect in the table.

SI units are used throughout the manual but other units are identified where they are still in common use. There are some peculiarities in that Planck's constant should be given in 'J s' and not 'erg s' on page xxv and the abbreviation for seconds is 's', for minutes 'min' and for hours 'h'. Consistency in symbols would help the reader as  $t$  is used for thickness and time in the same chapter. These are minor irritations that cause the reader to pause rather than doubt the validity of the argument. Each chapter has an extensive reference list that can be used to obtain more details of specific methods and there is a comprehensive index. There is always a problem in knowing when to publish because of changes in legislation. However, the chapters do reflect the likely revisions in the Ionising Radiations Regulations but perhaps a review of the legislative information could be considered in the year 2000 when the Regulations are in use. The price may be high but the reproduction is excellent. This Manual is a most comprehensive introduction to most practicable uses of radionuclides and should be on the bookshelf of all users of radioactivity.

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