Introduction to Radioanalytical Physics

Author	G. Deconninck
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Reviewer	Steven W. Yates

This book is the first volume of the nuclear methods monograph series of the *Journal of Radioanalytical Chemistry* and *Radiochemical and Radioanalytical Letters*. Although neutron activation analysis and radioisotope tracer techniques are not included in this book, a discussion of the use of low-energy accelerators and radiation detection for a range of applications, including trace analysis, presents an ambitious undertaking. The author's approach is in this case successful, and the result is a needed addition to the literature.

The text is arranged in chapters according to the type of radiation being detected. This approach is logical, since the radiation detection considerations usually dominate the applicability of any technique. Little attempt is made to examine the complexities of instrumentation and other technical aspects; rather, the focus is on the underlying principles. The presentations are kept simple, and the reasonably self-contained discussions are a major strength of the author's treatment. The simplicity of the mathematical formulas, with the insertion of numerical constants in many cases, is another appealing feature that adds to the practical utility of the text.

The first chapter discusses nuclear reactions. Kinematics, cross sections, and reaction characteristics are presented in sufficient detail to inspire the interested reader to study more advanced works or to satiate the scientist who seeks only a working understanding. Subsequent chapters cover the interactions of charged particle beams (including x-ray emission and energy loss considerations), analysis by elastic scattering of charged particles, prompt and delayed gamma-ray detection, and analysis by charged particle and neutron spectroscopy. The important corrections and effects are presented for each method. The final chapter concentrates on analytical applications of nuclear reactions and much too briefly surveys a number of possible radioanalytical applications to elemental and isotopic analysis, surface analysis, depth profiling, biological applications, etc. Unfortunately, the advantages and sensitivities of the methods discussed are seldom compared with those of other, nonradioanalytical methods.

This text is intended "to introduce the reader to the physical principles of radioanalytical methods" and is "designed as a text book for the use of scientists of diverse scientific backgrounds." Toward these goals, it is successful. While the bibliographies are not extensive, the reader who wishes to pursue one of the methods in greater depth is provided with a convenient starting point.

The major fault of this book likes not with the author but with the printer. The paper quality is poor (paper thin pages), and there are many instances of smudging or smearing of the print. This is particularly annoying when one is trying to determine whether a small, and essentially unreadable, subscript or superscript is an x or a 2. It is unfortunate that the printer should cast a shadow (albeit a small one) on what is otherwise a good work.

Steven W. Yates (BS, chemistry, University of Missouri, 1968; PhD, nuclear chemistry, Purdue University, 1973) is an associate professor of chemistry at the University of Kentucky. He has utilized a variety of light- and heavy-ion accelerators to pursue his research in nuclear and radiochemistry. His current research interests include nuclear structure studies of deformed and transitional nuclei, nuclear isomerism and high-spin phenomena, inelastic neutron scattering, and the application of nuclear scattering reactions for elemental analysis.