Prevention," "Stainless Steels," and "Tool Steels." This subdivision by alloy class makes the book valuable as a reference for engineers and designers.

The book is well illustrated. The 271 figures contain phase diagrams, schematic drawings to clarify passages of text, and experimental data. The prose is highly readable and well referenced. References are up-to-date and provide the reader with excellent access to the literature.

I have found the book to be a valuable reference for guiding students, for use in consulting work, and as a reference when dealing with customer-related materials problems. I would recommend it highly to metallurgists, materials scientists, and those involved in design or materials specification who desire a more in-depth understanding of the properties and structure of steels.

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Nuclear and Radiochemistry (3rd ed.)

Authors	Gerhart Friedlander, Joseph W. Kennedy, Edward S. Macias, and Julian M. Miller
Publisher	John Wiley & Sons, Inc., Somerset, New Jersey (1981).
Pages	684
Price	$42.00
Reviewer	Roy H. Filby

The third edition of *Nuclear and Radiochemistry* brings up to date a work that has become a classic since its appearance in 1949. The original text by Friedlander and Kennedy filled an important need in nuclear science education and was for many years the only textbook on nuclear and radiochemistry available to upper level students of nuclear science and chemistry. After more than 30 years, *Nuclear and Radiochemistry* still remains one of the most popular textbooks for use in nuclear chemistry courses in many countries, particularly after the second edition appeared in 1964. The third edition was written largely by G. Friedlander and E. Macias, J. W. Kennedy having died more than 20 years ago. J. M. Miller, who helped write the second edition, died unexpectedly in 1976.

The original text was written at a time when both nuclear chemistry and radiochemistry were rapidly developing disciplines with no well-defined areas of interest. During the past 30 years, nuclear chemistry and radiochemistry have pursued somewhat different paths. Although there is no agreement on definitions of the two disciplines, most nuclear scientists would concur with the statement that nuclear chemistry involves the fundamental study of the nucleus and therefore is concerned with both radioactive and nonradioactive species, whereas radiochemistry involves the study and application of radioactivity. Nuclear chemistry and nuclear physics today overlap significantly and often differ only according to the perspective of the investigator. Radiochemistry has developed into a discipline with major applications to many fields of science, e.g., chemistry, biology, geology, and nuclear medicine, to name but a few. It may be said that, at present, the most active areas of radiochemistry are in such applied fields as radioimmunoassay, radiopharmaceuticals, nuclear medicine, etc. Given the spectacular growth of nuclear chemistry research and radiochemistry, it is clear that a textbook covering both disciplines presents considerable difficulty of depth to the writers. The authors of the third edition of *Nuclear and Radiochemistry* have attempted to preserve the scope of the original text while reflecting the changes that have taken place over the past 30 years. In terms of presenting the basic concepts of nuclear and radiochemistry, the authors have succeeded well. Treatment of applications, particularly radiochemical applications, is less successful.

Most of the original structure of the first two editions has been retained in the present revision, but reorganization of some material has resulted in an improved sequence of topics. Except for the chapters on introductory radioactivity, atomic nuclei, radioactive decay, and statistical processes in radioactivity, all topics have been significantly revised. The book is characterized by an excellent treatment of the basic principles of nuclear chemistry, namely, nuclear structure and models, nuclear reactions, radioactive decay processes, and the interaction of radiation with matter. These early chapters are treated with a minimum of mathematical difficulty and thus are readily comprehensible to most chemists. Following these topics are chapters on radiation measurement, statistical aspects of radioactivity, techniques in nuclear chemistry, radiochemical applications, nuclear processes as probes, nuclear energy, sources of bombarding particles, and nuclear techniques in geology and cosmochemistry. These chapters have been extensively revised from the previous edition, with the introduction of much new material; the chapter on geology and cosmochemistry is particularly good.

In a work of this scope, it is inevitable that some topics are not treated adequately. This is particularly true of the sections dealing with radiochemistry. The section on radiochemical applications treats radioanalytical methods such as activation analysis and isotope dilution very sketchily. Other analytical techniques such as radiometric precipitations and titrations, substoichiometric isotope dilution, and isotope dilution mass spectroscopy are not discussed. Very little space is given to radiochemical separations, synthesis and properties of radiolabeled compounds, the radiochemistry of very low concentrations, separation of fission products, chemistry of nuclear fuel reprocessing and radiochemistry applied to radioactive waste disposal. In the chapter on radiation detectors and measurement, insufficient detail is given on common measurement systems. Gamma-ray spectroscopy, particularly using semiconductor detectors, which now finds extensive application to radioanalytical chemistry, is inadequately covered. Liquid scintillation counting, now the method of choice for most radiotracer work involving ^{14}C, ^{3}H, and ^{35}S, is barely mentioned. This is somewhat surprising considering the wide

application of liquid scintillation techniques in many fields. The section on nuclear instrumentation is much too brief; the functions of most nuclear instruments are not clearly described and little mention is made of the use of computers in nuclear instrumentation. In the opinion of the reveiwer, nuclear instrumentation merits a separate chapter in a text of this nature.

A topic that receives very little attention is environmental radioactivity. The sources of environmental radionuclides, their separation, and methods of investigation are important aspects of present-day radiochemistry. A separate chapter on radiation protection would be preferable to the small sections included in Chaps. 6, 7, and 14.

Nuclear and Radiochemistry is an excellent textbook for graduate or undergraduate nuclear chemistry courses despite the reservations noted above. In the reviewer's opinion, it remains the best text available. It is doubtful, however, if it can be used alone as a radiochemistry text, although the basic principles of nuclear science are well covered. For radiochemistry courses, supplementation with other sources is recommended. Nevertheless, the authors are to be congratulated on their excellent revision of a classic work. The book should also be recommended reading for any scientist requiring an overview of nuclear and radiochemistry. Making the book even more valuable are excellent bibliographies, a table of nuclides taken from *The Table of Isotopes* (7th ed., 1977), and the excellent and challenging problems at the end of most chapters. It is expected that this text will continue to draw enthusiastic responses from both undergraduate and graduate students in nuclear science and chemistry.

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Power Reactor Noise

Author	Joseph A. Thie
Publisher	American Nuclear Society, LaGrange Park, Illinois (1981)
Pages	208
Price	$38.00
Reviewer	Robert S. Wick

In the 18 years since the author published his U.S. Atomic Energy Commission monograph entitled *Reactor Noise*, there have been tremendous strides in this field both in the technology of measurement and in the area of phenomena identification. In a sense the use of power reactor noise as a diagnostic tool is perhaps coming of age. The author is quick to point out that the emphasis of this book is on the noise from operating power reactors as opposed to low power experiments of two decades ago. Hence, Dr. Thie is bringing the reader up to date with regard to the change in approach from a laboratory curiosity to potentially workable instruments for power plant operations. Thus, there is a minimum of overlap between his two monographs, although the first third of the book does review the fundamentals of noise theory and analysis.

The author has augmented his discussion of noise in pressurized water reactors (PWRs) and boiling water reactors (BWRs) with extensive references to the literature and to numerous national and international conferences. The most recent reference is dated 1980. All in all he has over 330 literature citations. Interestingly enough he has more literature citations for the two chapters on PWR and BWR reactors than he had for the entire first edition of the monograph.

After introductory chapters on statistical properties of noise, frequency-domain analysis, and time-domain analysis, he moves to the relationships between theoretical and experimental aspects of noise. The concept of neutron noise is reviewed next and then the remaining half of the book is devoted to reactor noise. Considerable emphasis is placed on the role structural elements of reactors play in noise generation. This is completely consistent with the number of operational problems that have arisen due to interaction between coolant flow and elastic structural members. The complications due to boiling are suitably addressed. Many practical problems and their resolutions are sited.

Considered as a whole, the book is an excellent up-to-date source of the state of the art for the practitioner and it is highly recommended as such. Of course it is concise, but the reader has the reference citations for greater detail. I would consider it as an excellent supplemental text to be used in conjunction with Robert Uhrig's text *Random Noise Techniques in Nuclear Reactor Systems*, Ronald Press, New York (1970).

In closing I would point out that the author presents in his introduction a very objective discussion of the reasons for and against the use of reactor noise tests. The points raised are still as germane as in the past, but the reasons for seem to have become somewhat more compelling than the reasons against since the publication of the first edition of this monograph.

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