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.

Royston H. Filby is professor of chemistry and director of the Nuclear Radiation Center at Washington State University. He has specialized in the application of nuclear techniques to trace element analysis. He has served as an International Atomic Energy Agency technical assistance expert in Romania and Bulgaria and has been visiting scientist at the National Bureau of Standards. He has recently edited Atomic and Nuclear Techniques in Fossil Energy Research, *published by Plenum Press, 1982.*

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.

Robert S. Wick (BS, mechanical engineering, Rensselaer Polytechnic Institute, 1946; MS, Stevens Institute of Technology, 1948; PhD, mechanical engineering, University of Illinois, Urbana, 1952) has been professor of nuclear and aerospace engineering at Texas A&M University since 1966. Before that he was at the Westinghouse Bettis Atomic Power Laboratories (starting in 1955), where he was associated with various reactor design projects.

Multiphase Science and Technology
(Vol. 1)

Editors	G. F. Hewitt, J. M. Delhaye, and N. Zuber
Publisher	Hemisphere Publishing Corporation, New York (1981)
Pages	528

Price $49.75

Reviewer Joel Weisman

This work is planned as the first volume of a multivolume series on multiphase flow. The editors have as their objective publication of authoritative reviews of what they see as important areas in multiphase systems. They hope that the series will enable the nonspecialist to learn the present state-of-the-art in the areas reviewed.

The first volume deals with four subjects. In Chap. 1, Bolle and Moureau review "Spray Cooling of Hot Surfaces." After a brief introduction, characteristics of sprays and atomizers are discussed. This is followed by an examination of the hydrodynamics of drop impingement and heat transfer during impact. The chapter concludes with a comparison of theoretical models and experiments.

Gyarmathy considers "Spherical Droplets in Gaseous Carrier Streams" in Chap. 2. The author begins with a dimensional analysis of the problem and follows this with an analysis of heat, mass, and momentum to a sphere. The last sections of the chapter discuss droplet equilibrium and stability, growth and vaporization, and various applications.

In Chap. 3, the focus of the book changes. R. Shock reviews "Boiling in Multicomponent Fluids." After considering phase equilibrium and nucleation, bubble growth is examined. The remaining sections of the chapter are then devoted to an examination of nucleate boiling, film boiling, and the critical heat flux.

In the final chapter, J. Chappuis examines "Contact Angles." The review begins with an examination of liquid and solid surfaces and adsorption in solid surfaces. Contact angles on ideal and real solid surfaces are then considered. Reviews of measurement methods and interpretation of contact angles follow.

All of the authors are well qualified to review the subjects to which they have been assigned. While some minor flaws exist, the reviews are thorough, scholarly, and generally well written. Engineers and scientists who are interested in a comprehensive review of any of the subject areas covered would find this volume useful.

The major fault with the current volume is its relative lack of focus. While it is true that this volume is restricted to vapor-liquid flow, this in itself is such a wide area that the individual interested in boiling of multicomponent fluids is not likely to be concerned with the spherical drop in a gaseous carrier. In this reviewer's opinion, the series would be much more useful if each individual volume had a particular focus. For example, the focus of the first two articles on droplet behavior could have continued with reviews of such subjects as droplet entrainment and mist flow in pipelines. It is believed that monographs of such a nature would be purchased more readily and be more valuable as an addition to an individual reference library.

Dr. J. Weisman is professor of nuclear engineering and director of the nuclear engineering program at the University of Cincinnati. Prior to joining the university in 1968, Dr. Weisman spent 18 years in industry. His last industrial position was that of manager of thermal analysis for the Westinghouse Pressurized Water Reactor Division.

Dr. Weisman is perhaps best known as editor of Elements of Nuclear Reactor Design, *Elsevier (1977) and as co-author of the ANS monograph* Thermal Analysis of Pressurized Water Reactors *(2nd ed., 1980).*

Handbook of Materials Testing Reactors and Associated Hot Laboratories in the European Community

Editors Peter von der Hardt and Heinz Röttger

Publisher D. Reidel Publishing Company, Inc., Hingham, Massachusets (1981)

Pages 152

Price $24.00

Reviewer B. L. Shriver

The *Handbook of Materials Testing Reactors and Associated Hot Laboratories in the European Community* was originally published in 1974 to provide technical information on large [>5-MW(thermal)] materials test reactors, related laboratories, and research programs. The 1981 revision to the handbook continues this objective by providing current data on 19 facilities in the seven countries of the European Communities.

The 1981 revision includes data on three reactors, the 58-MW(thermal) KNK-II in Karlsruhe, Federal Republic of Germany, the 14-MW(thermal) ORPHEE in Saclay, France, and the 57-MW(thermal) High Flux Reactor in Grenoble, France, not listed in the previous edition. In addition many of the other facilities have or are planning significant modifications which are noted in the handbook.

The information provided for each facility is in the form of eight data sheets completed by the owners of the facility. The information provided includes information on the reactor (type, power, neutron spectra), irradiation facilities, hot cells, and general information on active research programs. In many cases references are included, which direct the reader to more detailed information.

The handbook is a useful reference for people interested in the European research reactors much as the *Research, Training, Test and Production Reactor Directory* published by the American Nuclear Society is for U.S. nonpower reactors. Due to its format and limited scope, it is not likely to be of interest to general readers. For example, the description of experimental facilities is typically too brief to be of use to people not generally familiar with research reactors.

It is interesting to note that two major test or research reactors have been built in Europe in the late 1970s. In addition, several others have increased power or made improvements to their research capabilities. Unfortunately, the U.S. trends are also starting to surface. Two of the reactors are scheduled to be shut down, and two others listed their only future modifications as the use of low enrichment fuel.

Bryce L. Shriver (PhD, metallurgical engineering, University of Missouri-Rolla, 1973) is director of the Nuclear Reactor Facility and research assistant professor at the University of Virginia. He is the past chairman of the Test, Research and Training Reactor Managers Conference. Prior to joining the University of Virginia he served as an engineer on Admiral Rickover's staff in the Department of Energy. His research interests include the effects of radiation on the properties of structural materials.