tion. In particular, some teachers of chemical engineering will feel that the evolution of separate cases obscures general principles and encourages memorization of distinct techniques. Other teachers who have used the original edition successfully will welcome the expanded coverage of the second.

ROBERT R. ROTHFUS
Department of Chemical Engineering,
Carnegie Institute of Technology

Induction and Dielectric Heating. J. Wesley Cable. Reinhold, New York, 1954. vii + 576 pp. Illus. $12.50.

The author may be justly proud of his lucid and comprehensive interpretation of the fundamentals and the engineering phases of induction and dielectric heating. This work conveys a historical and technical panorama of the art and practice with such clarity that it is an excellent reference for the student and practicing engineer, and a highly functional guide for the technical and nontechnical members of industry who are associated with these forms of heating.

In reality this work comprises two basic subjects, induction heating and dielectric heating. While the two subjects are treated separately, frequent cross references point out the similarities and dissimilarities between the two types of heating, and demonstrate the advantages and disadvantages of each form. The engineering principles are competently discussed, and the theory is conveyed to the reader over a bridge of analogies for rapid digestion. The book is sprinkled with a number of pertinent graphic relationships that enhance the understanding of the subject matter and provide useful design data. The author is to be commended for selecting and furnishing only those equations germane to the comprehension and application of the science. Writers often succumb to the temptation to encumber their work with numerous mathematical or physical relationships with an apparent effort toward erudition but with wanton disregard of the real function of the text, which is to convey information accurately and directly.

Following the summary of the technical aspects of the art, Cable reviews the sources of energies available. This survey provides valuable engineering information on the various means of generating the high-frequency power necessary. The author's skill is again revealed by his ability to draw the reader's attention to such technical or economic facets of the equipment that are pivotal in determining its practical qualifications. To illustrate, in the discussion of the effects of bus voltage variations upon electronic generators, he presents pertinent graphs demonstrating the effect of filament voltage variations on the emission and life characteristics of an oscillator tube. Although this information, per se, is not unusual, it is a valuable help in determining the economic feasibility of electronic power supplies in plants suffering a certain degree of voltage variation.

Coil and electrode designs in large part determine the effective application of induction and dielectric heating, respectively, and the two chapters devoted to this phase of the art provide a very adequate background and guide for solving the design problems encountered.

The major part of the book is devoted to the application of induction and dielectric heating in industry and laboratories. This coverage presents a very thorough and comprehensive treatment of various industrial and other specialized uses of high-frequency electric heating. Its completeness, in fact, is extended to include speculation on the future potentialities of dielectric heating. The number of illustrations is ample, and they add significantly to the understanding of heating problems and applications.

The completeness of this book is further attested by the inclusion of a discussion of radio interference produced by the operation of the high-frequency electric heating equipment. I feel that *Induction and Dielectric Heating* is a valuable adjunct to the libraries of the designer and of the application engineer.

EMANUEL L. BRANCATO
Solid State Division,
Naval Research Laboratory, Washington 25, D.C.

Nuclear Reactors for Industry and Universities. Ernest H. Wakefield, Ed. Instruments Publ., Pittsburgh, 1954. ix + 93 pp. Illus. $2.

This brief book has three very timely and worthwhile objectives: (i) to call attention to the fact that small research-type reactors are now at such a stage of development that any large university or industry should be able to afford one; (ii) to stimulate and encourage the widespread use and further development of research reactors by universities and industry; and (iii) to present in compact form information that will "aid universities and industries in making decisions about the installation of reactors."

The first objective is well supported by a summary of a cost estimate prepared by Henry J. Gomberg and colleagues at the University of Michigan. It indicates that $370,000 will cover the cost of reactor and tank for a modified "swimming pool" arrangement, including operating necessities and safety instrumentation but exclusive of fuel, which must be obtained by arrangement with the Atomic Energy Commission. To this must be added the cost of the building ($60,000 to $300,000) and of the laboratory research facilities for which some sketchy estimates are indicated.

The second objective is supported by a stimulating preface by K. S. Pitzer and by a very brief analysis of the value of a research reactor, which would well merit broader consideration and treatment than that allotted to it.

Four chapters of elementary, semipopular, technical information about reactor classifications, control, instrumentation, and radioactive measurements, one chapter on radiation protection, and one chapter on legal aspects, are intended to support the third ob-

jective. Any university or industry capable of justifying an outlay of approximately $500,000 for a research reactor will certainly have on its staff one or more capable scientists who need and can make good use of a research reactor. These scientists, who will play an important part in justifying any decision to acquire a reactor, will find the technical information disappointingly elementary and of little assistance. Supporting references to the literature are not adequate to compensate for this deficiency.

The chapters on legal aspects and radiation protection are more helpful, because they present less commonly known but necessary information in condensed form, and these chapters place a very appropriate stress on the serious, important considerations of adequate radiation safeguards.

It is important at this time that extensive use and improvement of research reactors be stimulated. This book represents a timely step in the right direction, but falls short of meeting the need. It will perhaps best serve by stimulating the interest of nontechnical people.

R. D. HUNTOON
National Bureau of Standards, Washington, D.C.

A Text-Book of Macro and Semimicro Qualitative Inorganic Analysis. Arthur I. Vogel, Longmans, Green, New York–London, ed. 4, 1954. xv + 663 pp. Illus. + plate. $4.50.

This excellent volume represents an extension and modernization of the third edition (1945). In the first chapter (a long one) the author presents a very thorough coverage of all the background theory required for qualitative analysis and a large amount applicable to quantitative analysis as well. Many numerical problems are worked through in detail, and the Brönsted-Lowry treatment of acids and bases is used and applied to the hydrated ions of salts. Activity coefficients and their applications are briefly discussed.

Semimicro and macro techniques are thoroughly discussed in the second chapter, which contains many illustrations of apparatus and their use. In particular, attention might be called to page 187, which contains a nicely balanced photograph of all the semimicro apparatus needed by the student. Following this are chapters on reactions and analytic procedures for cations and anions, including the use of organic reagents. For the latter, sensitivity and concentration limits are given. One might wish that the molecular equations used in these chapters had been replaced by ionic equations, but the former were probably retained to conserve space (the author asks the student to use ionic equations in his notebook).

Chapter 5 does not seem to be needed, for it is given over to systematic macro qualitative analysis for elementary students, and the same material is extended and developed in Chapters 6 and 7, dealing with systematic qualitative inorganic analysis; separations are made conventionally with hydrogen sulfide. Later chapters deal with procedures for the removal of interfering organic acids, silicates, borates, fluorides, and phosphates. A comprehensive chapter on the chemistry of the less common elements is followed by a very useful though short chapter on paper chromatography and its application to group separation and identification of ions by R_f values.

The author is head of the chemistry department, Woolwich Polytechnic, London, but the book appears to have been written in the hope that it would find service in American schools as well as British. Names and addresses of manufacturers of instruments, both in the United States and in Europe, are often given, occasionally, with the advantages or disadvantages of one make over the other. British spelling is used throughout, and American teachers considering the book for adoption will have to consider this feature, along with the European convention (opposite sign) used in electrode potentials (this is not to say that all American authors are in agreement on this point). Opposed to these features is the obvious fact that the book appears eminently teachable, and that any student familiar with this work will have a very sound background in inorganic and analytical chemistry.

EVANS B. REID
Department of Chemistry,
The Johns Hopkins University

Laboratory Instruments. Their design and application. A. Elliot and J. Home Dickson. Chemical Publ., New York, 1953. 414 pp. Illus. $7.50.

This book consists of 16 chapters that cover in a limited way some of the problems of instrument building. Most of the chapters are only a few pages long; the authors devote most of the space to glass and optics. The chapter on glass contains more generally useful information than is usually found in one place. An attempt is made to include United States trade names for glasses and glass-working compounds. The chapter on lenses, mirrors, and prisms is so condensed that it is difficult to use without considerable prior knowledge of the subject. The numerous illustrations of lens, mirror, and prism arrangements, as well as tabulations of the properties of some types of lenses, could well be a source of "suggestion" to a designer of an instrument requiring a few optical parts. The treatment of subjects other than optics is superficial, and at times hardly more than a statement that the subject matter exists. The bibliography is principally of articles available only in Great Britain or in large United States libraries. British names, such as screw head, would be confusing to United States designers. The book as a whole is hardly a complete enough discussion of laboratory instruments to be useful for either instruction or reference.

DONALD E. WILLIAMSON
Williamson Development Co.,
West Concord, Massachusetts