book reviews

considerable research in and which plays a major role in the preparation and investigation of inorganic compounds. All contributions are generally readable. The format and printing show good quality, and there are very few typographical errors.

This book will appeal primarily to research chemists, but will also be useful as a reference text in advanced or specialized chemistry courses.

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Molten Salts Handbook

George J. Janz, Rensselaer Polytechnic Institute. Academic Press, New York, 1967. 588 pp. Figs. and tables. $25.

This volume is the culmination of several year's work by Professor Janz and a large number of his graduate students and post-doctoral associates. It attempts to provide for the reader a fairly complete tabulation of all data collected for molten salt systems up to the mid-1960's and summarizes or cites several thousand literature publications.

The information in the book has been organized into five main classifications: Physical Properties, Thermodynamic Properties, Electrochemical Properties, Spectroscopy and Structure, and Practical Features. A sixth section is devoted to experimental techniques and includes illustrations of typical fused salt apparatus and a bibliography of source papers on the subject. Each of the five main sections consists of tables containing variously raw data, smoothed data in equation form, qualitative descriptions of results, or merely a note that the property has been investigated for a particular system. The original literature references are given in all cases.

A critical assessment of available data has been performed and "best value" equations computed for density, viscosity, surface tension, refractive index, and electrical conductance of single salt melts as a function of temperature. Other data are taken directly from the literature. Many of the data tables have been borrowed from other review sources. In these cases results reported subsequent to the original compilation are given in separate, supplementary tables. Consequently in searching for a piece of information the reader may have to consult all of the tables in a given section, an obvious inconvenience. Data retrieval is facilitated, however, by a complete listing of all tables in the table of contents and by a chemical compound index at the end of the book.

Depending upon the property under consideration, the literature survey terminates in most cases anywhere between 1964 and 1966. It would have been helpful if the dates of termination of the literature surveys had been listed with each table; at the moment the only way to estimate this is to scan through the list of references following a table and pick out the most recent entries, a procedure that can occupy several minutes for some of the longer tables.

A spot check by the reviewer of several tables showed that very few important references had been missed, although there were a few conspicuous omissions. For instance, the conductance data for KCl, NaCl, LiCl, and KI of Van Artsdalen and Yaffe (*J. Phys. Chem.*, **59**, 118 (1955)) are referenced in the tables of single salt melt conductances, but the conductances of mixtures of these salts reported in the same article are not cited in the table of binary system conductances.

In spite of the minor deficiencies in "Molten Salts Handbook," this reviewer very strongly recommends its acquisition by anyone actively pursuing research in this area. He has had it on hand in his own laboratory for several months and has found it to be tremendously useful as a quick and convenient reference source both for data and for literature references. Professor Janz and his group are to be congratulated for the excellent job they have done in this ambitious undertaking. It is hoped they will continue with this work and issue revisions or supplements at regular intervals.

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Experimental Electronics. An Introductory Laboratory Manual for Physical Scientists

Richard J. Higgins, University of Oregon, Eugene. McGraw-Hill Book Co., New York, 1968. xvii + 186 pp. Figs. and tables. 21.5 × 28 cm. $4.50.

The challenges of preparing our students to intelligently select and critically use the products of a continuing instrumentation revolution persist, as the variety and complexity of available instruments and methods grow. Although a balanced response to these challenges requires an instructor to proceed well beyond the confines of a brief introduction to electronics, an approach to "chemical instrumentation" from the *perspective* of electronics is more than superficially attractive. An increasing number of "Electronics for . . ." texts are available to provide a foundation for this approach; however, despite a consensus view that some sort of laboratory experience is a necessary counterpoint to a textbook introduction to electronics, there has been a dearth of collected experiments to accompany the newer texts.

Higgins' "Experimental Electronics" is a welcome collection of 32 experiments in instrumentation electronics. The topics investigated are: dc measurements, including a Thevenin "black box" and the potentiometer (in all, 3 experiments); ac measurements, including resonant circuits and transient response (3 experiments); diode characteristics, rectification and filtering in power supplies, modulation and detection (4 experiments); vacuum triode amplifiers, both inverter and follower configurations (2 experiments); transistor characteristics and transistor amplifiers, including a dc differential amplifier, a power amplifier, and a lock-in amplifier (5 experiments), the SCR (1 experiment); operational amplifiers, including basic operations, analog simulation of a damped harmonic oscillator, and OA voltage regulation (4 experiments); oscillators (3 experiments); digital circuits, operations, and instruments (6 experiments); and last, transmission lines (1 experiment). Each of the experiments requires between one and three hours of work in the laboratory. The level of understanding and capacity for analysis demanded of the student are consistently high, yet not excessive; to encourage development of the student's initiative and judgment, the author provides much less detailed outlines of approaches and techniques for later experiments than for the introductory ones. The reviewer's students (juniors in chemistry), who have done fifteen of these experiments, *inter alia*, in their instrumentation course this year, have responded very favorably to Higgins' style and approach.

The experiments offered by the author are designed to accompany J. J. Brophy's "Basic Electronics for Scientists" (reviewed March, 1967, in THIS JOURNAL); Higgins' study problems (there are two to five for each experiment) are keyed to this text, and frequent references to it appear. The experiments themselves are of course compatible with other texts which offer comparably analytical treatments of the same topics.

With the exception of the operational amplifier and digital operations experiments, Higgins' manual is not tied to the test instruments or breadboard scheme of a specified manufacturer, although it might be noted that Hickock Teaching Systems, Inc. of Cambridge, Mass., has developed a complete set of laboratory equipment to implement this collection of experiments. To provide a modular approach to OA and digital instrumentation, however, the author has written these sections specifically for use with Philbrick's RP manifold and either the Hickock Logic Trainer or the Digital Equipment Corporation Logic Laboratory. Higgins notes that other choices are possible; the instructor exercising this option (choosing perhaps the lower-cost DEC "Computer Lab" for the digital experiments) will probably prefer use of the manufacturer's suggested experiments to the task of revising Higgins.

An instructor's guide, containing detailed component and instrument recommendations, many suggestions for modification of experiments or their adaptation to a demonstration format, and teaching hints from the author's experience, accompanies the manual. It should be particularly useful to an instructor approaching the problems of launching an electronics laboratory for the first time, and even old hands will find something new in this supplement.

This collection of experiments should interest all who seek to teach instrumentation electronics; in its coverage, its depth, and its style, it is an excellent contribution. Instrumentation practice in chemistry is well beyond its scope, but instructors should find that experiments selected from it provide a solid foundation