cent'' includes the confusing statement: ''The number 1 is 100%.'' As used, this statement is correct *before* the decimal point is shifted, but not *afterward.*

The discussion of slide-rule errors in the chapter on that subject could be improved to bring out more fully the limitations of the commonly used slide rule. The statement that ''slide-rule answers are accurate but not exact'' is hardly sufficient. In fact, the authors would have done well if they had included a brief chapter, written in their interesting style, on the usually dry subject of measurement, tolerances, precision, accuracy, and limits-of-error. Such terms as ''exact'' and ''accurate'' mean little in engineering unless carefully defined. No mention is made of calculating machines as used for mathematical work in which slide-rule errors would be too large to tolerate.

The abbreviations of terms do not in some cases follow the recommended practice of the American Institute of Electrical Engineers—for example, a-c should be used instead of a.c.

The errors and inconsistencies appear to be few indeed for a first edition, and both books are likely to be popular with many eager students.

I. MELVILLE STEIN
Leeds & Northrup Company, Philadelphia

Infrared and Raman spectra of polyatomic molecules. Gerhard Herzberg. New York: D. Van Nostrand, 1945. Pp. xiii + 632. (Illustrated.) $9.50.

This comprehensive treatise constitutes the second of a series on molecular spectra by a competent writer and will be cordially welcomed by all who have a serious interest in this field. It is, however, primarily a book for the specialist, and for its enjoyment a reasonable previous knowledge of the subject is a prerequisite. The extent of the material covered and the adequacy with which it has been treated may be judged by the 978 literature references and the complete subject index of 65 pages, which greatly enhance the value of the book as a reference.

The organization of the book is very logical, though possibly at the expense of introducing certain pedagogical difficulties, since the phenomena to be explained and their interest and relation to other knowledge do not become fully evident until the later chapters. In the Introduction a discussion of the symmetry properties of molecules is immediately presented, greatly facilitating the later discussion. Chapters I and II, which deal with Rotation and Rotation Spectra, and Vibrations and Vibrational Energy Levels, respectively, are primarily a theoretical discussion of the arrangement of the energy levels of molecules, of their degeneracy, and of their symmetry properties. The treatment is very complete, and, as in other sections of the book, alternative approaches to a given subject are often presented. In many cases proofs are not given, which occasionally seems unfortunate. For the reader who is not interested in theory for its own sake it may appear that undue

space is devoted to some particulars which will seldom, if ever, be observable by experiment.

It is not until Chapters III and IV that the significance of much of the preceding discussion will become evident to the reader who is not fully conversant with the subject. For many readers the main value of the book will lie in these chapters. In Chapter III, after an introduction to Vibrational Infrared and Raman Spectra, an exhaustive and critical review is given of existing data on all molecules up to the twelve-atomic. The unsatisfactory condition of certain analyses is pointed out, and this section should prove stimulating in its suggestions for future work. Chapter IV deals with the Interaction of Rotation and Vibration and is adequately illustrated by representative examples of vibration-rotation spectra. The collections of molecular constants obtained from rotational analyses will be useful for eference. Chapter V, which concludes the book, deals with the applications of molecular spectroscopy and is comparatively brief. It may prove somewhat disappointing to certain readers. Had it been more comprehensive, the need for the book itself would have been more evident.

The scope of the book and its possible relation to future applications of spectroscopy is naturally restricted by the fact that it deals with molecules of a limited size, for which a more or less complete analysis of the spectrum can be anticipated. This is illustrated by the fact that the most significant spectroscopic investigations on intramolecular hydrogen bonding have not been mentioned, and that other qualitative, though important, applications of spectroscopy have not been covered.

It is unfortunate that it was necessary to print this book in a type which is at best too small and, in very considerable sections, so small as to be a very severe strain on the eyes.

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Uranium and atomic power. **Jack De Ment and H. C. Dake. Brooklyn: Chemical Publishing Co., 1945. Pp. x + 343. $4.00.**

The uranium atom, possessing as it does extraordinary chemical as well as nuclear properties, is a difficult subject for a book. The usual procedure is to stress either the ordinary chemical properties of such an element or its nuclear or radioactive properties, but not both. The present volume does not deviate in this regard. It is far more concerned with the chemical properties of the element than with the properties of its nuclei, though it pays extended attention to some of the more recent and spectacular results. One finds a considerable increase in emphasis on the atomic energy in contrasting this second edition with the first edition, which is understandable.

As a chemical treatise, this volume is extraordinary. It reports in some detail a considerable number of facts about uranium and uranium ores which are normally omitted in standard reference volumes. For this reason, it has some real interest. On the other hand, the chemistry is rather incomplete and unsystematic. No serious attempt is made to correlate the properties of uranium with the neighboring elements of the periodic table, and great stress is laid on certain less fundamental properties, such as the fluorescence of uranium salts.

On the whole, this volume is a sort of collection of bits of information about the ordinary chemical and mineralogical properties of uranium compounds, with a considerable amount of rather heterogeneous writing about the more spectacular nuclear properties of the element. The title of the volume is misleading, because little of an authoritative nature is said about atomic power.

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Kilgore-Magnuson Bill

(*Continued from p. 230*)

DEFINITIONS

SEC. 12. As used in this Act—

(a) "Research and development" means theoretical analysis, exploration, and experimentation in any field of science (including but not limited to the mathematical, physical, biological, medical, engineering, and social sciences), and the extension of investigative findings and theories of a scientific or technical nature into practical application, including the experimental production and testing of models and processes.

(b) "Federally financed research and development" means research and development conducted directly by the Federal Government and all other research and development financed in whole or in part directly by the Federal Government from funds designated for research and development, under a contract, grant, or other direct form of financial assistance for research and development.

(c) "Government agency" includes departments, independent agencies and commissions, corporations, and other instrumentalities of the Federal Government.

(d' "Organizations includes State and Local government agencies, corporations, partnerships, nonprofit institutions, and individuals.

(e) "Scholarships and fellowships" means stipends covering tuition and other fees, and such living, travel, and other expenses as the Administrator may determine.

Scanning Science—

At a meeting of the New York Section of the American Chemical Society it was announced that several steel and iron companies in this country have already established very complete micrographic laboratories, where in three hours an accurate determination of the condition of any specimen of the daily output may be secured.

—7 February 1896