important defects which appear in crystalline solids. If these words have their usual meaning, I find it difficult to believe that the content of the first 108 pages is necessary. If, on the other hand, this book is intended to be an introduction to thermodynamics for people interested in metallurgy, then I consider it to be inadequate, misleading, and replete with abbreviations which can only cause confusion. For example, on page 3, the First Law of Thermodynamics is introduced but neither heat nor internal energy is defined in terms of mechanical processes. It has always been my experience in teaching thermodynamics that great care must be exercised in making the First Law clear and not just superficially acceptable. Similarly, there are many pages devoted to essentially trivial thermodynamic manipulations, if the student has had previous exposure to them, but mysterious thermodynamic manipulations if this is a first course. In an amusing error, on page 52 of Chapter 3, we learn, much to our surprise, that G. N. Lewis was an active scientist during the latter half of the nineteenth century. I am sure that this would have been surprising to Lewis himself.

There are parts of the book which I feel will be of value to metallurgists. Certainly the emphasis on examples of thermodynamic processes using inorganic reactions, the discussion of the quasi-chemical approach to solutions, the interpretation of phase diagrams, etc. will be of use. I cannot escape the feeling, however, that a more thorough treatment would have been of much greater value.

Determination of Organic Structures by Physical Methods, Volume 2. F. C. Nachod and W. D. Phillips, eds. 771 pp. Academic Press Inc., New York, 1962. $16.00. *Reviewed by D. M. Coulson, Stanford Research Institute.*

THE use of physical methods in the determination of the structure of organic molecules has developed rapidly in the past eight to ten years. This book contains an excellent coverage of several instrumental methods of organic-structure analysis with chapters on each by recognized authorities. The fields that are covered are optical rotary dispersion, infrared and Raman spectra, electronic spectra, nuclear-quadrupole-resonance spectra, NMR, and EPR. In each field, there is a limited discussion of the theoretical background, delving deeply enough to capture the interest of the theoretician. The description of instrumentation is generally brief and incomplete. An attempt is made in each chapter to demonstrate the applicability of a physical method of organic determination, mainly through examples. NMR and EPR are covered more completely, with contributions from several authorities in their fields, than are the other topics.

For a thorough appreciation of this compilation, a strong background in physical organic chemistry is needed. The combined use of the techniques described in the several chapters of this book for the solution of a single organic structural problem is not as adequately

treated as might be inferred from the title. The reader is left with the problem of determining which physical method to apply to the solution of a real problem. There is little indication in the individual chapters that these methods should be used in conjunction with one another. This book should be most useful for college seniors and graduate students in a survey course and as a reference book for practicing analytical and organic chemists.

Ultrasonic Physics (2nd ed.) By E. G. Richardson. Edited by A. E. Brown. 313 pp. American Elsevier Publishing Co., Inc., New York, 1962. $5.50. *Reviewed by Richard V. Waterhouse, The American University.*

THIS is a revised and slightly enlarged edition of a book which first appeared in 1952. The author, who died in 1960, was professor of acoustics at Durham University in England. His name is well known in this field and he has written other books on acoustics. The author chose the new material for the present volume, and drafted a large section of the new manuscript. The editor, formerly his assistant, prepared the manuscript for the press and in a very few instances filled "a remaining gap in the text".

The main topic of the book is the use of the ultrasonic interferometer in the experimental study of the vibrational and other properties of matter. No industrial applications are considered. The coverage is wide; the interferometer and its use are described, and this is followed by a discussion of the propagation of ultrasound in solids, liquids, disperse systems, and gases.

The author gives a fairly brief, over-all survey of experimental work in this field, avoiding a profound treatment of individual topics. Thus the book is in no way a rival of the more specialized treatises by Herzfeld and Litovitz on propagation in fluids (*Absorption and Dispersion of Ultrasonic Waves*, Academic Press, New York, 1959), and by Mason on propagation in solids (*Physical Acoustics and the Properties of Solids*, Van Nostrand, New York, 1958). Oddly enough, neither of these two authoritative works is mentioned in the present volume; nor is the excellent book by Vigoureux (*Ultrasonics*, Wiley, New York, 1951).

The new material in this edition consists chiefly of a chapter on the application of ultrasound to studies of the critical and other transition states. Papers dated 1952 and later account for about a quarter of the 400-odd references listed at the ends of the chapters of the book.

In discussing the theory of relaxation, which is of central importance in the matter of ultrasonic propagation in fluids, the author takes an unusually guarded position. He refers to the existing theory as "a purely a posteriori" hypothesis, and implies that its general correctness has not been established. This section of the book is carried forward without change from the first edition, and reads rather strangely in 1962 when most authorities consider the general theory of relaxation well established.