

chapter reviews the present knowledge of the internal structure of the earth. In the following pages the authors plunge into the main subject. They describe in detail the gravitational field and the shape of the equilibrium ellipsoid, they discuss gravity measurements, and they treat in detail the reduction of the measurements, departures from equilibrium, isostasy, and physical geodesy. The final chapters are on the convection currents postulated in the interior, and on the migration of the poles.

Both authors are certainly among the outstanding authorities on the subject of the book. Their treatment of the parts pertaining to their specialties is complete and well done. One of the authors, Vening Meinesz, has designed a widely used gravity meter of excellent accuracy and stability which is described, among other instruments. However, the authors do not seem to have agreed on a notation. For example, the Newtonian constant of gravitation, known to physicists as G , is defined on page 34 as k^2 but on page 119 as k , and later k is used as an elastic constant. Furthermore, in spite of the long chapter in which the authors describe internal convection within the earth, and regardless of the fact that the authors are well aware that geomagnetism is currently attributed in large part to irregular convection currents within the earth, they seem to accept without challenge the proposition that the magnetic poles and the poles of rotation are closely connected, and that because the earth's magnetism, as indicated by rocks, has varied during geological history the poles of rotation have wandered accordingly. The point is not whether the poles have or have not wandered; but that the evidence on which the supposition of wandering is based seems to be far from conclusive.

Otherwise the book is certainly an excellent one, containing much authoritative information and describing in detail many of the phenomena concerned. It is an excellent text and reference book, and should be on the bookshelf of every geophysicist.

Thermodynamics of Gases. Vol 12 of *Handbuch der Physik*. Edited by S. Flügge. 686 pp. Springer-Verlag, Berlin, Germany, 1958. DM 154.00 (subscription price DM 123.20). *Reviewed by Stuart A. Rice, Institute for the Study of Metals, University of Chicago.*

In the last fifteen years there has been a renewal of interest in the molecular theory of dissipative processes, largely stimulated by the work of Kirkwood and Born and Green. In keeping with this interest, sixty-five percent of this volume of the *Encyclopedia of Physics* deals with the kinetic theory of gases and the statistical mechanics of fluids. The first article, by J. S. Rowlinson, treats the thermodynamics of real gases in a clear and precise manner with good illustrations and with actual data. The article is not as detailed or as complete as that by Beattie. The last two articles by Jaekel and Alpert, respectively, deal with the experimental details of vacuum technique.

The major portion of the volume is in three articles. Waldmann gives a clear and workmanlike presentation of the Chapman-Enskog theory of gases. The material is well presented but invites an unfortunate comparison with the book by Hirschfelder, Curtiss, and Bird which is, of course, much more complete. From the point of view of this reviewer the best articles in this volume are by Mayer and by Grad. Mayer's article contains a detailed discussion of the theory of fluids in the gaseous and liquid regions for both the classical and quantum mechanical cases. The text is illuminated with several carefully worded physical arguments which do much to improve the presentation (cf., p. 171). In addition much material on the theory of liquids previously available only in the journal literature is collated and systematically integrated into the general presentation. Grad's article is simultaneously the most interesting and the most frustrating of the contributions. The author immediately comes to grips with the question of the introduction of irreversibility and the meaning of the H -theorem. The discussion is perceptive and physically illuminating. However, many of the arguments are augmented by analysis to which the almost invariable reference is "not yet published". In an article of this length (88 pages) a few more pages giving the analysis would have been very welcome and very much in place.

The articles by Mayer and Grad have either new material or collations and interpretations that are new and provocative, whereas other articles seem to cover fairly well-worn ground. The major value of this volume would appear to be as a convenient collection of most of the aspects of gas theory, but more detailed accounts are available for several of the topics.

Light and Matter II. Vol. 26 of *Handbuch der Physik*. Edited by S. Flügge. 965 pp. Springer-Verlag, Berlin, Germany, 1958. DM 168.00 (subscription price DM 134.40). *Reviewed by L. Marton, National Bureau of Standards.*

Four contributions constitute this volume of the *Encyclopedia of Physics*, three short ones in English and one very long one in French. The three shorter ones in order of appearance are: Luminescence by F. G. J. Garlick, Temperature Radiation of Solids by F. A. W. Rutgers, and Raman Effect by San-Ichiro Mizushima. They are followed by a much longer contribution written by Jean Lecomte on Infrared Spectroscopy. This longer contribution is so voluminous it could have been worthwhile to issue it separately as an individual monograph on the subject. It alone comprises almost 700 pages out of 965 allotted to the volume. The volume actually is even more voluminous than it appears from the number of pages. 965 pages is already substantial, but in fact, an enormous amount of material has been compressed into it using two sizes of type. A sizeable part of the material, particularly in the Lecomte contribution, is printed in smaller type. I don't recall having seen this type before

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By ROBERT L. WEBER, MARSH W. WHITE, and KENNETH V. MANNING, all at The Pennsylvania State University. Third Edition. In Press.

A substantial revision of the successful liberal arts physics text. Although the conventional approach to the subject is retained, new emphasis is placed on modern physics in this edition, and the two chapters in the previous edition on the subject have been expanded to four chapters in the revision. Calculus is not required for this book, although it lends itself well to courses in which calculus is studied concurrently.

in any other volume of the *Encyclopedia of Physics*. It may not be very attractive, but it is useful.

F. G. J. Garlick's contribution on luminescence starts with a paragraph containing "the definition of luminescence". Surprisingly enough the definition is almost entirely negative. The author starts with a relatively positive definition but immediately follows with a statement which implies that he doesn't accept this definition. He then attempts to delineate the subject by stating what is *not* luminescence. Except for reservations concerning negative definitions, I don't have very much criticism. The article is a good scholarly presentation of almost everything that is known about certain luminescence phenomena. The presentation is essentially limited to the production of physical luminescence and stays away from bioluminescence and similar phenomena. The article takes up 128 pages and contains both experimental and theoretical information.

In the 40-page contribution on temperature radiation of solids by G. A. W. Rutgers, the author concentrates mostly on black-body radiation, radiation laws, and black-body conditions. There is a discussion of the radiation constants and of international temperature scales which partially duplicates the DuMond-Cohen contribution in another volume of this series. The chapters on radiation from metals and from nonmetals give a good survey of their properties.

San-Ichiro Mizushima discusses the Raman effect in the following chapter, which is a careful exposition of experimental and theoretical results. The 70 pages are devoted to an introduction and experimental techniques, to the vibration of molecules, vibrational spectra, rotational spectra, vibrational rotational spectra, Raman effect in the liquid and solid states, and the calculation of thermodynamic functions from spectroscopic data.

As mentioned before, the longest chapter is that of Jean Lecomte on infrared spectroscopy. About 70 pages at the beginning are devoted to experimental details, specimen preparation, types of instruments, and what precautions to take in making measurements, followed by 17 pages of general remarks on absorption and reflection spectroscopy in the infrared. These remarks are very worthwhile and point out the usefulness of infrared spectroscopy for chemical analysis. The author carefully notes how cautious one has to be in interpreting the spectrum. The remaining 600 odd pages are taken up by descriptions of the individual spectra of innumerable organic or inorganic compounds. Here I am inclined to draw the line. I think that a good part of the material presented here does not properly belong in the *Encyclopedia of Physics*. I do not believe it is the task of the *Encyclopedia of Physics* to present absolutely everything known under the sun. I doubt if the average reader would be interested in the spectrum of methyl-1-hydroxy-10-phenanthrene-9-methyl carboxylate or of that of poly- γ -methyl-L-glutamate-DL-phenylalanine. One may even question whether the contents of a good

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part of this contribution do not belong more in a handbook of physical chemistry than in the *Encyclopedia of Physics*. The last two chapters, which are relatively short, contain matters of more physical interest. One is on absolute intensities of bands or of absorption rays in the infrared and, last but not least, dispersion in the infrared spectrum. All this criticism does not mean that the book's contents are not worth your attention. The volume is scholarly, put together by the best authorities in the field; particularly, Prof. Lecomte's authority in his own field is incontestable. It is merely a question of viewpoint which I am raising regarding the amount and type of material that should be concentrated in a volume of this kind. This in no way diminishes the value of this excellent book and full praise should be given both for the beautiful presentation and for excellent judgment shown in the choice of the contributors.

Metallurgical Thermochemistry (3rd Revised Edition). Vol. 1 of Internat'l Series of Monographs on Metal Physics & Physical Metallurgy. By O. Kubaschewski and E. L. Evans. 426 pp. Pergamon Press, London & New York, 1958. \$10.00. Reviewed by Cyril Stanley Smith, *Institute for the Study of Metals, University of Chicago*.

This is the third edition of this important work, with small but significant changes from the first edition of 1951. (The increased bulk of the book is mostly a result of larger type and thicker paper.) Its most valuable feature is the extensive and up-to-date tabulation of thermodynamic constants for metals and simple inorganic compounds. It also provides a remarkably good summary of thermodynamic theory and experimental methods as applied to metallurgical problems, with specific examples. It is essential to a metallurgist and will be useful to many others who have problems in the field of chemical thermodynamics.

Tables of Modified Quotients of Bessel Functions of the First Kind for Real and Imaginary Arguments. By Morio Onoe. 338 pp. Columbia U. Press, New York, 1958. \$12.50. Reviewed by J. Gillis, *The Weizmann Institute of Science*.

Given any sequence of cylinder functions $C_\nu(z)$, modified quotient functions of two types are defined by $zC_{\nu-1}/C_\nu$ and $zC_{\nu+1}/C_\nu$ respectively. In this book modified quotients of both types arising from Bessel functions of the first kind are tabulated. The range of orders is 1 (1) 16, and functions are listed for both purely real and purely imaginary arguments covering, in each case, the range 0(0.01)20.00.

It is difficult to imagine that the usefulness of these tables can ever be comparable with the work and expense which have evidently gone into their production. When such quotients are needed in a calculation on an automatic computing machine, it will nearly always be more efficient (and less costly in storage