

NEW PHYSICS BOOKS

⊕ PLENUM PRESS HANDBOOKS OF HIGH-TEMPERATURE MATERIALS, NOS. 1 & 2

NO. 1 — MATERIALS INDEX

by Peter T.B. Shaffer. Foreword by Dr. Henry Hausner. HANDBOOK NO. 1 offers data on the general, chemical, electrical, mechanical, nuclear, optical, structural and thermal properties of approximately 520 refractory materials arranged under each material. Contains a bibliography of 690 references to the literature on refractory compounds.

772 pages ⊕ \$17.50

NO. 2 — PROPERTIES INDEX

by G.V. Samsonov. Foreword by Dr. Henry Hausner. HANDBOOK NO. 2 presents a scientific classification of 600 refractory compounds systematically arranged by the following properties: crystal-chemical, thermal, thermochemical, electrical, magnetic, optical, mechanical, chemical and refractory. An invaluable appendix provides the most up-to-date phase diagrams of systems in which refractory compounds are formed. Contains a bibliography of over 1300 references to the literature, much of which is to Soviet work comparatively unknown to Western workers. Translated from Russian.

Approx. 400 pages ⊕ \$22.50

SOVIET MASER RESEARCH

Edited by Academician D.V. Skobel'tsyn. Reports of four coordinated researches into the theory and applications of masers for frequency standards conducted at the P.N. Lebedev Physics Institute under the guidance of Academician A.M. Prokhorov. Reports are: A Theoretical Study of the Frequency Stability of a Maser; Investigation of the Characteristics of Masers $U=3$, $K=3$ in ammonia $N^{14}H_3$; Theory of the Hyperfine Structure of the Rotational Spectra of Molecules; and The ND_3 Maser. Transactions (Trudy) No. 21. A Special Research Report. Translated from Russian. Over 200 pages ⊕ \$27.50

Contents on request



CONSULTANTS BUREAU
⊕ PLENUM PRESS

227 W. 17th St., N. Y., N. Y. 10011

There are chapters on vectors, matrices, linear equations, eigenvalues and eigenvectors, and tensor algebra. If the work should run to further editions, one would welcome the addition of a section on relaxation procedures, at least sufficient to enable the research worker or student to know where to look for more detailed accounts and what to seek in them.

Foresight and Understanding. An Enquiry into the Aims of Science. By Stephen Toulmin. 115 pp. Harper & Row, New York, 1961. Paper \$1.15.

Reviewed by R. B. Lindsay, Brown University.

The scientific method, when looked at critically, is susceptible of many interpretations, and this makes the philosophy of science a subject of never-ending fascination and a copious source of literature. The volume under review, whose author is a well-known philosopher and historian of science, originated in the thirty-fourth series of Mahlon Powell lectures at Indiana University in 1960. The aim of the book is to consider the central question: what makes a scientific theory, idea, or investigator successful?—in short, what is the meaning of success in science? This program is carried out in three phases: (1) the demolishing of the view that the purpose of science can be epitomized in a single phrase, (2) stress on the importance of "ideals of natural order" in the development of scientific explanation, and (3) introduction of the biological analogy of "survival value" as a test of the worth of a scientific idea.

The plan is attractive and the author's development of it is learned, vigorous, and persuasive. His style is pleasant and his illustrations appealing. If he fails to convince in every respect, it is partly because the magnitude of the task far outruns the space at his disposal. Yet his judgments throughout are highly suggestive and bear close examination. In his first phase, he attacks specifically the rather widely held pragmatic view that the principal purpose of science is to predict experience, and that our confidence in it as a worthwhile activity rests on the success with which it carries out this purpose. He then pro-

ceeds to note that different ages inevitably develop different views as to what concepts or "ideals of natural order", as he calls them, are genuinely fruitful; several plausible illustrations are presented from the history of physics and chemistry. Finally, the author draws an analogy between the evolution of scientific theories and biological evolution: scientific ideas survive by a kind of natural selection.

All this makes interesting and suggestive reading. But it leaves many questions open. In the last analysis, a scientific theory is really only a way of talking about a part of our experience, of such a character that it makes us feel we understand it; and if history teaches us anything definite about this, it is that it is a rather arbitrary process in which preference and taste enter decisively. The author's examples illustrate this very well, but emphasis on the point itself seems to be lacking. The same is true of the closely related problem of the extent to which scientific explanation is invention rather than discovery.

But, cavils aside, this is a very stimulating book and should be read by all physicists who have any interest in the foundations of their science.

Entropy. The Significance of the Concept of Entropy and Its Applications in Science and Technology (2nd ed.) By J. D. Fast. 313 pp. McGraw-Hill Book Co., Inc., New York, 1962. \$10.75.

Reviewed by Joseph G. Hoffman, State University of New York at Buffalo.

The broad title, *Entropy*, may be misleading because this book deals with what might be called, for lack of better terminology, ideal entropy. The preface points out that there is no reference to the thermodynamics of irreversible processes and the accompanying production of entropy, or to the entropy concept in information theory. Therefore, since there are many new and interesting developments in these latter fields, it is desirable to specify the approach to entropy taken.

It deals primarily with the ideal entropy of reversible systems in equilibrium states. The first chapter describes the entropy concept in classical thermodynamics. Chapter 2 presents essentially statistical definitions. Here, the quantum state is introduced and examples discussed such as the specific