The earlier chapters of the book detail those specification requirements for pure metals and non-metals used in the production of semiconductors, or in high-purity metallurgy. Compared with these technical limits are the quoted sensitivities of the available methods of analysis. It is pointed out that much work remains to be done for the case of ultra-pure metals, because an extensive gap still exists between the sensitivity of available methods of analysis and the exacting requirements of the consumer.

The general impression one gets of this volume is that a tremendous amount of analytical information has been compressed into small compass, but the picture presented of the general trend in Soviet analytical chemistry will, undoubtedly, prove of the greatest interest to European chemists. As an analytical reference book it will be, undoubtedly, in considerable demand, and will in many instances provide sufficient laboratory instruction to satisfy the trained analyst. In other cases, its value will rest in directing the attention of analysts to more detailed original papers. D. T. Lewis

HIGH MAGNETIC FIELDS

High Magnetic Fields

Proceedings of the International Conference held at the Massachusetts Institute of Technology, Cambridge, Massachusetts, November 1–4, 1961. Edited by Henry Kolm, Benjamin Lax, Francis Bitter and Robert Mills. Pp. xv+751. (Cambridge, Mass.: Massachusetts Institute of Technology Press; New York and London: John Wiley and Sons, Inc., 1962.) 113*s*.

THE generation of high magnetic fields has become a major technological problem common to many branches of physics, and is at present exercising the resources and ingenuity of an increasing number of physicists, engineers, and mathematicians. About 900 of these attended the first International Conference on High Magnetic Fields held at the Massachusetts Institute of Technology in November, 1961. The eighty-eight papers presented in eleven sessions on the production and application of high magnetic fields in plasma, solid-state, nuclear, and low-temperature physics are collected together in this volume. The three sessions on biological effects of magnetic fields have not been included and will be published instead in appropriate journals.

The original order of the papers has been rearranged and divided into four parts. Part 1 consists of forty papers on the generation of high magnetic fields. The latest work on the theoretical design of both normal and 'force-free' coils, and on the techniques of measuring high fields, is followed by a section on d.-c. magnets and their power supplies, including recent work on water-cooled solenoids, cryogenic magnets, auxiliary use of iron, and the design of homopolar generators. In the papers on pulsed magnets the emphasis is on the production of pulsed fields of long duration, and on methods of flux concentration, including a description of the implosion technique of attaining fields greater than 10^7 oersteds. The section also includes a paper summarizing methods of storing and transferring energy. Part 1 concludes with accounts (some prepared on the eve of the Conference) of the first magnets constructed from the new high-field super-conducting alloys Nb-Zr and Nb_3Sn, together with a paper on the magnetic radiation shielding of space vehicles.

Part 2 is devoted to accounts of high-field research programmes at nine laboratories in Britain, the United States, Japan, Holland, and Poland. Part 3 consists of twenty-six papers on solid-state and low-temperature physics in high magnetic fields covering resonance and oscillatory phenomena, magnetism and transport phenomena, and the latest measurements on high-field superconductors, including the announcement that V-Ga may remain superconducting up to fields of order 500 kilogauss. Finally, in Part 4 there are thirteen papers on applications of high magnetic fields in plasma, fusion, and nuclear physics, and a theoretical paper on the non-linear quantum electrodynamic phenomena that should be observable in ultra-high fields.

With few exceptions, the authors have written for those already familiar with the previous work and general background of the subject. The emphasis throughout is on latest ideas; introductions and summaries are kept to a minimum and the papers are designed to be read in close conjunction with their references. This absence of explanatory introductions, together with the omission of many of the diagrams and photographs shown at the conference, has considerably reduced the value and clarity of many of the papers. There are no abstracts, although a list of these appeared in the Conference programme, and no attempt was made to record the questions and discussions which followed each paper. Many will also regret the omission of the biological papers, which provoked considerable interest and controversy when presented.

For these reasons, this volume does not provide a very satisfying record of the Conference. In spite of its shortcomings, however, it is a collection of papers of considerable value, providing a unique guide to the present-day trends in high magnetic field research, and will form a useful source-book for workers in this field for several years. P. F. Smith

MATERIALS AT LOW TEMPERATURES

Properties of Materials at Low Temperature (Phase 1)

A Compendium. Edited by Victor J. Johnson. Pp. 508. (London and New York: Pergamon Press, 1961.) 200*s*.

OVER the past few years the scope of work at very low temperatures has so broadened that today there are engineering and even large-scale industrial applications of temperatures and techniques which a short time ago were thought of only in terms of academic research. The change has been one not only of scale but also of point of view, as can clearly be seen from the present volume, compiled by members of the U.S. National Bureau of Standards Cryogenic Engineering Laboratory, and intended to be the first of a series providing rapid reference to data on the physical properties of materials at low-temperatures. The information is presented in the form of boldly drawn graphs, together with selected numerical values. The substances, the properties of which are given, are treated in a standard manner, as if they were all of equal importance, and the emphasis is on quick reference rather than high accuracy, even where tables of more precise data are available.

The volume is issued in the form of a very stoutly bound book of loose-leaf data sheets, which can be replaced or supplemented as new information becomes available. Part 1 covers ten selected properties—including density, thermal conductivity, specific heat, vapour pressure and viscosity—of the principal cryogenic fluids, while Part 2 covers the thermal expansion, thermal conductivity, specific heat and enthalpy of various solids, chiefly metals and alloys. Part 3 consists of a very useful cross-indexed bibliography. It has to be said that although the volume brings together a great mass of data, the method of presentation decidedly limits its usefulness. For example, the vapour pressure of liquid helium is given in a single semi-logarithmic plot, together with a short table of values at equal intervals of temperature. The boiling point and lambda point are not given, and the tabulated values are too widely spaced for use in accurate thermometry. It is only fair to say, however, that though the editor expresses the hope that the volume will be of value to research workers, it is primarily intended for the design engineer with a