Physical Adsorption of Gases" (by S. J. Gregg) are included. Colloids are represented by three long contributions: "Aggregation in Surfactant Systems" (by Per Ekwall, I. Danielsson and Per Stenius), "Theory of Homogeneous Nucleation from the Vapour" (by G. M. Pound, K. Nishioka and J. Lothe) and "Hydrosols" (by D. H. Napper and R. J. Hunter). Each contribution is well provided with references (mainly very recent) and a comprehensive list of headings of sections and subsections. The latter will be much used since no subject or name index for the volume is included, indices for the series being collected in the index volume.

The choice of topics would seem at this time to be wise but undoubtedly will require modification in further volumes. Some of the shorter articles are considerably condensed and designed for the specialist rather than the new worker in the field, but, on the other hand, the chapters on membranes and surfactants are of more general character and more suited to the general reader. The final 60-page chapter on hydrosols is a comprehensive advanced treatment, which includes the preparation and characterization of dispersions, double layer theory and colloidal stability as well as coagulation.

The book is adequately produced with clear diagrams, but its price will ensure that it occurs mainly on institutional library shelves. P. JOHNSON

Properties of Metals

Solid State Theory in Metallurgy. By P. Wilkes. Pp. xii+453. (Cambridge University Press: London, 1973.) £8.95; £3.20 paper.

THE modern student of metallurgy no longer sees his ultimate goal as "the art of working metals", to quote the dictionary, but is more akin to the physicist, or "student of nature", to quote the same source. He seeks a more basic understanding of the properties of metals and solids which make them useful to mankind, and consequently the knowledge of both the electronic and atomic structure of condensed matter is of profound importance in his studies. In a past era the area of electronic structure would normally be considered the domain of the solid state physicist, but it is encouraging to review a new book on solid state theory by a metallurgist aimed at undergraduate and graduate students of metallurgy and material science.

Dr Wilkes's book is divided into three parts. The first two parts are written so that they can be studied concurrently or independently whilst the final part draws upon the results of the previous sections. In part I, starting from the physics of the free electron, Dr Wilkes develops ideas on the behaviour of free electrons in a solid in a logical, if conventional, manner. In part II the concept of the crystal lattice is described. Lattice vibrations in, and the elastic properties of, such an idealized solid are described and compared with the properties of real materials. Lattice defects and faults are then introduced, but not dwelt upon over-long since this area is amply covered in other metallurgical texts.

There follows a section on diffraction by crystals which not only describes the theory and experimental techniques available (X rays and electrons are mentioned but, annoyingly, not neutrons) but, using Fourier methods, clearly shows that the underlying connexions between diffraction and the Brillouin zone theory are solids. This, to me, is the best section in the book.

In the final part, the theory and properties of electrons in real metals are explored through the nearly free electron and tight binding methods, introducing the ideas of pseudopotentials, pair potentials and screening on the way. The ultimate usefulness of the theory is now made evident by comparison with the structure and properties of a range of metals, semiconductors and alloys. In the final chapter the theory is applied to high energy electrons in a lattice and the consequences in electron microscopy and diffraction.

The book is written in an exciting style of new discovery indicating its obvious kinship to the lecture course which the author no doubt gave at Manchester. The text is generally well illustrated by a series of informative diagrams and photographs and each chapter ends with a comprehensive list of books for further reading though, unfortunately, there are no references to original articles or papers. Dr Wilkes says in the preface that he has endeavoured "to explain each mathematical step and omit none"—a worthy aim for an undergraduate text which is faithfully maintained throughout the book. The mathematical steps do occasionally, however, hold up the pace of the physical argument. Perhaps more mathematical appendices would have helped, but this is a minor criticism.

The level of the material presented in parts I and II should not present difficulties to first and second year undergraduate students, but some sections of part III are clearly postgraduate material. The question might then be raised as to whether any one book can satisfactorily aim at such diverse levels of experience. I believe that with guidance the able undergraduate should not find himself "out of depth" with the majority of this text, and many postgraduate metallurgists will find the book a clear introduction to an unfamiliar area of knowledge.

Taking into account the minor reservations and criticisms I have made, I still feel that the book can be strongly recommended to students of metallurgy and material science, and would make a worthwhile introduction to solid state physics for students of other disciplines.

L. GILLOTT

Scattering Theory

Quantum Theory of Scattering Processes. (International Encyclopedia of Physical Chemistry and Chemical Physics.) By J. E. G. Farina. Pp. xi+152. (Pergamon: Oxford and New York, February 1973.) £4.50.

THIS short and lucid book provides a sound introduction to the quantum theory of collisions for research workers in physics, chemistry and mathematics. Compactness has been achieved by concentrating on a small number of fundamental topics, which are illustrated with examples drawn from atomic physics. The compassionate author carefully explains each step in the algebra and even the more difficult chapters should be easily followed by a first year graduate student. Although it is necessary to abandon rigour occasionally in a book of this length, the author points out such shortcomings where they apply and his mathematics is conscientiously scrupulous in most of the text.

The introductory chapter of the book deals with the properties of important differential equations arising in collision theory and solves the problem of scattering by a centre of force using partial wave analysis and the Kohn variational method. In chapter 2 the Born series is derived *via* the free particle Green's function and the integral equation of scattering. Chapter 3 tackles problems raised by the Pauli principle and the separation of relative and centre of mass motion. Inelastic scattering and rearrangement collisions are considered in the next chapter. The fifth chapter, on formal scattering theory, begins with a treatment of some useful contour integrals and uses the results to derive the Lippmann–Schwinger equation, which is then applied to direct collisions and the scattering of a particle by two centres of force. The remaining chapters are concerned with the time dependent approach to collisions and the scattering matrix.

The fundamentals of the subject are treated thoroughly in this admirable book, but the coverage is not extensive enough, even at an elementary level, for

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