most exacting end-user. Even allowing for the space limitations there are some surprising omissions from the heat-resisting polymers; the organo-metallic compounds in particular appear to have been neglected. The chapter on composites is essentially technological, although there may be a difference of opinion as to where science ends and technology begins. There is certainly no doubt about the scientific nature of the final chapter on "Neutron Spectroscopy", which briefly outlines the theory of neutron inelastic scattering, or more basically of the binding forces in solids.

From this necessarily brief outline it is evident that the two volumes do full justice to the title. There is inevitably, as the editor admits, some overlapping of subject matter, but this is useful as giving viewpoints by different experts and in most cases based on different scientific disciplines. After careful consideration of the extensive text it is difficult to agree with the editor's claim that it will help anyone "encountering polymers for the first time to obtain a detailed understanding of the present level of appreciation of the nature of polymer behaviour in any selected field". Rather one must conclude that it is the book for the expert and those concerned with research and development in specific fields. The references in each chapter (classified alphabetically by author) give an excellent guide to the collected literature up to 1968/69. The indexes are adequate, but in view of the extent of the subject matter, a more detailed subject index would have facilitated quick reference. Inevitably the cost of these volumes is high, and must limit circulation even to libraries. Having regard to the specialist nature of each chapter it might have been more profitable alike to publisher and reader to split this enormous field, making each chapter (with perhaps a little judicious pruning) into a separate monograph. These volumes should at least find a place in every library concerned with polymer research.

V. E. YARSLEY

Nuclear Shell Guide

The Practitioner's Shell Model. By George F. Bertsch. Pp. viii+206. (North-Holland: Amsterdam and London, 1972.) Dfl. 36; $10.50.

FOR more than twenty years the nuclear shell model has been the model on which nuclear physicists have based most of their understanding of the structure of atomic nuclei, and few of us have been happy with alternative models until some understanding of their relation to the shell model has been obtained. There is an enormous variation in the degree of complexity of explanations of nuclear properties based on the shell model, which range from the prediction of spins and magnetic moments of nuclear energy levels from the quantum numbers of a single particle to the huge matrix diagonalization programmes for the configuration mixing of several particles. This book is an attempt to describe the middle ground between these two extremes where physical insight takes the place of elaborate calculation. The author is well qualified to write such a book, because he has done much with this approach.

The first two chapters give brief accounts of Hartree-Fock theory and the shell model, and of harmonic oscillator wave functions. The essentials of angular momentum theory and recoupling are presented in the third chapter. In the fourth chapter the nuclear interaction used in shell model calculations and its relation to the free nucleon-nucleon interaction are discussed. Chapter 5 is devoted to the effects of this interaction in nuclei in which only two particles (or a particle and a hole) are free to respond, while chapter 6 is concerned with configurations of several particles and the development of deformations of the nucleus. The next chapter deals with the effects of polarization of closed shells, which can alter both the effective interaction between particles, and their effective charges and moments. The final chapter discusses the information that can be obtained on shell structure from direct nuclear reactions by using the distorted wave Born approximation. At the end of each chapter there are problems with worked solutions.

The book is a valuable contribution to the subject, and the power and limitations of this approach should be understood by anyone who wants to work with detailed shell model calculations, or to teach students about the shell model. It is not in any sense a comprehensive guide to all aspects; many important areas are either completely omitted or barely mentioned. The classification of states by means of group theory has been very important, but there is no detailed discussion of it here. Pairing and the random phase approximation are omitted on the grounds that they are adequately treated elsewhere, but there is not even a proper explanation of the importance of short range forces for producing pairing; it might be thought from the remark made on page 98 that there is as much correlation of two particles in the state of maximum angular momentum as there is in the state of zero angular momentum. Within its limitations the book provides a clear and concise guide to important aspects of the nuclear shell model.

D. J. THOULESS

Neutron Activation

Neutron Activation Analysis. By D. De Soete, R. Gijbels and J. Hoste. Pp. xx+836. (Wiley: New York and London, July 1972.) £14.

THAT this large and comprehensive treatise on neutron activation analysis fills a real need is evident from the constant demand for the copies in my laboratory. The volume, the thirty-fourth in the Wiley–Interscience series of chemical analysis monographs, describes within its compass of almost 900 pages most aspects of neutron activation analysis and associated techniques.

The comprehensive nature of the work is best indicated by a brief survey of the contents. Two introductory chapters are followed by a detailed account of neutron-induced reactions and then, in chapter 4, a description of the various neutron sources—reactor, accelerator and isotopic—and of their operation. The next two chapters, dealing with the radioactivity growth and decay laws, radioactive disintegration and radiation detectors, are followed (chapter 7) by a consideration of the preparation of samples and standards. Chapters 8 and 9 describe respectively activation analysis with and without post irradiation radiochemical separation and the next two chapters discuss systematic errors and the statistical interpretation of results. Chapter 12, mainly a bibliography of the field, is followed by seven appendices containing tables of cross-sections for thermal, fission and 14 MeV neutron reactions, lists of radionuclides in order of gamma ray energy, gamma ray mass attenuation coefficients and chemical yield data.

It is not to be expected that a work of this sort will be completely free of errors or omissions, but those there are are not serious. A book which considers in detail, for example, diffusion of neutrons, beta ray theory, reactor physics and so on might also be expected to describe all major relevant chemical procedures. But for some of the most common of these—ion exchange, for example—the reader is directed to other works, although these are not specified Nor does there appear to be any discussion of the important allied technique of capture gamma ray analysis.

The index is unsatisfactory and should be made much more comprehensive in any future edition. Also the method of reference to other sections of the book is clumsy (it is best to go via the list of contents) and it should be possible in a future edition to refer by page number. The treatment of ^{252}Cf as a neutron source is too brief (six lines), while Table

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