thesis, and the stereochemical consequences of the symmetry rules so profound, that one really cannot criticize their selection. We can safely assume that other books taking up omitted topics will soon be available.

The present book is very well written, using a deliberately nonmathematical approach. The illustrations are particularly well done and show the arguments and the conclusions quite clearly. The authors have presented in a convenient and attractive way their pioneering contributions to an important new area of chemistry.

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Actinide Element

The Chemistry of Plutonium. J. M. CLEVELAND. Gordon and Breach, New York, 1970. xxiv, 654 pp., illus. $19.50; to institutions, $39.50.

Some 30 years have passed since the discovery of plutonium. From less-than-microgram to many-ton amounts has been the history of production; the volume of literature has kept pace, and we find that the element is indeed well studied, certainly better than many other more common elements. Since plutonium has been and is of prime importance in weapons work and will most assuredly become extremely important for electrical generation in the next generation of nuclear breeder reactors, it is not surprising that a great deal of both basic and applied research has been carried out over this 30-year period.

The author has attempted to include all of the known chemistry of plutonium in one volume with the unfortunate, in my opinion, exception of the chemistry of the metal itself. I believe that the author has indeed collected essentially all the rest of the unclassified chemical knowledge of plutonium and has reported it in a comprehensive and lucid fashion. The book jacket states that the coverage of the many topics is so thorough that the original literature in most cases need not be consulted. To depend on this book rather than upon the original articles is, of course, a rather optimistic and probably foolhardy procedure. However, the discussions are sufficiently complete that the researcher can decide which articles to consult and can then find those of the 1100 references he desires conveniently listed.

The Chemistry of Plutonium is divided into four sections. The first is a very brief introductory discussion. The next section, on solution chemistry, is several hundred pages long and discusses topics such as oxidation states and reactions, hydrolysis, complex formation, ion exchange, solvent extraction, and nonaqueous solution chemistry. The third section is also long and discusses the compounds of plutonium in a comprehensive way, giving such physical properties as crystal structure, melting point, and vapor pressure, along with preparative methods. The final section, on chemical processing, is more engineering in nature and discusses reactor fuel treatment, conversion of other compounds to the tetrafluoride, metal preparation, and, finally, recovery and waste disposal.

Although there are few who can use all of the varied information given, almost anybody interested in actinide chemistry will find this book to be a very useful collection of the known facts on the element plutonium.

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The Distorted Wave Method

Direct Nuclear Reaction Theories. NORMAN AUSTERN. Wiley-Interscience, New York, 1970. x, 390 pp., illus. $19.95. Interscience Monographs and Texts in Physics and Astronomy, vol. 25.

Austern has written a textbook intended for advanced graduate students and research workers in the field of direct nuclear reactions. But he has achieved much more. Acting in the capacity of a super referee he has brought together over 600 articles for digestion, dissection, rejection, and reconstitution. The final product is presented to the reader as one of those marvelous multicolored candy balls known to English children as "gob stoppers." It delights the eye as well as the palate as it so easily dissolves in the mouth. The aftertaste is tart (some might say bitter); the overall effect is refreshing.

The main theme of the book is the distorted wave method and its application to nuclear processes. The discussion of this is preceded by introductory chapters on scattering theory. A wave packet approach is employed, but in a manner which is shown to be relevant rather than pedantic. This leads naturally into a discussion of delay times and the difference between a compound nucleus and direct reaction. Antisymmetrization is discussed in configuration space, not in a second quantized formulation. Students will undoubtedly find this easier, but it will not help them in reading outside this book.

Detailed and easily readable examples of the method are then given in a huge chapter on applications. Experimentalists especially will find this the most useful part of the book. The presentation is both complete and clear, and there can be few reactions that are not discussed in detail. The results are illustrated throughout by such an overwhelming number of accurate fits to experiment that one is convinced that all is solved and there is nothing more to learn. But we are only halfway through the book. There follow quieter chapters to which perhaps fewer readers will penetrate but which I found equally absorbing. Those finer points so essential to the real specialist, so important in dragging up that last vestige of information from the data, are worked over. Coupled channels, L-space models, recoil effects, and many other topics are included, with a last chapter on unified theories and dispersion theory.

All the time I was reading this book, though, a specter kept tugging at my mind. His name is Fadeev. I would really have been interested to hear what Austern has to say about non-Fredholm kernels, dangerous diagrams, and divergence of the Born series. Does Fadeev's work show that there is a tragic flaw in the whole fabric of our understanding of many-particle interactions, or is it just an irrelevant mathematical detail which in the final analysis affects nothing? If Austern knows the answer to this question he is not telling us here.

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Stereochemistry

Polymer Conformation and Configuration. FRANK A. BOVEY. Academic Press, New York, 1969. x, 182 pp., illus. $9.50. Current Chemical Concepts.

This volume is based on a series of lectures presented by the author at the Polytechnic Institute of Brooklyn. Bovey surveys areas of polymer stereochemistry, including the use of such