comes out clearly; and they give rigorous theoretical derivations wherever possible. Both Castellan and Levine include helpful reviews of the necessary mathematics.

In the new edition of Levine, the two chapters dealing with solutions have been rewritten in such a way as to reduce the number of equations. Both Levine and Castellan have added many worked problems; indeed, the 750 problems in Castellan's third edition roughly doubles the number included in its predecessor. The new edition of Levine also contains sections treating a variety of recently-developed experimental techniques, such as ion cyclotron resonance, field-ion microscopy and photoacoustic spectroscopy.

Any author of a physical chemistry textbook is faced with a dilemma in organizing his material. The main body of the course must be devoted to chemical thermodynamics. If sections on the kinetic theory of gases and statistical mechanics are placed early in the book, the student is helped in his understanding of thermodynamics. However, one cannot develop statistical mechanics without first saying something about quantum theory; and quantum theory is a difficult topic which most authors would prefer to put towards the end of their books. These three authors respond differently to the problem. Levine discusses statistical mechanics in one of his later chapters, after the sections on quantum theory. Castellan places the classical derivation of the Maxwell–Boltzmann velocity distribution early in his book, while leaving the part of statistical mechanics which depends on quantum theory until one of his last chapters; and Moore includes a section on quantum theory very early in his book.

All three of these excellent and clearly written textbooks deserve to be considered by anyone planning a course in physical chemistry at the undergraduate level. They not only guide the student safely through the fundamentals, but also introduce him to exciting areas of current research. Personally, I prefer the more exact and mathematical style of Castellan and Levine to the descriptive treatment given by Moore, but the choice of book will depend on the level of the course being planned. □

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The inorganic core

Jon McCleverty

Concepts and Models of Inorganic Chemistry, 2nd Edn.
By Bodie Douglas, Darl H. McDaniel and John J. Alexander.
Wiley: 1983. Pp.800. Hbk £34.15, $47.85; pbk £10, $16.

Inorganic Chemistry: A Unified Approach. By William Porterfield.
Addison-Wesley: 1984. Pp.688. $33.95, £14.95.

BECAUSE of the wide range of inorganic chemistry, and constraints on time, one must be selective in the aspects of the subject presented to undergraduates. So it is reassuring that, on both sides of the Atlantic, there is a common perception of the core of "inorganic" knowledge that every graduating student of chemistry should know. For example, both of the books reviewed here regard as essential a discussion of atomic structure and periodicity, bonding and some aspects of thermodynamics and mechanism, including photochemical processes. Coordination and organometallic chemistry have a definite place and may be linked to homogeneous catalysis. There is also a recognition that limited amounts of descriptive chemistry are necessary, and that attention must be paid to developments in cluster, solid-state and bioinorganic chemistry.

In Douglas *et al.*'s *Concepts and Models of Inorganic Chemistry* the emphasis is on theories and rationalizations rather than on a systematic discussion of the elements, and so the reader will not find much comment on the synthesis of inorganic compounds or indeed on many of the unsolved mysteries of this challenging branch of the subject. Of particular note, however, is the excellent résumé of symmetry and Group Theory, and the section on solid-state chemistry is very well-illustrated, going satisfyingly beyond most other textbooks pitched at the same level. Notwithstanding the remarkable lack of any reference to magnetism, coordination chemistry is effectively covered, but the section on organometallic chemistry is disappointingly short, with omission of certain important aspects of main-group organometallics. The diagrams and tables are clear and easily readable — possibly because of the book's unusual shape (195 x 240 mm) — but the index is a little confusing, there being reference to compounds which appear only in the (useful) problem sections and not in the text.

In *Inorganic Chemistry*, Porterfield observes that some of the most exciting developments in the field have come from the movement towards integration of previously distinct areas, for example polyhedral boranes and transition metal clusters. Because of this, he suggests that a new organizational principle may be necessary in the teaching of the subject. His book, which is produced to a slightly higher quality than the Wiley text, is in five parts, the first of which is largely introductory. The next two are concerned with the "statics" and "dynamics" of main-group chemistry, and Parts Four and Five with similar aspects of transition-metal chemistry. The reactions of main-group compounds are presented with a strong thermodynamic flavour, and include significant discussion of redox activity and non-aqueous solvent behaviour. Magnetism is described, and organometallic chemistry and catalysis are thoroughly discussed. One of the most exciting features of this book is the chapter describing photochemical reactions of transition metals.

The main differences between the two books relate more to presentation than to philosophy. Indeed, the authors of *Concepts and Models* actually come closer in some areas to reaching the goal of integration than does Porterfield, especially when dealing with aspects of inorganic solids and cluster chemistry. While covering much of the same material as Douglas *et al.*, Porterfield assembles it differently and in places fails to take full advantage of the unified approach he has espoused. Thus the synthesis of material within the confines of main-group or transition-element chemistry is good, often imaginative, but true unification should dissolve this artificial and partly historical division. By far the clearest difference between the books relates to Group Theory. Porterfield has made the explicit decision not to include accounts of its use. In my view this is most unfortunate — much of contemporary inorganic chemistry relies on the rationalization and handling of spectroscopic and bonding information via Group Theoretical tools.

Both of these books include some more advanced material than Huheey's most readable *Inorganic Chemistry* (Harper & Row, 3rd Edn 1983) — which, incidentally, also omits Group Theory. They are not as heavy going or as selective as Purcell and Kotz's molecular-orbital orientated book, *Inorganic Chemistry* (Holt-Saunders, 1977), but offer far more helpful teaching and explanatory material than *Advanced Inorganic Chemistry*, the comprehensive research-orientated work of Cotton and Wilkinson (Wiley, 4th Edn 1980).

Despite the authors' stated intentions, I feel that *Concepts and Models* still betrays the unspoken belief of many American chemists that inorganic chemistry is a kind of applied physical chemistry. That is not necessarily a fault, merely a way of looking at the world, but because of it I doubt that the book will be highly recommended in Britain. For me, Porterfield's book is the more attractive and more obviously dedicated to the identity of inorganic chemistry. It is broadly equivalent to Moeller's *Inorganic Chemistry: A Modern Approach* (Wiley, 1982; for review see *Nature* **302**, 460; 1983) but because of the criticisms mentioned above I would prefer the latter. Nevertheless, I am glad to have Porterfield and Douglas *et al.* on my shelves — both are thought-provoking and provide new views of familiar landscapes; which is always illuminating. □

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