

Book review

Boranes and Metalloboranes: Structure, Bonding and Reactivity; by C.E. Housecroft, Ellis Horwood, Chichester, 1990, 158 pages, £29.95. ISBN 0-7458-0459-4.

There has been a tendency over the last few decades to consign the chemistry of boranes and metalloboranes to an esoteric and irrational corner of inorganic chemistry. The isolation and characterisation of the pyrophoric boron hydrides in the 1920s and 1930s was recognised as an amazing achievement which led to important advances in manipulative techniques, but it was difficult to understand how the higher boranes were formed in pyrolysis reactions, what determined their stoichiometries, or how their molecules held together. Students had to learn formulae which did not fit normal rules of valency, three dimensional structures which were difficult to visualise, and strange *styx* nomenclature which did not seem to be needed in the rest of inorganic chemistry. The situation is no longer quite like that. The bonding in boranes is described in much the same way as that in other molecules, the relationships between their shapes is much better understood, and rational methods of synthesis, in which increasingly complex structures are built up step by step, have been developed. Nevertheless, the chemistry of boranes and metalloboranes remains an extremely demanding subject for teachers and learners alike.

They will be greatly helped by this excellent book. It is written in an informal style with a liberal sprinkling of italics and exclamation marks, but the contents are carefully selected, superfluous material is left out, terms are carefully defined, and difficult questions are not glossed over. The subject is developed logically. First, structure, bonding, and chemistry of BH_3 are considered in relation to the properties of similar molecules. Physical methods are carefully explained and their strengths and limitations analysed. Then structures of boranes and hydroborate anions of increasing complexity are described, and the relationships between metalloboranes and boranes shown. The chapter on bonding shows how a particular molecule may be described in several related ways: orbital diagrams are carefully drawn with consistent orientations so that comparisons are easy. There is a clear exposition of the basis of Wade's rules and of the isolobal principle, with several illustrative examples set out in detail. The final chapter deals with reactivity. Good use is made of diagrams giving representative reactions of small open cage boranes, large open cage boranes, *closo*-borane anions, and metalloboranes. There is a formula and subject index, and references—many to recent papers and reviews—are given at the end of each chapter.

A good undergraduate text needs to be up-to-date and authoritative and to be written in such a way that students are encouraged to explore the subject further for themselves. In all these aspects the present volume is first class. An undergraduate text needs, however, to be affordable. Few students will be able to buy their own copies for what will inevitably be only a small part of an undergraduate course. It is

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to be hoped that even when library resources are severely restricted there will be enough for the purchase of books such as this.

*School of Chemistry and Molecular Sciences,
University of Sussex, Brighton, BN1 9QJ (U.K.)*

J. David Smith