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Book review

Rigby, M., Smith, E. B., Wakeham, W. A., Maitland, G. C.: The forces between molecules. Oxford: Oxford University Press 1986. 232 pp (ISBN 0-19-855207-6), £25.00

This is a nice, useful book about the forces between molecules. In order to be completely satisfied with the book, however, one must share the authors' opinion about the usefulness of quantum mechanical calculations: "Although the theoretical investigations of intermolecular interactions can give valuable insight into the nature and origin of the forces between molecules ... it is not possible at the present time to obtain detailed information about the intermolecular potentials at all separations directly from quantum mechanical studies" (p. 17). The reader will find almost nothing about quantum chemical calculations of molecular interactions. On the other hand, experimental techniques suitable for obtaining information on molecular interactions are described and discussed in detail. It should be added that the present book is designed to complement the previous monograph by the same authors entitled *Intermolecular forces - their origin and determination.*

The introductory chapter describes different components of interaction energy and gives basic expressions for them. The four following chapters deal with most important experimental sources of information about van der Waals molecules. The chapters are entitled: "Molecular beams", "Spectroscopic measurements", "Gas imperfection" and "The transport properties of gases". The methods are clearly described and numerous examples are presented, frequently illustrated by instructive figures. The two following chapters describe solid and liquid states. In the latter chapter the Monte Carlo and molecular dynamics methods are mentioned, although only very briefly. The last chapter, "Potential functions - the state of the art", is excellently written and is a collection of very useful information on the interactions of different systems. The potential functions are discussed separately for gas, liquid and solid phases. The first part deals with potential functions for different systems: atom-atom, ion-atom, atom-diatomic system, diatomic system-diatomic system and simple polyatomic system-simple polyatomic system. For large polyatomic systems the site-site potentials are presented. The respective potentials are based on experimental measurements and theoretical calculations. In the third part of the chapter devoted to the solid phase, the Deryaguin, Landau, Verwey and Overbeek theory is briefly outlined and values of Hamaker constants for different systems are presented.

Useful data are given at the end of the book in five appendices (e.g. molecular parameters and characteristic properties of some simple substances).

As mathematical details have been excluded, the book is easy to read. The highly didactic value of the book is further enhanced by the inclusion of exercises at the end of each chapter. At the end of each chapter suggested further reading is provided.

The book can be recommended to anyone (including students) who would like to obtain basic introductory information about molecular interactions in general and about the experimental evaluation of molecular interactions in particular. For theoretical aspects, however, additional reading is necessary.

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