

book reviews

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Reactivity of molecular solids. Edited by Elena V. Boldyreva and Vladimir V. Boldyrev. Chichester: John Wiley & Sons, Ltd, 1999, pp. xi + 328. Price £ 130.00. ISBN 0-471-99907-5.

This book is the third in the publisher's series on the molecular solid state. It contains eight chapters on various topics related to solid-state chemistry. The first chapter, by Elena Boldyreva, *Interplay between Intra- and Intermolecular Interactions in Solid-State Reactions*, provides a general overview of the subject. The chapter begins with a short introduction to the subject, continues with definitions and outlines the problems involved with the study of solid-state reactions. It then summarizes the various techniques used in the study of such reactions. The chapter ends with thorough assessments of the qualitative effects related to the studies in this subject.

The second chapter, *Cooperative Effects in Solid-State Reaction*, by Tadeusz Luty and Craig J. Eckhardt, is very interesting and well written. They examine how the lattice alters as a function of the physical and chemical changes arising from the population variation of the reactant and product. They show how these changes can be included in a general quantitative theory based on elasticity. After discussing two examples of solid-state reactions, they present a comprehensive theory that formulates the interaction between the lattice and the chemical forces that determine the course of the reaction.

Kailasam Venkatesan wrote the third chapter, *Some Aspects of Bimolecular Photoreactions in Crystals*. There are many reviews written on the subject so, at the beginning of the chapter, the author puts the emphasis on describing attempts that have been made to use the basic knowledge of

crystal engineering to develop strategies for the preparation of crystals that will be light sensitive. Discussion of the effect of temperature and wavelength on solid-state photochemistry follows and the chapter ends with a brief introduction to the concept of the reaction cavity and its application.

The next three chapters are devoted specifically to the problems involved with the kinetics of solid-state reactions. The first, chapter 4, *Kinetics and Spatial Propagation of Intramolecular Reactions in Solids*, written by the editors and Tatiana P. Shakhtshneider, deals with diffusionless intramolecular solid-state reactions such as isomerization, racemization, conformational isomerization *etc.* In the first section they discuss the kinetics and spatial propagation of solid-state reactions and define the feedback phenomenon. In the following two sections, the authors discuss the effect of the environment on the kinetics of such intramolecular reactions using both simulation and experimental data.

Kinetic Descriptions of the Simplest Bimolecular Reactions in Organic Solids, written by Vladimir A. Tolkathev, is the second chapter of the series. It concerns problems related to contradictions between theory and experiment, and cases where there are not sufficient experimental data.

The third chapter in this series is *Radical Solid-State Reactions at High Pressure*, written by Anatoly L. Buchachenko, M. V. Motyakin and I. I. Aliev. The authors discuss the effects of pressure and/or shear deformation on radical reactions in molecular single crystals. They also show simple relations between activation volume and other physical properties such as the pressure and compressibility coefficient.

The last two chapters in the book are related to applications of the solid-state and solid-state transformation in the pharma-

ceutical industry. The first of these, *Poly-morphs and Solvates of Molecular Solids in the Pharmaceutical Industry*, is written by Gabriele Winter. After a short introduction to the different types of polymorphism, the author discusses the importance of polymorphism to the pharmaceutical industry and describes the various experimental techniques which are being used for identification and structure elucidation of the solid compounds.

The other chapter is entitled *Mechanochemical Synthesis and Mechanical Activation of Drugs*, written by Tatiana P. Shakhtshneider and Vladimir V. Boldyrev. The authors describe the effect of mechanical treatment of a solid on its properties. Amorphization and polymorphic transitions are commonly observed phenomena resulting from such treatments. The knowledge that such variations can take place is of vital importance, because common technological stages in pharmaceutical production include pressing and forming tablets.

In the preface to the book, the authors write 'the volume may seem to be rather heterogeneous'. This is true; some chapters are not coherent with the general content of the book, but overall the book is worth reading. As usual, some chapters are better written than others. The reader will certainly realise that although our knowledge in solid-state reactivity is growing, there are regions which are still waiting to be illuminated.

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