Molecular Crystals and Liquid Crystals

Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/gmcl20

A Review of: "Crystals and Crystal Structures, by Richard Tilley"

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Version of record first published: 22 Sep 2010

To cite this article: Tsunehisa Okuno (2007): A Review of: "Crystals and Crystal Structures, by Richard Tilley", Molecular Crystals and Liquid Crystals, 469:1, 131-132

To link to this article: http://dx.doi.org/10.1080/15421400701431661

Mol. Cryst. Liq. Cryst., Vol. 469, pp. 131–132, 2007

ISSN: 1542-1406 print/1563-5287 online
DOI: 10.1080/15421400701431661

Taylor & Francis
Taylor & Francis Group

Book Review

Crystals and Crystal Structures, by Richard Tilley, Wiley, 2006; 270 pp; $145, cloth; $60, paper.

Crystallography, which made dramatic progress in the past decade, plays an important part in a wide range of disciplines, including biology, chemistry, materials science and technology, mineralogy, and physics, as well as engineering. This book is written as an introductory textbook for students and others who need to understand crystallography without necessarily becoming crystallographers.

This book is organized into eight chapters. The first chapter gives an introduction to the subject and explains how to describe crystal structures. Chapter 2 introduces the important concept of lattices and provides formulas for the description and calculation of lattice and crystal geometry. Symmetry in two and three dimensions is described in Chapters 3 and 4, respectively. Chapter 5 is focused on how to build or display a crystal structure based on the information available in databases. Chapter 6 is concerned with diffraction of X-rays and discusses the relationship between diffraction and structure. The phase problem is treated in this chapter. Chapter 7 is focused on the principal ways in which structures are depicted in order to reveal structural relationships or biochemical reactivity. The final chapter, Chapter 8, outlines defects in crystals and recent developments in crystallography such as the recognition of incommensurately modulated crystals and quasicrystals.

This is a very good introductory textbook for undergraduate students and young researchers who need to study crystallography. It thoroughly describes the fundamental concepts, such as crystal systems, unit cells, space groups, and Bragg's law. Symmetry, in particular is explained very carefully. There are introductory questions at the beginning of each chapter. They are enormously helpful for grasping what topics are focused on in each chapter. A set of problems and exercises also assists in understanding the contents of the chapter.

This book outlines not only single-crystal X-ray diffraction but also powder X-ray diffraction, neutron diffraction, and electron microscopy.

It helps readers understand several analytical methods. The relationship between physical properties and symmetry is also explained clearly.

However this book is a fundamental textbook. Researchers who plan to perform X-ray diffraction measurements must read more practical books. For example, there is not a detailed description of generation of X-rays or solution of crystal structures. The explanation of refinement factors such as R, wR, and S is not sufficient to, help readers understand the crystallographic literature.

All in all, this is a very good introductory textbook for X-ray crystallography, and I strongly recommend this book to undergraduate and postgraduate students.

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