

Introduction for Module 14 – The Solid State

Textbook: [Open Stax Chemistry 2e](#)

Suggested Reading: Chapter 10.5-10.6

Learning Objectives:

- Describe the main types of crystalline solids: ionic solids, metallic solids, covalent network solids, and molecular solids
- Describe the arrangement of atoms and ions in crystalline structures
- Compute ionic radii using unit cell dimensions
- Explain the use of X-ray diffraction measurements in determining crystalline structures

Captions and Attributions:

- 1) The simple cubic cell is defined by only a single atom at all 8 corners of a cubic cell. [Figure 10.49 A simple cubic lattice unit](#) by [OpenStax](#) is licensed under [CC BY 4.0](#).
- 2) Many types of unit cells exist, with a wide range of shapes and geometric restrictions. [Figure 10.56 There are seven different lattice systems](#) by [OpenStax](#) is licensed under [CC BY 4.0](#).
- 3) A body centered cubic (BCC) structure features an atom at the center in addition to atoms at the corners. [Figure 10.51 In a body-centered cubic structure](#) by [OpenStax](#) is licensed under [CC BY 4.0](#).
- 4) A face centered cubic (FCC) structure features atoms on each face in addition to atoms at the corners. [Figure 10.52 A face-centered cubic solid](#) by [OpenStax](#) is licensed under [CC BY 4.0](#).
- 5) X-Ray crystallography can use the properties of electromagnetic radiation to determine the exact structure of an ionic compound. [Figure 10.65 \(a\) In a diffractometer](#) by [OpenStax](#) is licensed under [CC BY 4.0](#).
- 6) Three cubic unit cell structures are compared. [Figure 10.50 Cubic unit cells of metals](#) by [OpenStax](#) is licensed under [CC BY 4.0](#).



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