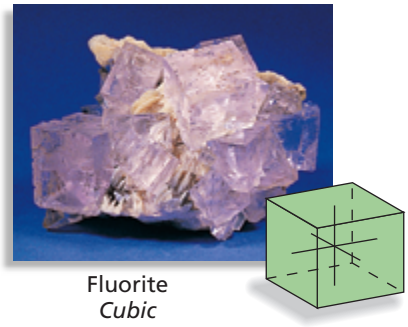
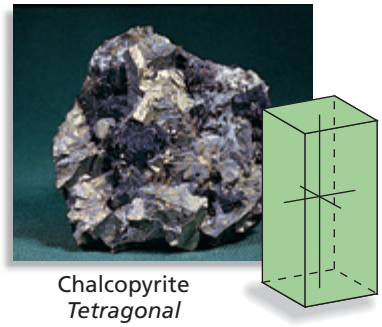
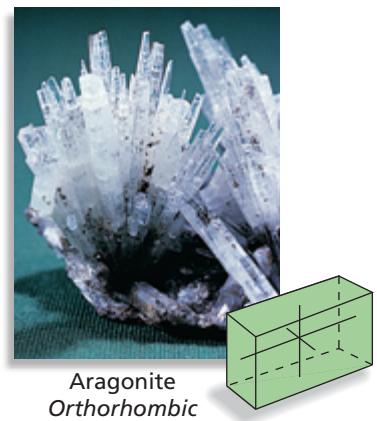
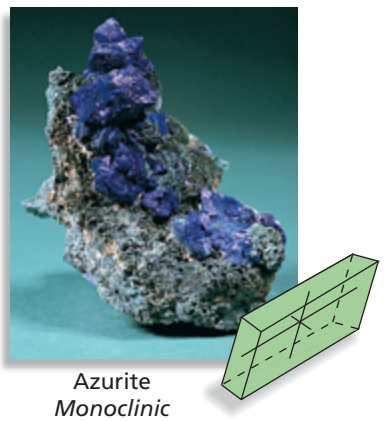

Fluorite
Cubic


Chalcopyrite
Tetragonal


Emerald
Hexagonal


Calcite
Trigonal


Aragonite
Orthorhombic


Azurite
Monoclinic

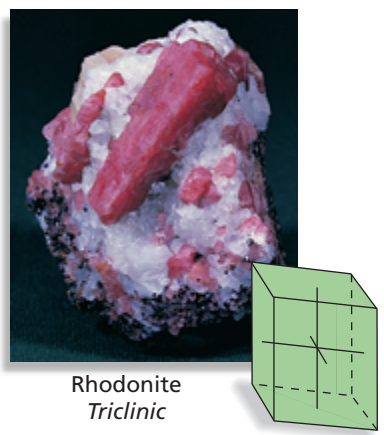

Rhodonite
Triclinic

FIGURE 11 Shown are the seven basic crystalline systems and representative minerals of each.

Low Rate of Diffusion

If a zinc plate and a copper plate are clamped together for a long time, a few atoms of each metal will diffuse into the other. This observation shows that diffusion does occur in solids. The rate of diffusion is millions of times slower in solids than in liquids, however.

Crystalline Solids

Crystalline solids exist either as single crystals or as groups of crystals fused together. *The total three-dimensional arrangement of particles of a crystal is called a* **crystal structure.** The arrangement of particles in the crystal can be represented by a coordinate system called a *lattice. The smallest portion of a crystal lattice that shows the three-dimensional pattern of the entire lattice is called a* **unit cell.** Each crystal lattice contains many unit cells packed together. **Figure 10** shows the relationship between a crystal lattice and its unit cell. A crystal and its unit cells can have any one of seven types of symmetry. This fact enables scientists to classify crystals by their shape. Diagrams and examples of each type of crystal symmetry are shown in **Figure 11.**

Binding Forces in Crystals

Crystal structures can also be described in terms of the types of particles in them and the types of chemical bonding between the particles.