

The Solution Process

SECTION 2

Factors Affecting the Rate of Dissolution

If you have ever tried to dissolve sugar in iced tea, you know that temperature has something to do with how quickly a solute dissolves. What other factors affect how quickly you can dissolve sugar in iced tea?

Increasing the Surface Area of the Solute

Sugar dissolves as sugar molecules leave the crystal surface and mix with water molecules. The same is true for any solid solute in a liquid solvent: molecules or ions of the solute are attracted by the solvent.

Because the dissolution process occurs at the surface of the solute, it can be speeded up if the surface area of the solute is increased. Crushing sugar that is in cubes or large crystals increases its surface area. In general, the more finely divided a substance is, the greater the surface area per unit mass and the more quickly it dissolves. **Figure 6** shows a model of solutions that are made from the same solute but have a different amount of surface area exposed to the solvent.

Agitating a Solution

Very close to the surface of a solute, the concentration of dissolved solute is high. Stirring or shaking helps to disperse the solute particles

OBJECTIVES

- List and explain three factors that affect the rate at which a solid solute dissolves in a liquid solvent.
- Explain solution equilibrium, and distinguish among saturated, unsaturated, and supersaturated solutions.
- Explain the meaning of “like dissolves like” in terms of polar and nonpolar substances.
- List the three interactions that contribute to the enthalpy of solution, and explain how they combine to cause dissolution to be exothermic or endothermic.
- Compare the effects of temperature and pressure on solubility.

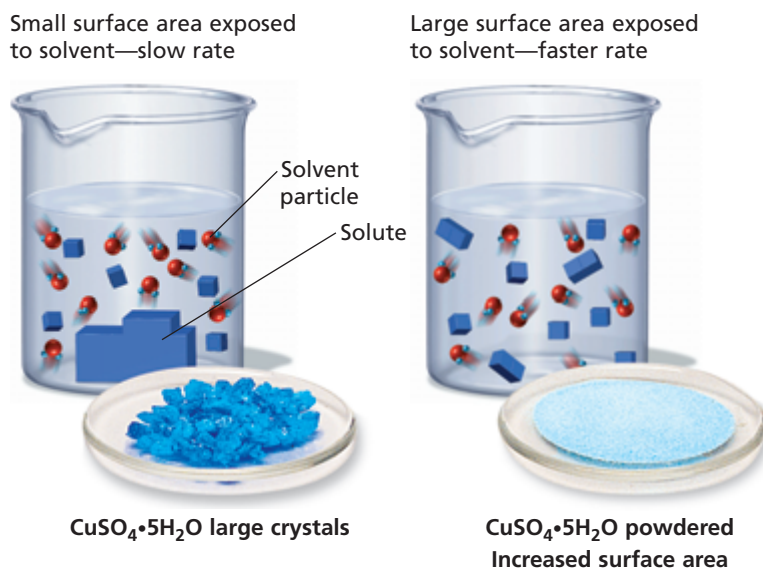


FIGURE 6 The rate at which a solid solute dissolves can be increased by increasing the surface area. A powdered solute has a greater surface area exposed to solvent particles and therefore dissolves faster than a solute in large crystals.