



15.3

Factors Affecting the Rate of Dissolution

Objective: *To understand the factors that affect the rate at which a solute dissolves.*

When a solid is being dissolved in a liquid to form a solution, the dissolution (dissolving) process may occur rapidly or slowly. Three factors affect the speed of the dissolving process: *surface area*, *stirring*, and *temperature*.

Because the dissolving process occurs at the surface of solid being dissolved, the greater the amount of surface area exposed to the solvent, the faster the dissolving will occur. For example, if we want to dissolve a cube of sugar in water, how can we speed up the process? The answer is to grind up the cube into tiny crystals. Because the crystals from the ground-up cube expose much more surface area to the water than the original cube did, the sugar dissolves much more quickly.

The dissolution process is also increased by stirring the solution. Stirring removes newly dissolved particles from the solid surface and continuously exposes the surface to fresh solvent.

Finally, dissolving occurs more rapidly at higher temperatures. (Sugar dissolves much more rapidly in hot tea than iced tea.) Higher temperatures cause the solvent molecules to move more rapidly, thus increasing the rate of the dissolving process.

In addition to dissolving faster at higher temperatures, most solids are more soluble at

higher temperatures. That is, in most cases more solid will dissolve in water at 90 °C than in water at 25 °C. The opposite is true for gases dissolved in water. The solubility of a gas in water typically decreases as the temperature increases.



Tea dissolves much faster in the hot water on the left than in the cold water on the right.

Focus Questions



Sections 15.1–15.3

1. Draw a molecular-level picture to show how salt and sugar look when dissolved in water.
2. Chemists often say “like dissolves like.” What does this statement mean?
3. Can a dilute solution also be saturated? Explain.
4. Increasing the number of collisions between solid and solvent particles increases the rate at which a solid dissolves. Explain how stirring, increased surface area, and higher temperature increase the number of collisions that take place.