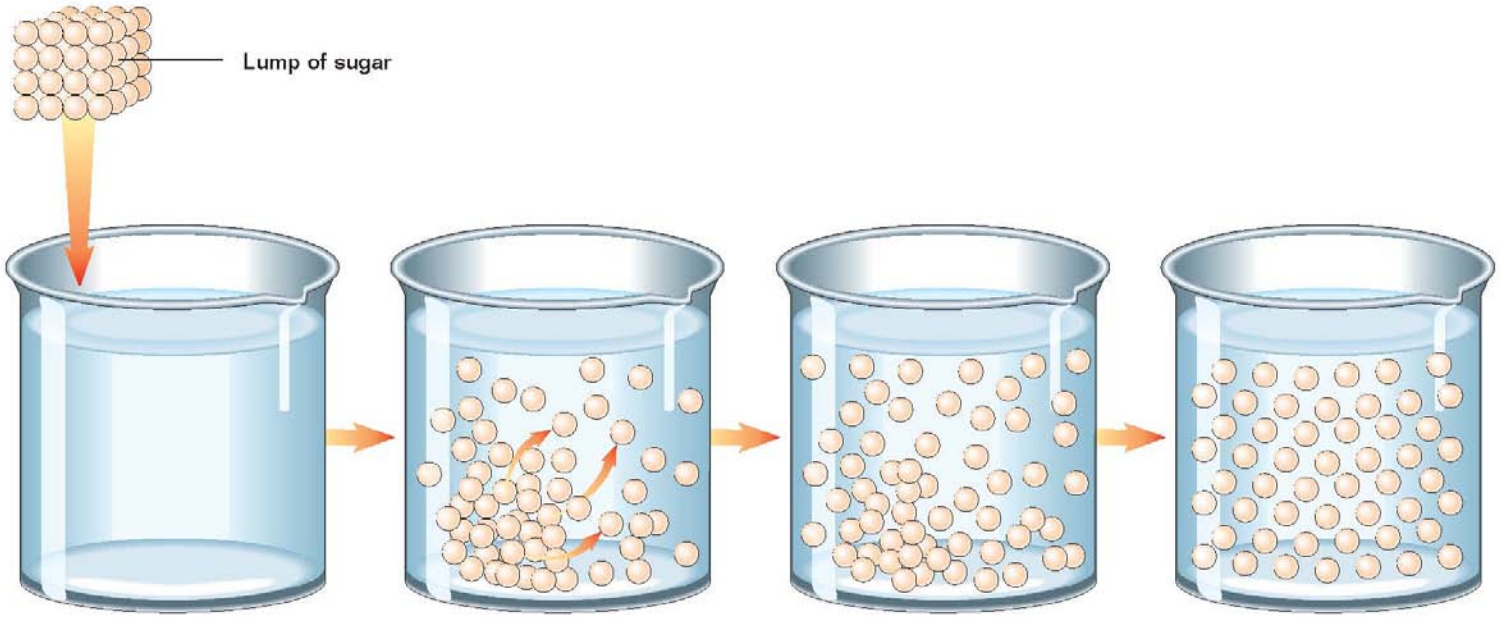
Cell Transport
Section 2

Passive Transport

Key Idea: In passive transport, substances cross the cell membrane down their concentration gradient.

- Equilibrium is a state that exists when the concentration of a substance is the same throughout a space.
- The concentration gradient is a difference in the concentration of a substance across a distance.

- Diffusion is the movement of particles from an area of high concentration to an area of low concentration.



If you drop a lump of sugar into a beaker of water, the sugar particles will diffuse and become evenly distributed throughout the water.

- The carrier protein is a protein that transports substances across a cell membrane.

Simple Diffusion

- Small, nonpolar molecules can pass directly through the lipid bilayer.
- Oxygen moves down its concentration gradient into the cell. Carbon dioxide diffuses out of the cell.

Facilitated Diffusion

- Ions, sugars, and amino acids can diffuse through the cell membrane through channel proteins.
- These proteins, sometimes called *pores*, serve as tunnels through the lipid bilayer.

Osmosis

Key Idea: Osmosis allows cells to maintain water balance as their environment changes.

Osmosis is the diffusion of water from an area of high concentration to an area of low concentration across a selectively permeable membrane.

Water Channels

- The cell membrane contains channel proteins that only water molecules can pass through.
- Osmosis allows cells to maintain water balance as their environment changes.

Predicting Water Movement

The direction of water movement in a cell depends on the concentration of the cells environment.

1. Water moves out - solution is hypertonic (higher solute) and cell loses water and shrinks.

2. Water moves in - solution is hypotonic (lower solute) and cell gains water and expands.

3. No change in water movement - solution is isotonic (same solute) and cell stays the same size.

Effects of Osmosis

- Animal cells can avoid swelling caused by osmosis by actively removing solutes from the cytoplasm.
- Swelling caused by a hypotonic solution could cause a cell to burst. Rigid cell walls of plants and fungi prevent the cells of these organisms from expanding too much.

Active Transport

Key Idea: Active transport requires energy to move substances against their concentration gradients.

- The sodium-potassium pump is a carrier protein that actively transports three sodium ions out of the cell and two potassium ions into the cell.
- The word release means to set free.

Pumps

- The pump prevents sodium ions from building up in the cell.
- The concentration gradients of sodium ions and potassium ions also help transport other substances, such as glucose, across the cell membrane.

Vesicles

- Proteins and polysaccharides cross the cell membrane in vesicles, which are membrane-bound sacs.
- Endocytosis - movement of a large substance into a cell
- Exocytosis - movement of material out of a cell