

Types of Transport

Passive Transport

movement of materials across a cell membrane without the use of cellular energy

diffusion

osmosis

facilitated diffusion

Active Transport

movement of materials across a cell membrane with the use of cellular energy

molecular transport

endocytosis

exocytosis

Brownian Motion




Brownian motion refers to the random movement of molecules.

Molecules move in all directions with equal frequency, bouncing off each other as they collide. This causes molecules concentrated in one area to spread outward.

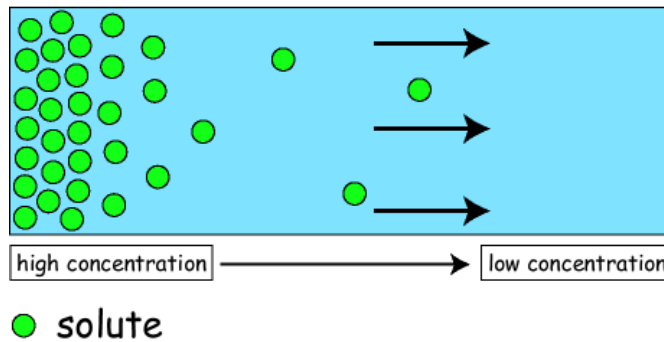
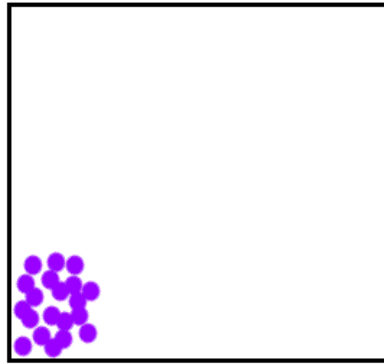


Diffusion

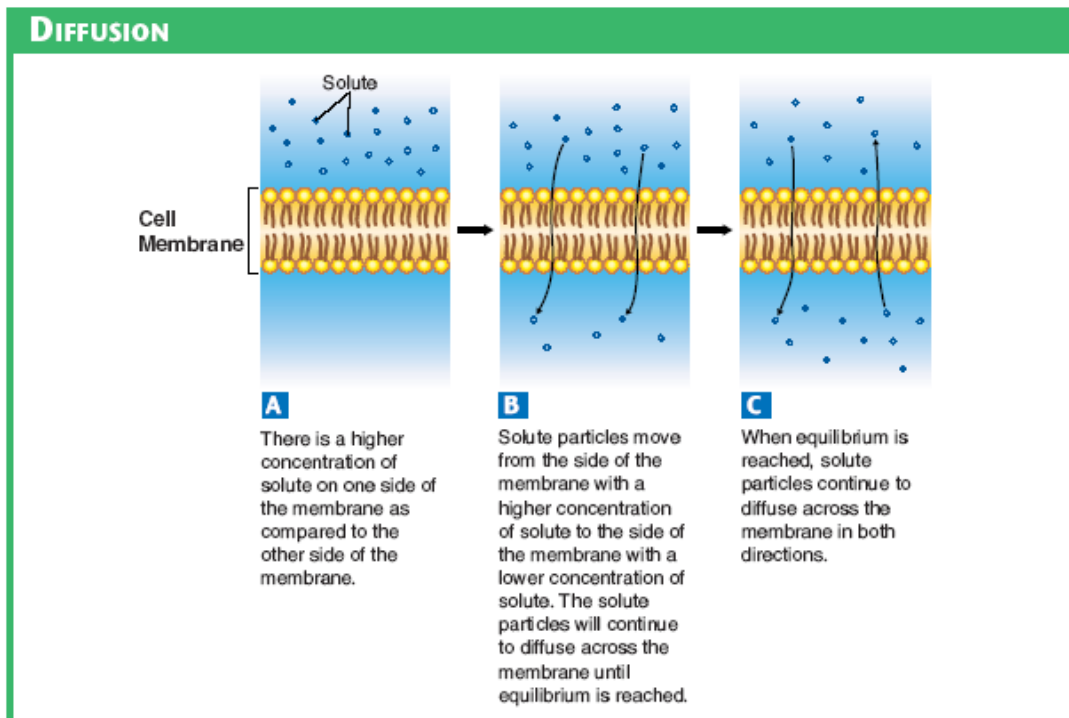
Diffusion can be explained by the movement of molecules from an area of **high** concentration **to** an area of **low** concentration . Diffusion rates increase with increasing *temperature, pressure and concentration*. When molecules are finally distributed equally, then equilibrium is reached.

HIGH  LOW

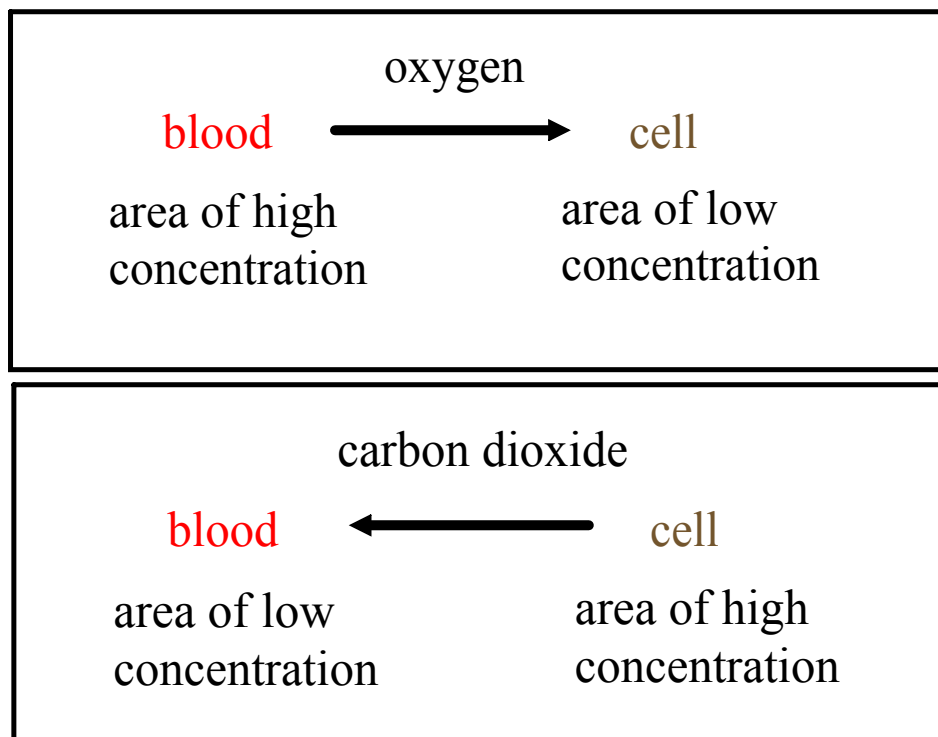
concentration gradient



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Oxygen and carbon dioxide move across cell membranes by diffusion.



If a substance is able to diffuse across a membrane, the membrane is said to be **permeable** to it. A membrane is **impermeable** to substances that cannot pass across it.



Most biological membranes are selectively permeable meaning that some substances can pass across them and others cannot.

selectively permeable membrane = semipermeable membrane

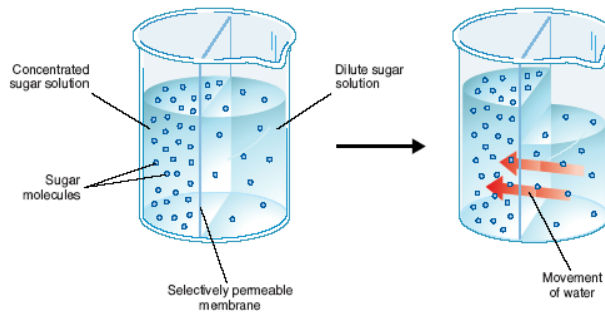
Quick Lab - How can you model permeability in cells?
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Osmosis

Osmosis is the diffusion of water through a selectively permeable membrane. Water will tend to move across the membrane until equilibrium is reached.

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▼ **Figure 7-15** Osmosis is the diffusion of water through a selectively permeable membrane. In the first beaker, water is more concentrated on the right side of the membrane. As a result, the water diffuses (as shown in the second beaker) to the area of lower concentration.

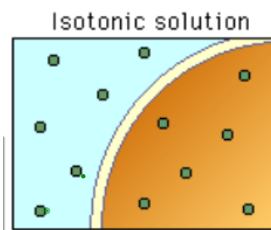


Water will tend to move across the membrane until equilibrium is reached. The concentrations of water and sugar will be the same on both sides of the membrane.

Types of Solutions

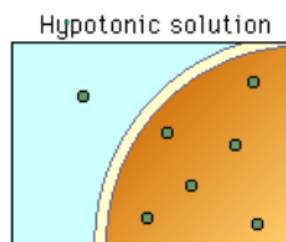
Isotonic solutions are solutions in which concentration of **solute** outside the cell is **equal** to the concentration of solute molecules inside the cell.

no net change in water movement



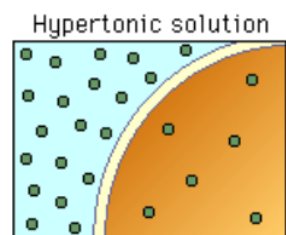
Hypotonic solutions are solutions in which the concentration of **solute** outside the cell is **lower** than that found inside the cell.

water diffuses into the cell



Hypertonic solutions are solutions in which the concentration of **solute** outside the cell is **higher** than that found inside the cell.

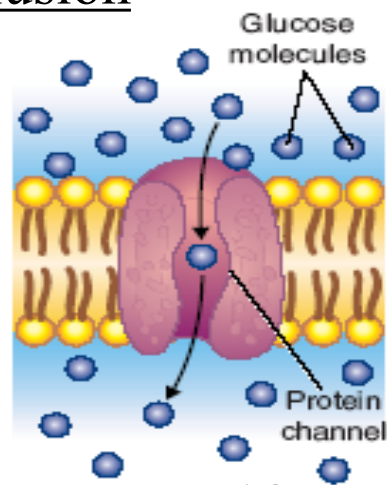
water diffuses out of the cell



Facilitated Diffusion

Facilitated diffusion occurs when protein carrier molecules located in the cell membrane can aid in passive transport.

high concentration of solutes -> low



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▲ **Figure 7-17** During facilitated diffusion, molecules, such as glucose, that cannot diffuse across the cell membrane's lipid bilayer on their own move through protein channels instead. **Applying Concepts** Does facilitated diffusion require the cell to use energy?