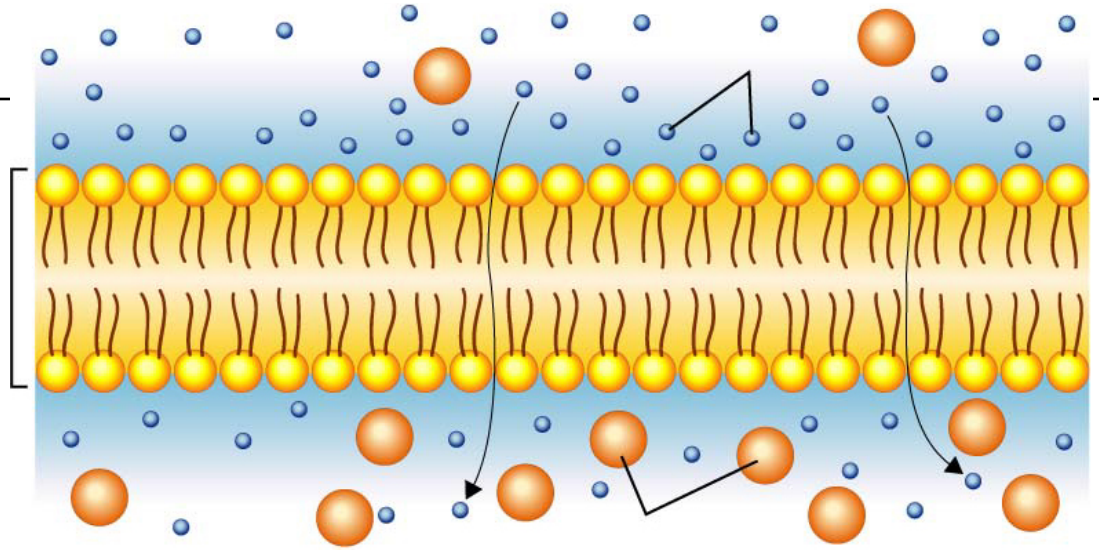
Movement Through the Membrane

Chapter 7.3

Set-up

- Use your potato corer to make 2 cores.
- Put one core in salt water
- Put one core in deionized water

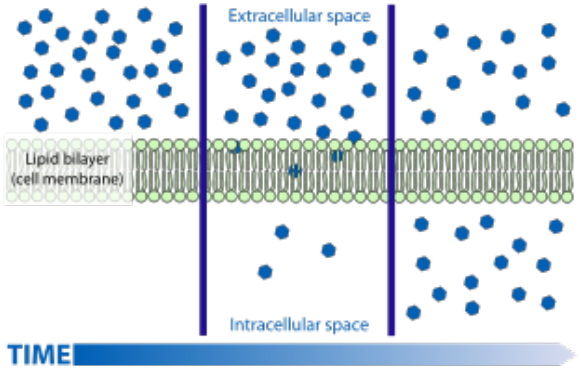
Cell membrane function

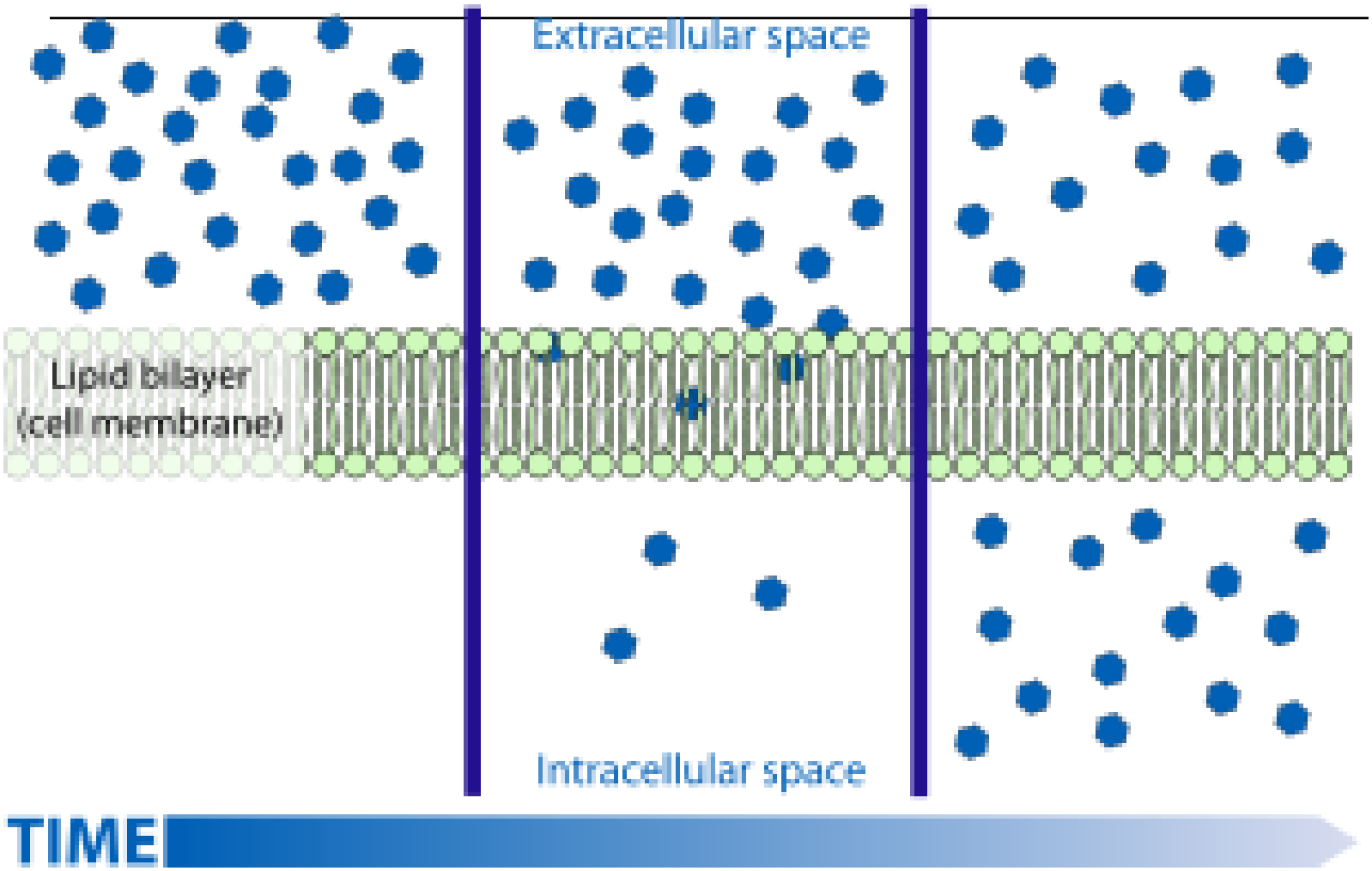


- Cells contain fluid (cytoplasm)
- Cells are surrounded by fluid (intercellular fluid)
- Cell membrane regulates the movement of molecules between the intercellular fluid and the cytoplasm

Diffusion

- Molecules move from an area of high concentration to low concentration
- Equilibrium – when the concentration of the solute is the same throughout the solution
- Small particles can move across cell membrane through diffusion
- Doesn't require energy




Extracellular space
Lipid bilayer
(cell membrane)
Intracellular space
TIME

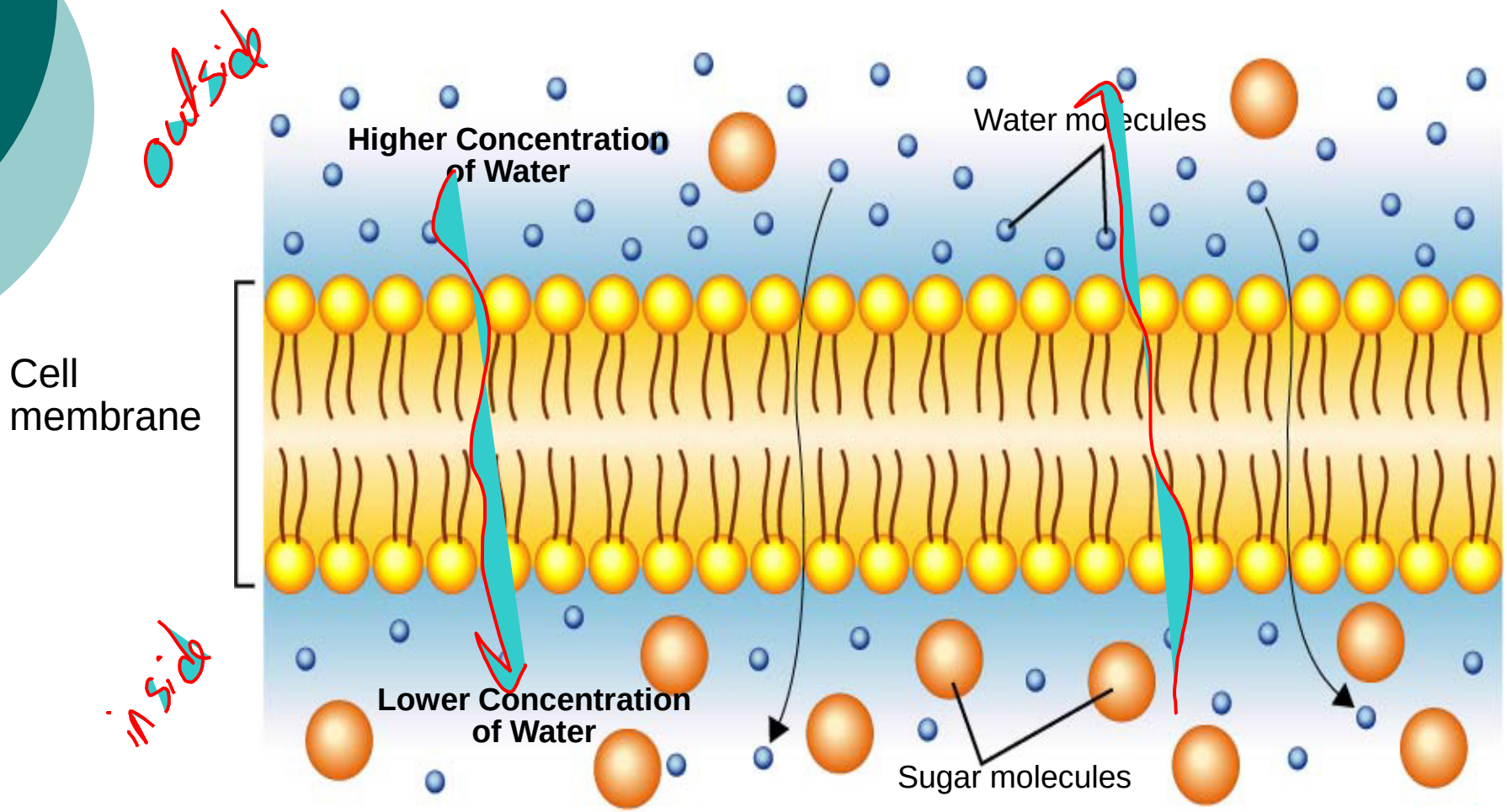
Diffusion Demonstrations

- Describe how the water is changing.
- Are the ink molecules all moving in the same direction or is the movement random?
- Does diffusion require energy?

Osmosis

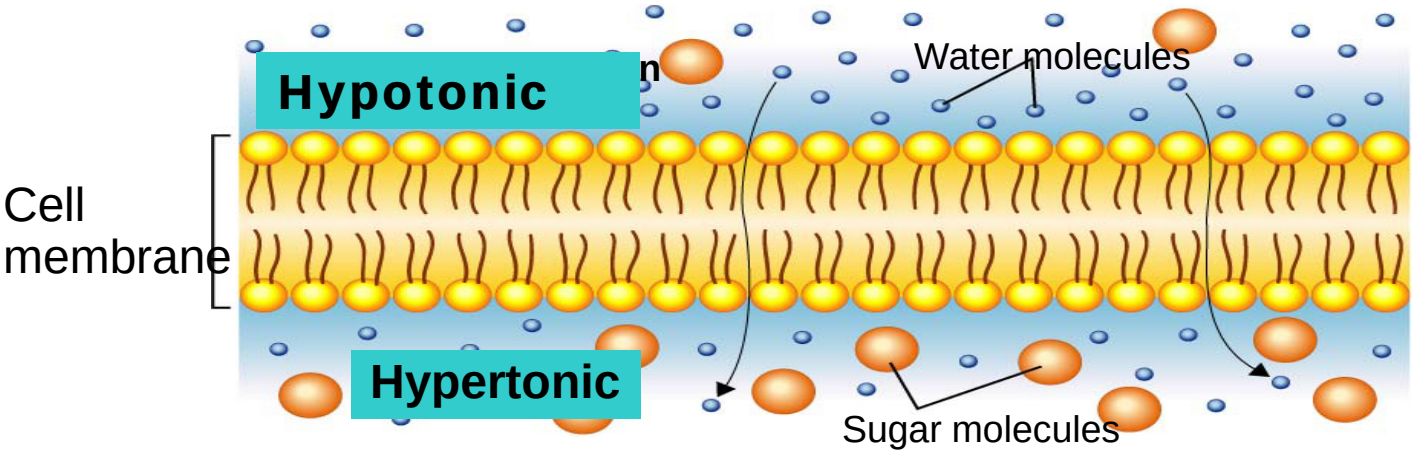
- Diffusion of **water** through a **selectively/semi** permeable membrane
- Water can pass through the membrane, but other substances can't
- Water moves from an area of high concentration to low concentration until equilibrium is reached

Osmosis


Outside
Higher Concentration of Water
Water molecules
Cell membrane
Inside
Lower Concentration of Water
Sugar molecules

Effects on Cells

- Isotonic – same strength
- Hypertonic – above strength, very concentrated solution
- Hypotonic – below strength, diluted solution



Effect on a Cell

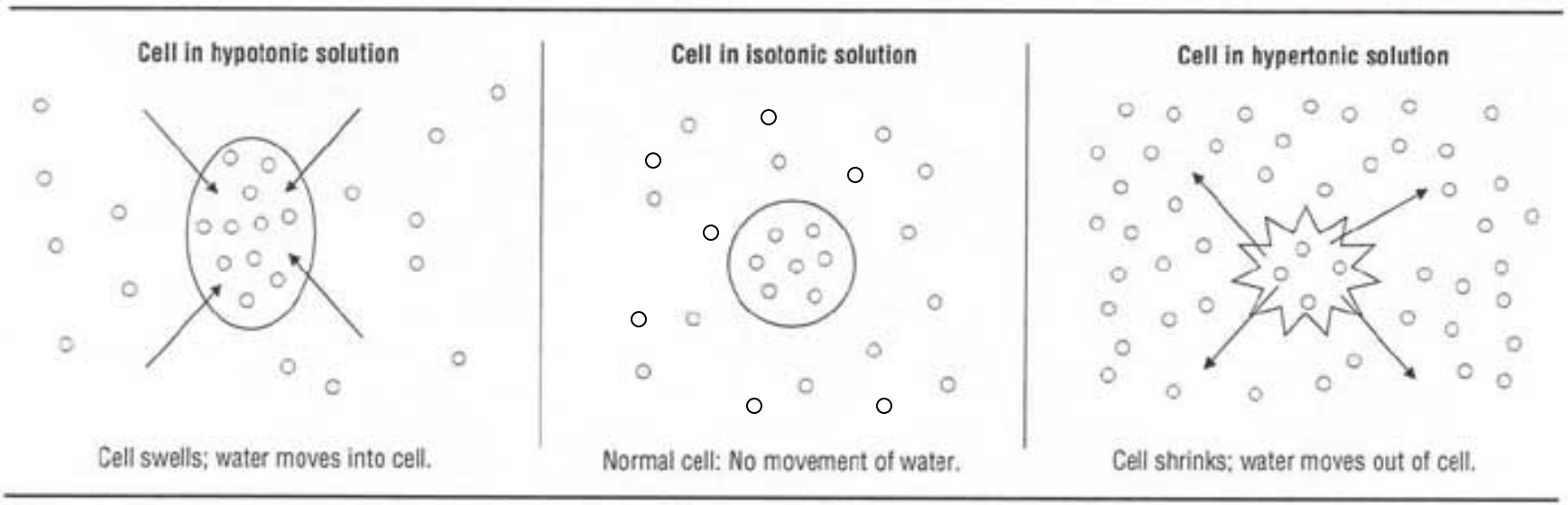
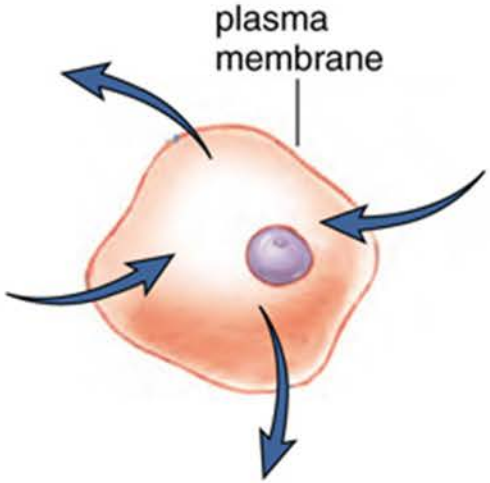
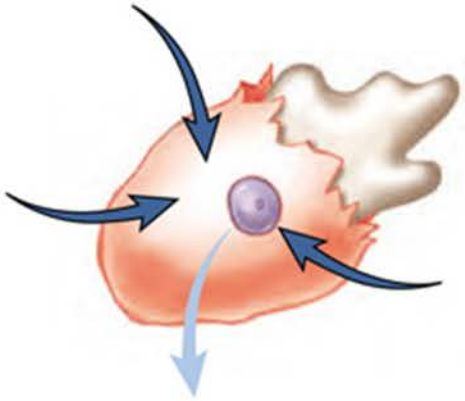


Figure 1. Effect of Osmosis Across a Cell Membrane

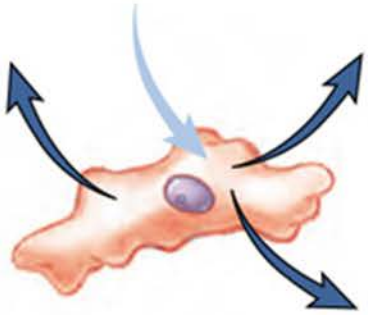
Animal cells



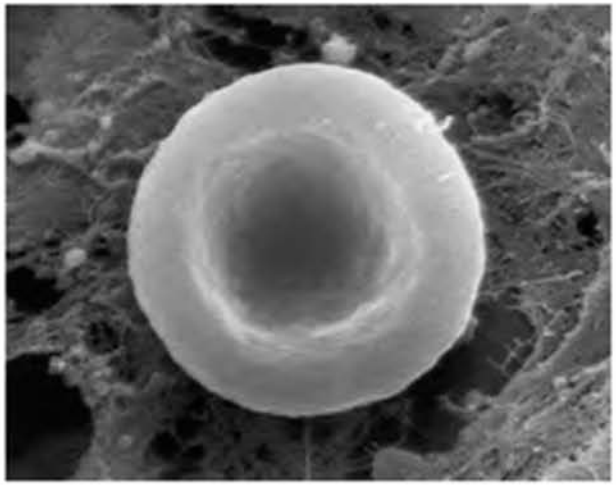
a. In an isotonic solution, there is no net movement of water. A normal red blood cell is shown.

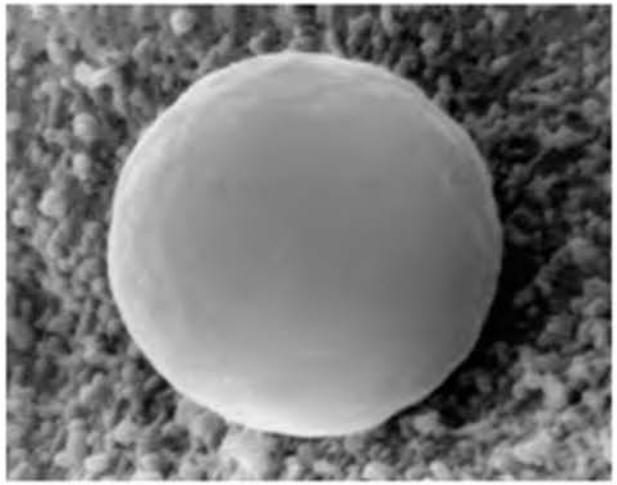


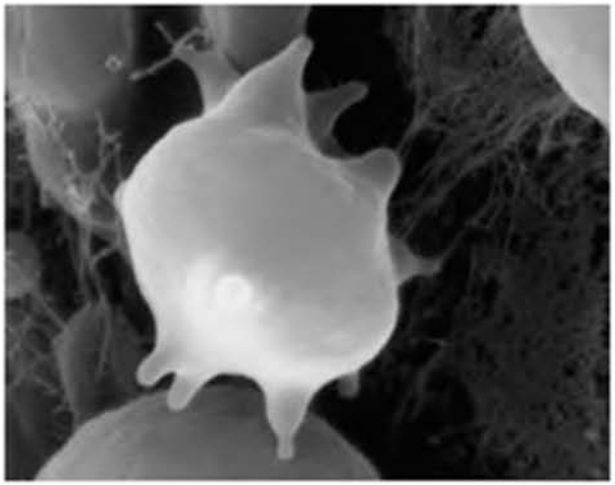
b. In a hypotonic solution, water enters the cell, which may burst (lysis). Note the cell is swollen.



c. In a hypertonic solution, water leaves the cell, which shrivels (crenation).







Osmosis Demonstration

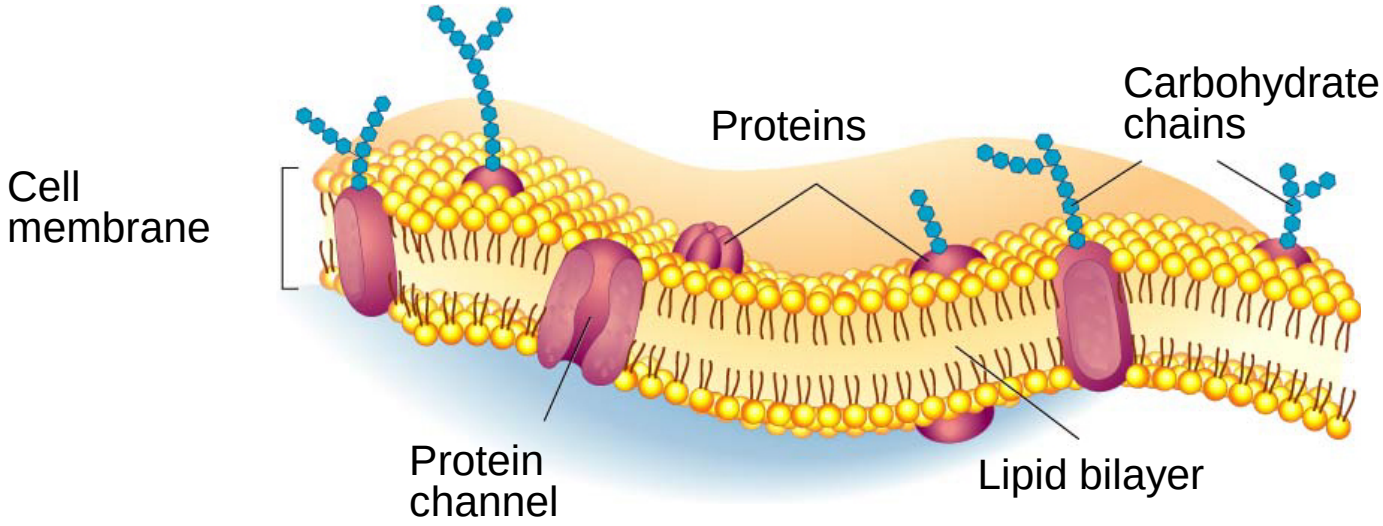
- What happened to the potato core in the deionized water?
- Is the deionized water hypotonic, isotonic or hypertonic?
- What happened to the potato core in the salt water?
- Is the salt water hypotonic, isotonic or hypertonic?

Summary

- As a summary of your notes, write one paragraph comparing diffusion to osmosis. Be sure to describe how each process works, how they are the same and how they are different.

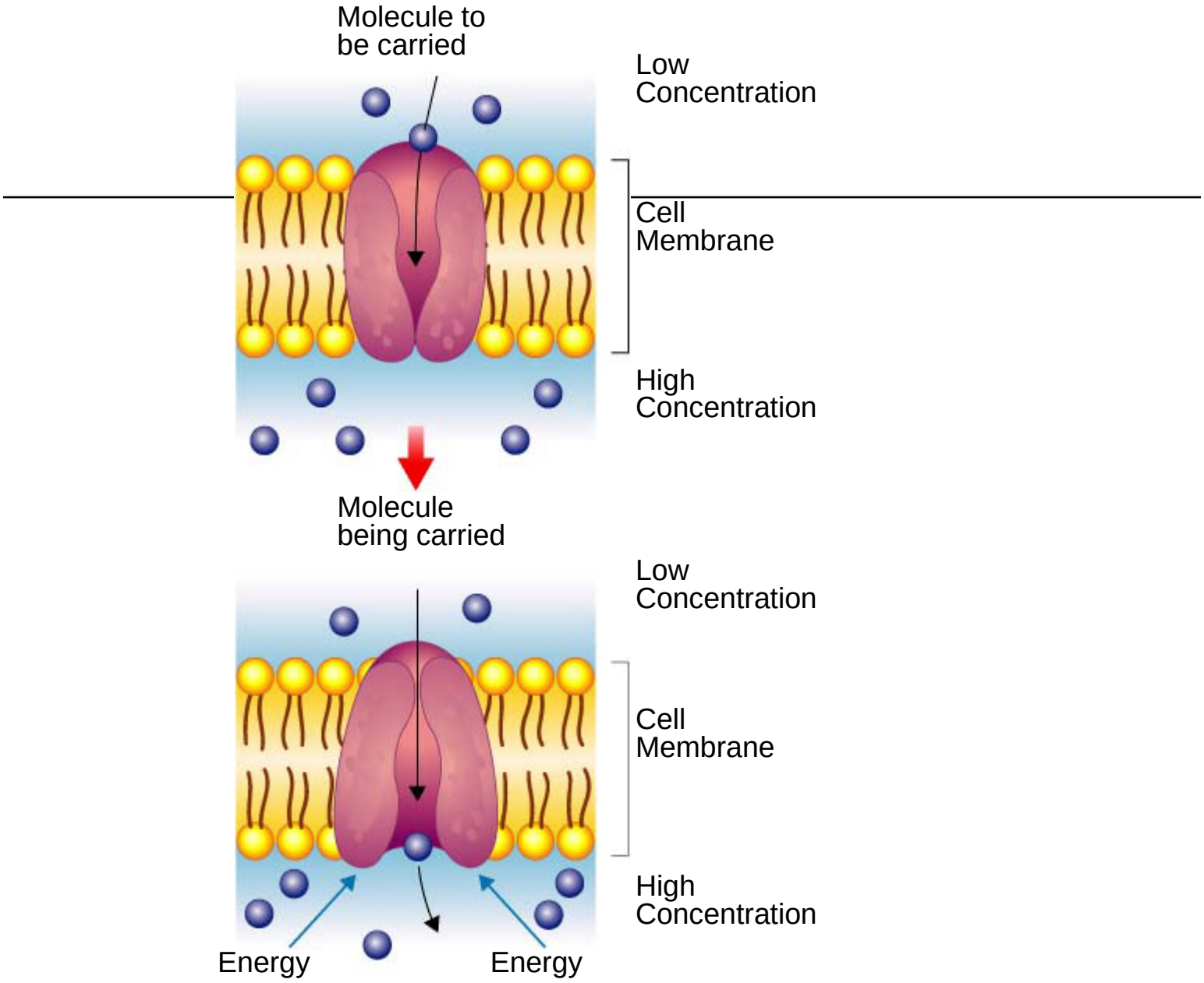
Facilitated Diffusion

- Diffusion with help
- Protein channels
  - Tunnel through membrane
  - Allow a specific molecule to pass through
  - Fast and specific, doesn't require energy
  - Check out this video



Active Transport

- Substance moved against the concentration gradient
- Area of [low] to [high]
- Requires energy
- Special “pumps” in cell membrane
- Sodium/potassium pumps pump in K+ ions and pump out Na- ions
- Check out this video


Molecule to be carried
Low Concentration
Cell Membrane
High Concentration
Molecule being carried
Low Concentration
Cell Membrane
High Concentration
Energy
Energy

Membrane Folding action

- Endocytosis-- membrane folds around and engulfs small particle
- Makes a vacuole
- Phagocytosis – cell engulfs a large particle
- Exocytosis – cell spits out a particle
- Check out this video