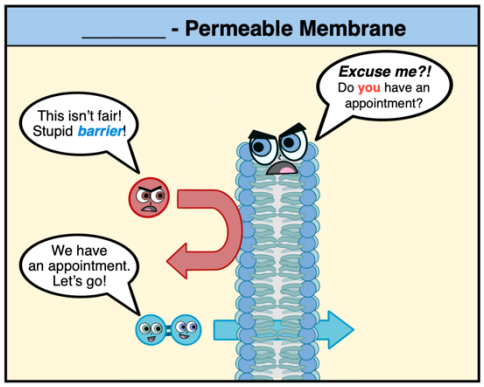
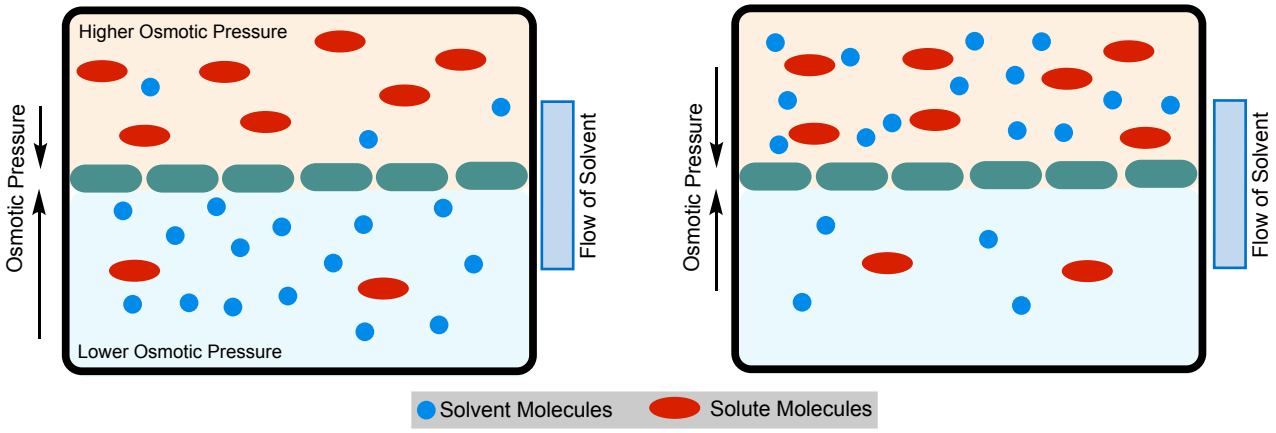
CONCEPT: OSMOSIS

- **Osmosis** is the net movement of _____ (usually water) across a *semipermeable membrane*.
  - □ **Semipermeable Membrane:** material allowing solvent and other _____ molecules to pass across.
  - □ Cell membranes around _____ are semipermeable.
    - prevent solutes from passing through
    - solutes can be ions or large molecules



- Solvent moves from a _____ concentration solution to a _____ concentration solution.
  - □ Eventually equilibrium is reached and net flow of solvent is stopped by _____.
  - □ **Osmotic Pressure:** pressure exerted on the semipermeable membrane by the solvent.



EXAMPLE: Osmosis is best defined as the movement of:

a) Water molecules across a semipermeable membrane into a region of low solute concentration.

b) Solute molecules from an area of high concentration to an area of lower concentration.

c) Solute molecules from an area of low concentration to an area of higher concentration.

d) Water molecules across a semipermeable membrane into a region of high solute concentration.

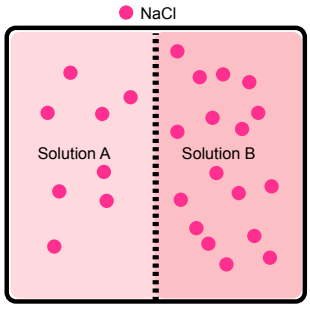
CONCEPT: OSMOSIS

PRACTICE: A semipermeable membrane is placed between the following solutions.

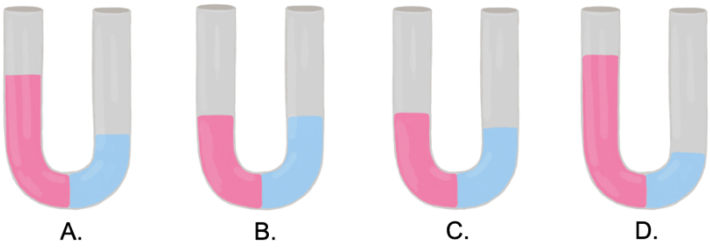
Which solution will increase in volume?

a) Solution A: 6.78% NaCl

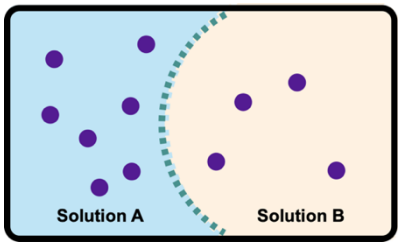
b) Solution B: 12.7% NaCl



PRACTICE: Four U tubes each have distilled water in the right arm, a solution in the left arm, and a semipermeable membrane between the arms. If the solute is LiF, which solution is most concentrated?



PRACTICE: Identify the direction of water flow between 2 solutions separates by semipermeable membrane, where ● are the solute particles.



a) water will flow from solution A to solution B due to higher osmotic pressure on the solution B.

b) water will flow from solution A to solution B due to lower osmotic pressure on solution B.

c) water will flow from solution B to solution A due to lower osmotic pressure on solution B.

d) water will flow from solution B to solution A due to lower osmotic pressure on solution A.

e) water will not flow because both solutions have the same osmotic pressures.

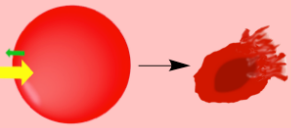
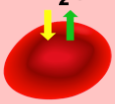
CONCEPT: OSMOSIS

- Direction of solvent flow depends on *tonicity*.
  - □ **Tonicity:** relative concentration of _____ dissolved in the solutions.

Tonicity of Solutions

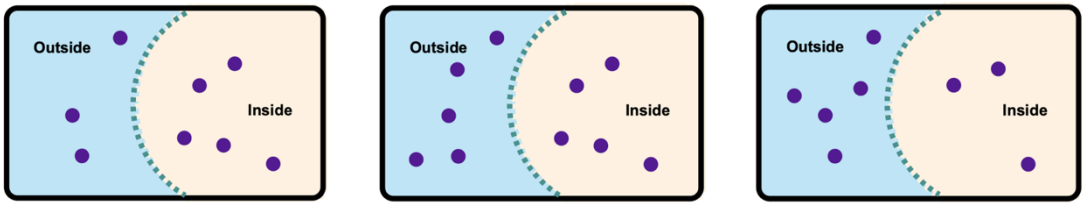
1. **Hypotonic Solution:** has a lower solute concentration and lower osmotic pressure relative to body fluids.
2. **Isotonic Solution**: two solutions have the same solute concentration and osmotic pressure.
   - □ Intravenous solutions must be _____ to bodily fluids such as blood, plasma, tissue fluids, etc.
3. **Hypertonic Solution:** has a higher solute concentration and osmotic pressure relative to body fluids.

Solution Tonicity in Red Blood Cells

	1 Hypotonic Environment 	2 Isotonic Environment	3 Hypertonic Environment 
Solute Concentration Outside the Cell	□ _____ solute concentration	□ _____ solute concentration	□ _____ solute concentration
Osmotic Pressure Outside the Cell	□ _____ pressure	□ _____ pressure	□ _____ pressure
Effects on Red Blood Cells	□ water _____ the cell □ causes **hemolysis**: - cell _____ & _____ H_2O 	□ water enters & exits the cell at equal rate □ no _____ movement of water H_2O 	□ water _____ the cell □ causes **crenation**: - cell dehydrates & _____ H_2O 

- □ ***Hypo****tonic Environment:* **Hippo**  drinks too much water and swells like a cell.
- □ ***Hyper****tonic Environment:* **Hyper** kid  playing outside gets dehydrated like a cell.

EXAMPLE: Label the tonicity of the solution outside the cell, where ● are the solute particles.



_____ _____ _____

CONCEPT: OSMOSIS

PRACTICE: If the fluid surrounding a patient's red blood cells is depleted in electrolytes, is crenation or hemolysis more likely to occur?

a) crenation b) hemolysis

PRACTICE: A solution with the same osmotic pressure as the blood is

a) isotonic to the blood b) hypotonic to the blood c) hypertonic to the blood d) nontonic to the blood.

PRACTICE: A red blood cell placed in pure water will swell because:

a) the osmotic pressure is greater in the water than in the cell.

b) the osmotic pressure is greater in the cell than in the water.

c) the osmotic pressure is the same in the cell and the water.

d) water moves from a higher osmotic pressure to a lower osmotic pressure.

e) the vapor pressure of the water in the cell is greater than the vapor pressure of pure water.