

# What is Osmosis and Diffusion?

## Worksheet

Diffusion is the net movement of particles from an area of high concentration to low concentration; osmosis is the diffusion of water specifically, across a selectively permeable membrane, from a region of high water (low solute) concentration to low water (high solute) concentration.

## Questions

- Which best describes osmosis?
  - Movement of any solute across a membrane
  - Diffusion of water across a selectively permeable membrane
  - Active transport of ions
  - Movement of gases only
- A cell placed in a hypertonic solution will most likely
  - Swell and burst
  - Shrink (crenate)
  - Stay exactly the same
  - Divide rapidly
- In = MRT, if molarity M doubles while T stays constant, osmotic pressure
  - Halves
  - Stays the same
  - Doubles
  - Quadruples
- Does diffusion require energy (ATP) input?
  - Yes, always
  - No, it is passive
  - Only in animal cells
  - Only for water
- Find the osmotic pressure of a 0.30 mol/L sucrose solution at 300 K.
- A red blood cell is placed in distilled water (pure water, no solute). Predict what happens and why.
- Find the molarity needed to produce an osmotic pressure of 12.3 atm at 273 K.
- Define: What is diffusion?
- Define: What is osmosis?
- Define: What is a hypertonic solution?

## Answer Key

1. B) Diffusion of water across a selectively permeable membrane - Osmosis specifically refers to water diffusing across a selectively permeable membrane.
2. B) Shrink (crenate) - In a hypertonic solution, water leaves the cell toward the higher solute concentration outside, causing it to shrink.
3. C) Doubles - is directly proportional to M, so doubling M doubles .
4. B) No, it is passive - Diffusion is a passive process, moving down the concentration gradient without needing ATP.
5. = MRT = 0.30 0.0821 300 7.39 atm
6. The cell's cytoplasm has a higher solute concentration than pure water (a hypotonic environment). Water moves by osmosis from the low-solute water into the high-solute cell, following the concentration gradient. The cell swells and may burst (lyse) because water keeps entering.
7. = MRT  $M = \frac{P}{RT}$   $M = \frac{12.3}{(0.0821 \cdot 273)}$   $M = \frac{12.3}{22.41}$  0.55 mol/L
8. The net movement of particles from high to low concentration until equilibrium is reached, requiring no energy input.
9. The diffusion of water across a selectively permeable membrane, from low solute (high water) to high solute (low water) concentration.
10. A solution with a higher solute concentration than the cell, causing the cell to lose water and shrink.

### **Bounlu**

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