

What is Diffusion and Osmosis?

Worksheet

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

Questions

1. What does diffusion always move from high to low?

- A) Temperature only
- B) Concentration of particles
- C) Cell volume
- D) Membrane thickness

2. Osmosis specifically refers to the movement of what?

- A) Any gas
- B) Proteins
- C) Water
- D) Salt ions

3. A cell placed in a hypertonic solution will

- A) Swell and burst
- B) Shrink (crenate)
- C) Stay exactly the same
- D) Divide rapidly

4. In $\pi = iMRT$, what does 'i' represent?

- A) Temperature
- B) Van't Hoff factor (particles per formula unit)
- C) Osmotic pressure
- D) Volume

5. Calculate the osmotic pressure of a 0.3 mol/L glucose solution at 298 K (glucose does not dissociate, so $i = 1$).

6. A red blood cell is placed in a hypertonic solution (higher solute concentration outside than inside). What happens to the cell?

7. A drop of food coloring is added to a glass of still water. Describe what happens over 10 minutes using the concept of diffusion.

8. Define: What is diffusion?

9. Define: What is osmosis?

10. Define: What is a hypertonic solution?

Answer Key

1. B) Concentration of particles - Diffusion is driven by a concentration gradient, moving particles from high to low concentration.
2. C) Water - Osmosis is diffusion of water across a selectively permeable membrane.
3. B) Shrink (crenate) - Water leaves the cell toward the higher outside solute concentration, causing it to shrink.
4. B) Van't Hoff factor (particles per formula unit) - 'i' is the number of particles a solute dissociates into, e.g. $i=2$ for NaCl.
5. $= iMRT = 1 \cdot 0.3 \cdot 0.0821 \cdot 298 = 7.34 \text{ atm}$
6. Water moves from low solute (inside cell) to high solute (outside) concentration by osmosis. The cell loses water and shrinks - this is called crenation.
7. Color molecules start concentrated at one point (high concentration). They move toward the surrounding low-concentration water (net movement high to low). After ~10 minutes, the color spreads evenly - the system reaches equilibrium.
8. The net movement of particles from an area of high concentration to low concentration, without using energy.
9. The diffusion of water across a selectively permeable membrane, from low to high solute concentration.
10. A solution with a higher solute concentration than the cell - water leaves the cell, causing it to shrink.

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