

Biology Laboratory

Observation of diffusion and osmosis

Diffusion and osmosis are two fundamental processes in the biology:

They explain how substances move across cell membranes and how cells maintain balance with their environment.

Understanding these processes is essential for studying cell function and survival.

What is the Diffusion?

Diffusion is the movement of molecules from an area of high concentration to an area of low concentration until equilibrium is reached.

Main Characteristics

- * Does not require energy
- * Occurs in gases, liquids and solids
- * Continues until concentrations become equal

Example

- * Perfume spreading in air
- * Oxygen moving into cells
- * Ink spreading in water

Types of Diffusion Across Cell Membrane

a. Simple Diffusion

Movement of small molecules such as oxygen and carbon dioxide directly through the membrane.

b. Facilitated Diffusion

Movement of molecules through special transport proteins in the membrane.

Factors Affecting Diffusion:

1. Temperature (higher temperature increases diffusion rate)
2. Concentration gradient
3. Size of molecules
4. Surface area of the membrane

What is the Osmosis?

Osmosis is a special type of diffusion It is the movement of water molecules across a semi-permeable membrane from a region of high-water concentration to a region of low water concentration.

Main Characteristics

- * Only water molecules move
- * Requires a semi-permeable membrane
- * Vital for cell survival

Factors Affecting Osmosis

- 1) Difference in solute concentration
- 2) Temperature
- 3) Membrane permeability

4) Surface area of the membrane

Importance in Living Cells:

- 1) Maintains cell size and shape
- 2) Regulates water balance
- 3) Supports nutrient and waste transport
- 4) Prevents cell damage

Types of Solutions (Osmosis):

◆ Hypotonic Solution:

- Higher water concentration outside the cell
- Cell swells

◆ Hypertonic Solution

- Lower water concentration outside the cell
- Cell shrinks

◆ Isotonic Solution

- Equal water concentration
- No net movement

Laboratory Experiment:

Experiment Title:

Demonstration of Osmosis Using Potato Strips.

Aim

To observe the effect of osmosis on plant tissue.

Materials

- Fresh potato

- Knife
- Beakers
- Distilled water
- Salt solution
- Balance (optional)

Procedure

1. Cut the potato into equal strips
2. Measure initial length or weight
3. Place one strip in distilled water
4. Place another strip in salt solution
5. Leave for 30–45 minutes
6. Remove strips and observe changes

Observations

- Potato in distilled water becomes firm
- Potato in salt solution becomes soft

Result

Water moves into the potato cells in distilled water (hypotonic solution)

Water moves out of potato cells in salt solution (hypertonic solution)

Conclusion

Osmosis causes changes in cell turgidity depending on surrounding solution concentration.