

Cell Biology Laboratory

Osmosis and Diffusion

Introduction:

Diffusion and osmosis are two fundamental processes in cell 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.

Objectives of the Lecture

By the end of this lecture, students will be able to:

Define diffusion and osmosis

Differentiate between diffusion and osmosis

Understand the role of semi-permeable membranes

Perform a simple laboratory experiment related to osmosis

Diffusion

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

Key Points:

- * 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

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.

Key Points:

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

Importance in Living Cells:

- Maintains cell size and shape
- Regulates water balance
- Supports nutrient and waste transport
- 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.