LAB 04 – Diffusion and Osmosis

Objectives:

- Describe the physical mechanisms of diffusion and osmosis.
- Understand the relationship between surface area and rate of diffusion.
- Describe how molar concentration affects the process of diffusion.
- Predict cell outcomes when changing the concentration of solute in a solution in which the cell is suspended.
- Determine the molar concentration of sucrose in a plant cell.

Do not just copy these down for the abstract! These are the learning objectives, not the objectives of the actual experiment!

Introduction:

Many aspects of the life of a cell depend on the fact that atoms and molecules are constantly in motion (the concept of kinetic energy). This kinetic energy results in molecules bumping into and rebounding off each other and moving in new directions. One result of this molecular motion is the process of diffusion.

Cells must move materials through membranes and throughout cytoplasm in order to maintain homeostasis. The movement is regulated because cellular membranes, including the plasma and organelle membranes, are selectively permeable. Membranes are phospholipid bilayers containing embedded proteins. The phospholipid fatty acids limit the movement of water because of their hydrophobic characteristics.

The cellular environment is aqueous, meaning that the solvent is water, in which the solutes, such as salts and organic molecules, are dissolved. Water may pass freely through the membrane by osmosis or through specialized protein channels called aquaporins. Most ions move through protein channels, while larger molecules, such as carbohydrates, are carried by transport proteins.

The simplest form of movement is diffusion, in which solutes move from an area of high concentration to an area of low concentration; diffusion is directly related to molecular kinetic energy. Diffusion does not require energy input. The movement of a solute from an area of low concentration to an area of high concentration requires energy input in the form of ATP and protein carriers called pumps.

Water moves through membranes by diffusion; this process is called osmosis. Like solutes, water moves down its concentration gradient. Water moves from areas of high potential (high water concentration) and low solute concentration to areas of low potential (low water concentration) and high solute concentration. In walled cells, osmosis is affected not only by the solute concentration but also by the resistance to water movement in the cell by the cell wall. This resistance is called turgor pressure (the physical pressure exerted on the cell).

The terms *hypertonic*, *hypotonic*, and *isotonic* are used to describe solutions separated by selectively permeable membranes.

- A hypertonic solution has a higher solute concentration and a lower water potential as compared to the other solution; therefore, water will move into the hypertonic solution through the membrane.
- A hypotonic solution has a lower solute concentration and a higher water potential than the solution on the other side of the membrane; water will move down its concentration gradient into the other solution.
- Isotonic solutions have equal water potential.

Biology Lab Manual Answers Diffusion Osmosis

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leaves 7 To study and identify different types of inflorescence Racemose and Cymose 8 To study imbition in seed raisins 9 To demonstrate that anaerobic respiration take place in the absence of air 10 To study human skeleton and joints 11 To study the external features of cockroach with help of model or chart *Biology Lab Manual Class XI | As per the latest CBSE syllabus and other State Board following the curriculum of CBSE.* Dr. Priyanka Gupta,Mr. Kaushalesh Dwivedi,2022-08-04 With the NEP and expansion of research and knowledge has changed the face of education to a great extent In the Modern times education is not just constricted top the lecture method but also includes a practical knowledge of certain subjects This way of education helps a student to grasp the basic concepts and principles Thus trying to break the stereotype that subjects like Physics Chemistry and Biology means studying lengthy formulas complex structures and handling complicated instruments we are trying to make education easy fun and enjoyable

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