


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.

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Sebastian Brünink



Lab Four Lab Manual Diffusion And Osmosis:

Biology Lab Manual Neena Sinha, R Rangarajan, R P Manchanda, R K Gupta, Rajesh Kumar, Lab Manual *Anatomy & Physiology Laboratory Manual and E-Labs E-Book* Kevin T. Patton, 2018-01-24 Using an approach that is geared toward developing solid logical habits in dissection and identification the Laboratory Manual for Anatomy and coloring exercises offer a kinesthetic experience useful in retention of content User friendly spiral binding allows for hands free viewing in the lab setting Step by step dissection instructions with accompanying illustrations and photos cover anatomical models and fresh or preserved specimens and provide needed guidance during dissection labs The dissection of tissues organs and entire organisms clarifies anatomical and functional relationships 250 illustrations including common histology slides and depictions of proper procedures accentuate the lab manual s usefulness by providing clear visuals and guidance Easy to evaluate tear out Lab Reports contain checklists drawing exercises and questions that help you demonstrate your understanding of the labs you have participated in They also allow instructors to efficiently check student progress or assign grades Learning objectives presented at the beginning of each exercise offer a straightforward framework for learning Content and concept review questions throughout the manual provide tools for you to reinforce and apply knowledge of anatomy and function Complete lists of materials for each exercise give you and your instructor a thorough checklist for planning and setting up laboratory activities allowing for easy and efficient preparation Modern anatomical imaging techniques such as computed tomography CT magnetic resonance imaging MRI and ultrasonography are introduced where appropriate to give future health professionals a taste for and awareness of how new technologies are changing and shaping health care Boxed hints throughout provide you with special tips on handling specimens using equipment and managing lab activities Evolve site includes activities and features for students as well as resources for instructors *Lab Manual Biology Class 11* Rajesh Kumar, Lab Manual **Part - Anatomy & Physiology Laboratory Manual - E-Book** Kevin T Patton, PhD, 2014-12-02 Effectively master various physiology dissection identification and anatomic explorations in the laboratory setting with the *Anatomy Physiology Laboratory Manual 9th Edition* This practical full color lab manual contains 55 different A P lab exercises that cover labeling anatomy identification dissection physiological experiments computerized experiments and more The manual also includes safety tips a comprehensive instruction and preparation guide for the laboratory and tear out worksheets for each of the 55 exercises In addition 8 e Lab modules offer authentic 3D lab experiences online for virtual lab instruction 8 interactive eLabs further your laboratory experience in the digital environment Complete list of materials for each exercise offers a thorough checklist for planning and setting up laboratory activities Over 250 illustrations depict proper procedures and common histology slides Step by step guidance for dissection of anatomical models and fresh or preserved specimens with accompanying illustrations helps you become acclimated to the lab environment Physiology experiments centering on functional processes of the human body offer immediate and exciting examples of physiological

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