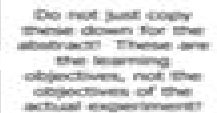


LAB 04 – Diffusion and Osmosis

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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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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Education, Committee on Programs for Advanced Study of Mathematics and Science in American High Schools, 2002-09-06 This book takes a fresh look at programs for advanced studies for high school students in the United States with a particular focus on the Advanced Placement and the International Baccalaureate programs and asks how advanced studies can be significantly improved in general It also examines two of the core issues surrounding these programs they can have a profound impact on other components of the education system and participation in the programs has become key to admission at selective institutions of higher education By looking at what could enhance the quality of high school advanced study programs as well as what precedes and comes after these programs this report provides teachers parents curriculum developers administrators college science and mathematics faculty and the educational research community with a detailed assessment that can be used to guide change within advanced study programs *Anatomy and Physiology, Laboratory Manual* Connie Allen, Valerie Harper, 2016-12-28 The Allen Laboratory Manual for Anatomy and Physiology 6th Edition contains dynamic and applied activities and experiments that help students both visualize anatomical structures and understand complex physiological topics Lab exercises are designed in a way that requires students to first apply information they learned and then critically evaluate it With many different format options available and powerful digital resources it s easy to customize this laboratory manual to best fit your course AP Biology Deborah T. Goldberg, 2020-06-19 Be prepared for exam day with Barron s Trusted content from AP experts Barron s AP Biology 2020 2021 includes in depth content review and practice It s the only book you ll need to be prepared for exam day Written by Experienced Educators Learn from Barron s all content is written and reviewed by AP experts Build your understanding with comprehensive review tailored to the most recent exam Get a leg up with tips strategies and study advice for exam day it s like having a trusted tutor by your side Be Confident on Exam Day Sharpen your test taking skills with 2 full length practice tests Strengthen your knowledge with in depth review covering all Units on the AP Biology Exam Reinforce your learning with practice questions at the end of each chapter **Lab Manual Biology Class 12** Rajesh Kumar, Lab Manual **Workbook and Lab Manual for Mosby's Pharmacy Technician**, 2015-01-28 With chapter by chapter review and practice this easy to use workbook and lab manual reinforces your understanding of key facts and concepts from Mosby s Pharmacy Technician Principles and Practice 4th Edition Chapter specific lab exercises and skill check off sheets correspond to procedures in the textbook and a wide variety of review questions including fill in the blank matching true false and multiple choice exercises and activities help you study more effectively and learn to apply your knowledge for success on the job Practice with the most important subject areas taught in pharmacy technician programs prepares you for the PTCE and your future job Critical thinking exercises help you apply what you ve learned to real life situations Fill in the blank matching true false and multiple choice questions reinforce chapter material UNIQUE Internet research activities prepare you for research tasks you will encounter on the job Math calculation exercises help you master this difficult area of pharmacology NEW Chapter specific lab exercises give you

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