

## CHAPTER 5.3—5.5: Transport Across the Plasma Membrane

1. The cell membrane is selectively permeable. Explain what that means. Which molecules easily cross the membrane? How are molecules transported that do not easily cross the membrane?

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2. Define the following

a. Diffusion \_\_\_\_\_

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b. Facilitated Diffusion \_\_\_\_\_

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c. Osmosis \_\_\_\_\_

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d. Hypotonic \_\_\_\_\_

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e. Hypertonic \_\_\_\_\_

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f. Isotonic \_\_\_\_\_

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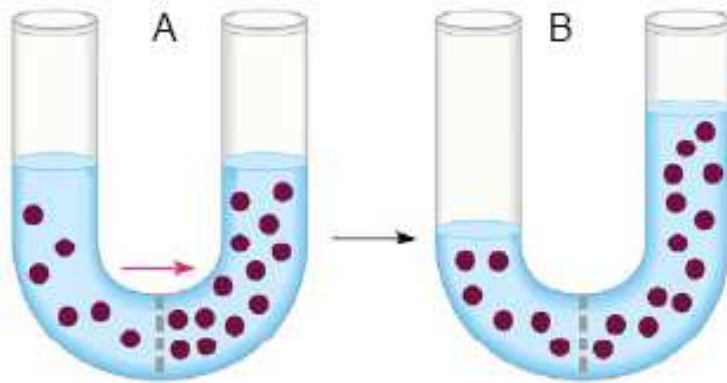
3. Explain how facilitated diffusion works and give an example.

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4. What is happening in the diagram below?



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5. What is the function of aquaporins? Why are they necessary?

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6. What do animal & plant cells do when placed in solutions that are:

a. Hypotonic \_\_\_\_\_

b. Hypertonic \_\_\_\_\_

c. Isotonic \_\_\_\_\_

7. How does the *Paramecium* maintain osmoregulation?

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8. What is the difference between exocytosis and endocytosis?

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Name: \_\_\_\_\_

9. Distinguish between pinocytosis and phagocytosis.

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10. Describe an example of receptor-mediated endocytosis.

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11. How do active and passive transport differ?

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12. The sodium-potassium pump uses \_\_\_\_\_ to pump \_\_\_\_\_  
out of the cell and \_\_\_\_\_ into the cell.

13. Define a type of 'coupled' transport and give an example.

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14. Define a type of 'counter' transport and give an example

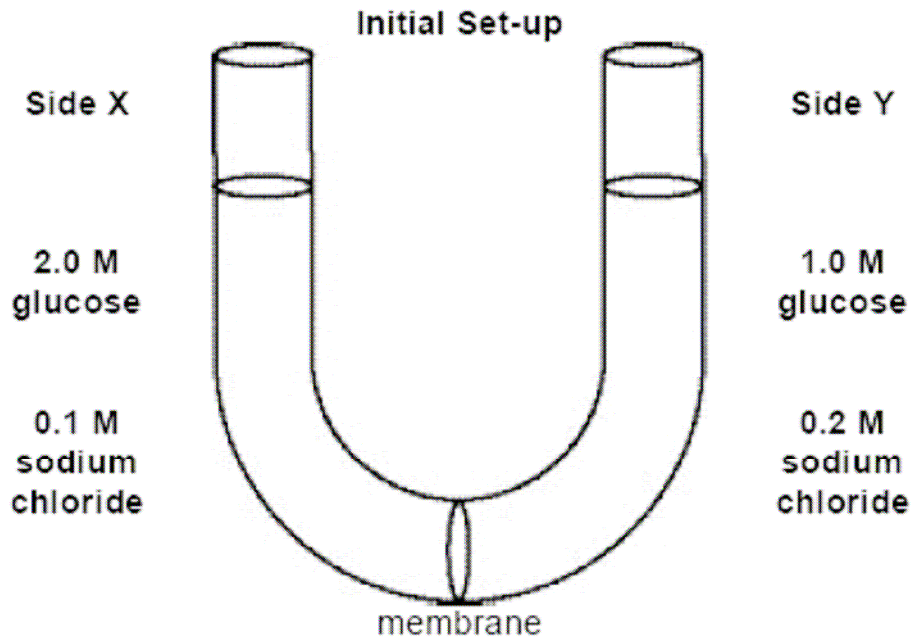
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## THE OSMOSIS CHALLENGE!!!

The following questions refer to the diagram below.

The solutions in the two arms of the U-tube are separated at the bottom of the tube by a selectively permeable membrane. At the beginning of the experiment the volumes in both arms are the same, and the level of the liquid is therefore at the same height. The membrane is permeable to water and to sodium and chloride ions, but **not** to glucose. The apparatus is allowed to stand for three days.



For each of the next 10 questions, select the most appropriate phrase using the following key.

- a. Both the **statement** and the **reason** are correct.
- b. The **statement** is correct, but the **reason** is incorrect.
- c. The **statement** is incorrect, but the **reason** is a fact or a principle.
- d. Both the **statement** and the **reason** are incorrect.

- \_\_\_\_\_ 1. The sodium chloride solution on Side X will become more concentrated and that on Side Y less concentrated **because** a substance tends to diffuse from regions of lower concentration to regions of higher concentration of that substance.
- \_\_\_\_\_ 2. The concentrations of the glucose solutions on Sides X & Y will remain unchanged **because** the membrane is impermeable to glucose and so glucose cannot diffuse from one side to the other.
- \_\_\_\_\_ 3. The concentration of sodium chloride on Side X will eventually equal that on Side Y **because** sodium and chloride ions will move by diffusion from one side to the other, gradually reaching a uniform density, and then the net movement of ions will stop.

- \_\_\_\_\_ 4. The concentrations of glucose on Side X will decrease and that on Side Y increase **because** water molecules will diffuse through the membrane from Side Y to Side X by osmosis, thus lowering the glucose concentration on Side X.
- \_\_\_\_\_ 5. The fluid level will increase on Side Y and decrease on Side X **because** water molecules will move through the membrane from regions of higher to regions of lower concentration of water molecules.
- \_\_\_\_\_ 6. The fluid level on Side X will rise **because** the water molecules on that side at the beginning of the experiment have more free energy than those on Side Y.
- \_\_\_\_\_ 7. The net movement of water molecules will be from Side X to Side Y **because** water molecules will move from the solution with the lower osmotic potential to the solution with the higher osmotic potential when the two are separated by a selectively permeable membrane.
- \_\_\_\_\_ 8. Water molecule will move only from Side Y to Side X and not from Side X to Side Y **because** water molecules move only from regions of higher to regions of lower concentration.
- \_\_\_\_\_ 9. The fluid on Side X will rise **because** the solution in Side X had lower osmotic potential than the solution in Side Y.
- \_\_\_\_\_ 10. Water molecules will tend to move from Side Y to Side X **because** the net movement of water molecules will be from the solution with the lower to the solution with the higher osmotic potential.

### END OF CHAPTER 5 MULTIPLE CHOICE

1. Which statement about membrane phospholipids is not true?
  - A) They associate to form bilayers.
  - B) They have hydrophobic "tails."
  - C) They have hydrophilic "heads."
  - D) They give the membrane fluidity.
  - E) They flip-flop readily from one side of the membrane to the other.
2. When a hormone molecule binds to a specific protein on the plasma membrane, the protein it binds to is called a
  - A) ligand.
  - B) clathrin.
  - C) receptor protein.
  - D) hydrophobic protein.
  - E) cell adhesion molecule.
3. Which statement about membrane proteins is not true?
  - A) They all extend from one side of the membrane to the other.
  - B) Some serve as channels for ions to cross the membrane.
  - C) Many are free to migrate laterally within the membrane.
  - D) Their position in the membrane is determined by their tertiary structure.
  - E) Some play roles in photosynthesis.

4. Which statement about membrane carbohydrates is not true?
  - A) Most are bound to proteins.
  - B) Some are bound to lipids.
  - C) They are added to proteins in the Golgi apparatus.
  - D) They show little diversity.
  - E) They are important in recognition reactions at the cell surface.
  
5. Which statement about animal cell junctions is not true?
  - A) Tight junctions are barriers to the passage of molecules between cells.
  - B) Desmosomes allow cells to adhere firmly to one another.
  - C) Gap junctions block communication between adjacent cells.
  - D) Connexons are made of protein.
  - E) The fibers associated with desmosomes are made of protein.
  
6. You are studying how the protein transferrin enters cells. When you examine cells that have taken up transferrin, you find it inside clathrin-coated vesicles. Therefore, the most likely mechanism for uptake of transferrin is
  - A) facilitated diffusion.
  - B) an antiport.
  - C) receptor-mediated endocytosis.
  - D) gap junctions.
  - E) ion channels.
  
7. Which statement about ion channels is not true?
  - A) They form pores in the membrane.
  - B) They are proteins.
  - C) All ions pass through the same type of channel.
  - D) Movement through them is from high concentrations to low concentrations.
  - E) Movement through them is by simple diffusion.
  
8. Facilitated diffusion and active transport both
  - A) require ATP.
  - B) require the use of proteins as carriers.
  - C) carry solutes in only one direction.
  - D) increase without limit as the concentration gradient increases.
  - E) depend on the solubility of the solute in lipids.
  
9. Primary and secondary active transport both
  - A) generate ATP.
  - B) are based on passive movement of  $\text{Na}^+$  ions.
  - C) include the passive movement of glucose molecules.
  - D) use ATP directly.
  - E) can move solutes against their concentration gradients.