**Cell Transport and Homeostasis**

**True or False** *Write true if the statement is true or false if the statement is false.*

\_\_\_\_\_ 1. Passive transport needs energy.

\_\_\_\_\_ 2. Active transport needs energy.

\_\_\_\_\_ 3. Carrier proteins change shape when they transport substances.

\_\_\_\_\_ 4. Diffusion does not require any help from other molecules.

\_\_\_\_\_ 5. Facilitated diffusion does not require any help from other molecules.

\_\_\_\_\_ 6. Endocytosis removes large molecules from the cell.

\_\_\_\_\_ 7. In diffusion, substances move from an area of lower concentration to an area of higher concentration.

\_\_\_\_\_ 8. The sodium-potassium pump is a type of channel protein.

\_\_\_\_\_ 9. Ions can easily flow through a carrier protein.

\_\_\_\_\_ 10. Diffusion is the osmosis of water.

\_\_\_\_\_ 11. Endocytosis and exocytosis are types of vesicle transport.

\_\_\_\_\_ 12. Channel proteins form small “holes” in the plasma membrane.

\_\_\_\_\_ 13. Transport of substances across the cell membrane helps maintain homeostasis by keeping the cell's conditions within normal ranges.

\_\_\_\_\_ 14. Channel proteins and carrier proteins are both transport proteins.

\_\_\_\_\_ 15. The plasma membrane controls what enters and leaves the cell.

**Critical Reading** *Read these passages from the text and answer the questions that follow.*

**Passive Transport**

**Passive transport** occurs when substances cross the plasma membrane without any input of energy from the cell. No energy is needed because the substances are moving from an area where they have a higher concentration to an area where they have a lower concentration. Concentration refers to the number of particles of a substance per unit of volume. The more particles of a substance in a given volume, the higher the concentration. A substance always moves from an area where it is more concentrated to an area where it is less concentrated. It’s a little like a ball rolling down a hill. It goes by itself without any input of extra energy.

**Simple Diffusion**

**Diffusion** is the movement of a substance across a membrane, due to a difference in concentration, without any help from other molecules. The substance simply moves from the side of the membrane where it is more concentrated to the side where it is less concentrated. Substances that can squeeze between the lipid molecules in the plasma membrane by simple diffusion are generally very small, hydrophobic molecules, such as molecules of oxygen and carbon dioxide.

**Osmosis**

**Osmosis** is a special type of diffusion — the diffusion of water molecules across a membrane. Like other molecules, water moves from an area of higher concentration to an area of lower concentration. Water moves in or out of a cell until its concentration is the same on both sides of the plasma membrane.

**Facilitated Diffusion**

Water and many other substances cannot simply diffuse across a membrane. Hydrophilic molecules, charged ions, and relatively large molecules, such as glucose, all need help with diffusion. The help comes from special proteins in the membrane known as **transport proteins**. Diffusion with the help of transport proteins is called **facilitated diffusion**. There are several types of transport proteins, including channel proteins and carrier proteins.

* Channel proteins form pores, or tiny holes, in the membrane. This allows water molecules and small ions to pass through the membrane without coming into contact with the hydrophobic tails of the lipid molecules in the interior of the membrane.
* Carrier proteins bind with specific ions or molecules, and in doing so, they change shape. As carrier proteins change shape, they carry the ions or molecules across the membrane.

*Questions*

1. Explain why passive transport does not require energy.

2. What is a main difference between diffusion and facilitated diffusion?

3. Describe how simple diffusion proceeds. What kind of molecules can move across the membrane by simple diffusion?

4. How is water transported across the membrane?

5. What are the two types of transport proteins? Describe how they function.

**Multiple Choice** *Circle the letter of the correct choice.*

1. Controlling what enters and leaves the cell in an important function of the
   1. nucleus.
   2. vesicle.
   3. plasma membrane.
   4. Golgi apparatus.
2. During diffusion, substances move from an area of \_\_\_\_\_\_\_\_\_\_\_\_ concentration to an area of \_\_\_\_\_\_\_\_\_\_\_\_ concentration.
   1. higher, lower
   2. lower, higher
   3. higher, equal
   4. lower, equal
3. A channel protein does which of the following?
   1. Carries ions or molecules across the membrane.
   2. Forms tiny holes in the membrane.
   3. Changes shape as it transports molecules.
   4. all of the above
4. The sodium-potassium pump
   1. uses energy to move sodium ions out of the cell and potassium ions into the cell.
   2. uses energy to move potassium ions out of the cell and sodium ions into the cell.
   3. moves sodium ions out of the cell and potassium ions into the cell without using energy.
   4. moves potassium ions out of the cell and sodium ions into the cell without using energy.
5. Osmosis
   1. is the diffusion of water.
   2. is the diffusion of water and other small molecules.
   3. is the diffusion of water and small ions.
   4. is the diffusion of small molecules and ions.
6. Types of passive transport include which of the following? (1) simple diffusion, (2) osmosis, (3) facilitated diffusion, (4) active transport, and (5) vesicle transport.
   1. 1 and 2
   2. 1, 2, and 3
   3. 4 and 5
   4. 1, 2, 3, 4, and 5
7. Endocytosis and exocytosis
   1. are both a type of vesicle transport.
   2. move very large molecules either in or out of the cell.
   3. are both a form of active transport.
   4. all of the above
8. Which of the following needs energy? (1) passive transport, (2) active transport, (3) exocytosis, and (4) osmosis.
   1. 1 only
   2. 2 only
   3. 2 and 3
   4. 2, 3, and 4

**Matching** *Match the vocabulary word with the proper definition.*

**Definitions**

\_\_\_\_\_ 1. transport across a membrane without any additional energy requirement

\_\_\_\_\_ 2. the diffusion of water

\_\_\_\_\_ 3. type of vesicle transport that moves a substance into the cell

\_\_\_\_\_ 4. type of vesicle transport that moves a substance out of the cell

\_\_\_\_\_ 5. special proteins in the membrane that aid diffusion

\_\_\_\_\_ 6. membrane protein that forms a small hole that allows ions to pass through

\_\_\_\_\_ 7. an active transport protein

\_\_\_\_\_ 8. diffusion with the help of transport proteins

\_\_\_\_\_ 9. the movement of a substance across a membrane without any help from other molecules

\_\_\_\_\_ 10. the transport of very large molecules, such as proteins

\_\_\_\_\_ 11. transport across a membrane in which energy is required

**Terms**

a. active transport

b. channel protein

c. diffusion

d. endocytosis

e. exocytosis

f. facilitated diffusion

g. osmosis

h. passive transport

i. sodium-potassium pump

j. transport protein

k. vesicle transport

**Fill in the Blank** *Fill in the blank with the appropriate term.*

1. By moving substances into and out of cells, \_\_\_\_\_\_\_\_\_\_\_\_ , the process of keeping stable conditions inside a cell, is maintained.

2. A \_\_\_\_\_\_\_\_\_\_\_\_ protein changes shape as it carries ions or molecules across the membrane.

3. Exocytosis is the type of \_\_\_\_\_\_\_\_\_\_\_\_ transport that moves a substance out of the cell.

4. \_\_\_\_\_\_\_\_\_\_\_\_ transport is movement across the plasma membrane that does not require an input of energy.

5. The sodium-potassium \_\_\_\_\_\_\_\_\_\_\_\_ is involved in the active-transport of ions.

6. Facilitated diffusion needs the help of \_\_\_\_\_\_\_\_\_\_\_\_ proteins

7. \_\_\_\_\_\_\_\_\_\_\_\_ refers to the number of particles of a substance per unit of volume.

8. \_\_\_\_\_\_\_\_\_\_\_\_ is the type of vesicle transport that moves a substance into the cell.

9. Energy for active transport is supplied by molecules of \_\_\_\_\_\_\_\_\_\_\_\_.

10. \_\_\_\_\_\_\_\_\_\_\_\_ is the diffusion of water.

11. During active transport, a substance is moving from an area of \_\_\_\_\_\_\_\_\_\_\_\_ concentration to an area of \_\_\_\_\_\_\_\_\_\_\_\_ concentration.

12. Moving molecules in and out of the cell is an important role of the \_\_\_\_\_\_\_\_\_\_\_\_.

**Critical Writing** *Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.*

Discuss passive and active transport. Describe the main differences between these two types of transport, and provide examples of each type.