

## SECTION 1-4

## SECTION SUMMARY

## The Cell in Its Environment

## 1

### Guide for Reading

- ◆ By what three methods do materials move into and out of cells?
- ◆ What is the difference between passive transport and active transport?

The cell membrane is **selectively permeable**, which means that some substances can pass through it while others cannot. The cell membrane is usually permeable to substances such as oxygen, water, and carbon dioxide. On the other hand, the cell membrane is usually not permeable to some large molecules and salts. **Substances that can move into and out of a cell do so by one of three methods: diffusion, osmosis, or active transport.**

The main method by which substances move into and out of cells is diffusion. **Diffusion** is the process by which molecules tend to move from an area of higher concentration to an area of lower concentration. The concentration of a substance is the amount of the substance in a given volume. Diffusion is caused by molecules moving and colliding. The collisions cause the molecules to push away from one another and spread out. Molecules diffuse through the cell membrane into a cell when there is a higher concentration of the molecules outside the cell than inside the cell.

The diffusion of water molecules through a selectively permeable membrane is called **osmosis**. Osmosis is important to cells because cells cannot function properly without adequate water. In osmosis, water molecules move from an area where they are highly concentrated through the cell membrane to an area where they are less concentrated.

The movement of materials through a cell membrane without using energy is called **passive transport**. Diffusion and osmosis are both types of passive transport. When a cell needs to take in materials that are in higher concentration inside the cell than outside the cell, the movement of the materials requires energy. **Active transport** is the movement of materials through a cell membrane using energy. **The main difference between passive transport and active transport is that active transport requires the cell to use energy while passive transport does not.** A cell has several ways of moving materials by active transport. In one method, transport proteins in the cell membrane “pick up” molecules outside the cell and carry them in, using energy in the process. Another method of active transport is engulfing, in which the cell membrane surrounds, or engulfs, a particle. The cell must use energy in this process as well.

Most cells are very small. One reason is related to the fact that all materials move into and out of cells through the cell membrane. Once a molecule enters a cell, it is carried to its destination by a stream of moving cytoplasm. In a very large cell, streams of cytoplasm must travel farther to carry materials from the cell membrane to all parts of the cell. When a cell reaches a certain size, it divides into two new cells.

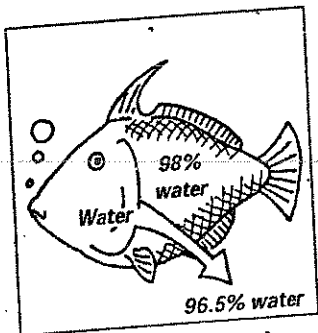
**SECTION 1-4**

**REVIEW AND REINFORCE**

**The Cell in Its Environment**

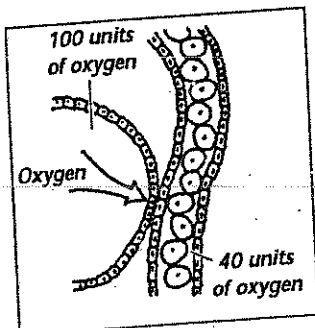
**◆ Understanding Main Ideas**

Fill in the blank to identify the process illustrated in each of the following figures.



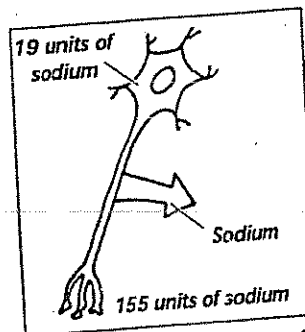
Water moves out of the cells of a saltwater fish and into the ocean.

1. \_\_\_\_\_



Oxygen moves from the lungs into the bloodstream.

2. \_\_\_\_\_



Sodium is pumped out of a nerve cell.

3. \_\_\_\_\_

Answer the following questions on a separate sheet of paper.

4. Explain how osmosis differs from diffusion.
5. Compare and contrast active and passive transport.
6. Identify two methods of active transport.
7. State one reason that cells are small.

**◆ Building Vocabulary**

If the statement is true, write true. If the statement is false, change the underlined word or words to make the statement true.

8. Selectively permeable means letting some but not all substances pass through.
9. Osmosis is the process by which molecules tend to move from an area of higher concentration to an area of lower concentration.
10. The process by which water moves across a selectively permeable membrane is called diffusion.
11. Diffusion and osmosis are types of active transport.
12. Passive transport requires energy.

# Cell Transport Review Worksheet

Name \_\_\_\_\_

Complete the table by checking the correct column for each statement:

| Statement                          | Isotonic solution | Hypotonic solution | Hypertonic solution |
|------------------------------------|-------------------|--------------------|---------------------|
| Causes a cell to swell             |                   |                    |                     |
| Doesn't change the shape of a cell |                   |                    |                     |
| Causes osmosis                     |                   |                    |                     |
| Causes a cell to shrink            |                   |                    |                     |

Match the term with its correct description:

- |                          |                     |
|--------------------------|---------------------|
| a. energy                | e. active transport |
| b. facilitated diffusion | f. exocytosis       |
| c. endocytosis           | g. carrier protein  |
| d. passive transport     | h. channel protein  |

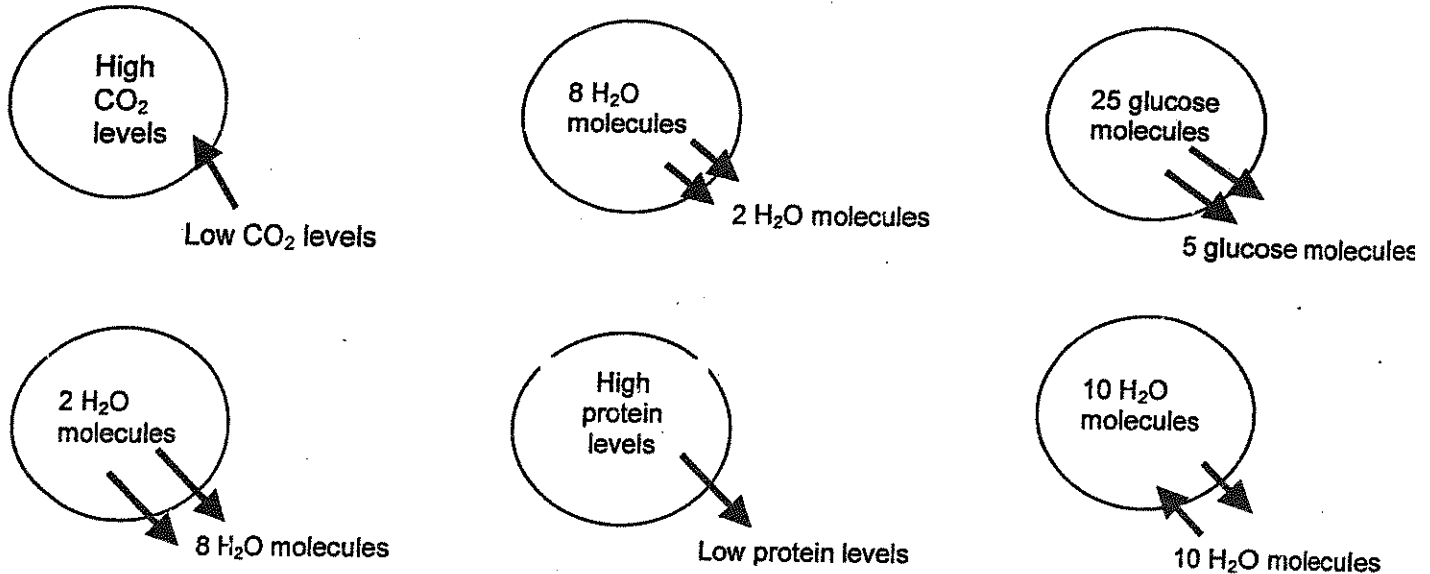
- \_\_\_\_\_ Is used during active transport but not passive transport
- \_\_\_\_\_ Active transport process in which a cell takes IN a molecule.
- \_\_\_\_\_ Particle movement from an area of higher concentration to an area of lower concentration. No energy required
- \_\_\_\_\_ Process by which a cell expels wastes using energy
- \_\_\_\_\_ A form of passive transport that uses transport proteins
- \_\_\_\_\_ Particle movement from an area of lower concentration to an area of higher concentration
- \_\_\_\_\_ Transport protein used in active transport

Match the term with its correct description:

- |                     |                      |                |
|---------------------|----------------------|----------------|
| a. carrier protein  | d. passive transport | g. exocytosis  |
| b. active transport | e. osmosis           | h. equilibrium |
| c. diffusion        | f. endocytosis       |                |

- \_\_\_\_\_ The diffusion of water through a cell membrane
- \_\_\_\_\_ The movement of substances through the cell membrane without the use of cellular energy (general definition)
- \_\_\_\_\_ Used to help substances enter or exit the cell membrane
- \_\_\_\_\_ When energy is required to move materials through a cell membrane
- \_\_\_\_\_ When the molecules of one substance are spread evenly throughout another substance to become balanced
- \_\_\_\_\_ The cell membrane forms around another substance, for example, how the amoeba gets its food. Hint (requires energy)
- \_\_\_\_\_ When molecules move from areas of high concentration to areas of low concentration

Label the diagrams of cells using the following terms: diffusion, active transport, osmosis, equilibrium. The arrows show the direction of transport. You may use the terms more than once!



### Osmosis Practice Activity

Osmosis is the diffusion of water from an area of high concentration to an area of low concentration. Only water moves in osmosis! The diagrams below show the concentration of water and salt inside the cell and the concentration of water and salt surrounding the cell. Complete the sentences below by comparing the concentration of the water inside the cell and the concentration outside the cell.

1.
 

|   |   |   |
|---|---|---|
| <div style="border: 1px solid black; border-radius: 50%; width: 150px; height: 150px; margin: 0 auto; display: flex; align-items: center; justify-content: center;"> <div style="text-align: center;">5% NaCl<br/>95% H<sub>2</sub>O</div> </div> | <div style="text-align: center;">95% NaCl<br/>5% H<sub>2</sub>O</div> | <p>a. Water will flow _____ (into the cell, out of the cell, in both directions).</p> <p>b. The cell will _____ (shrink, burst, stay the same).</p> |
|---|---|---|
  
2.
 

|   |   |   |
|---|---|---|
| <div style="border: 1px solid black; border-radius: 50%; width: 150px; height: 150px; margin: 0 auto; display: flex; align-items: center; justify-content: center;"> <div style="text-align: center;">5% NaCl<br/>95% H<sub>2</sub>O</div> </div> | <div style="text-align: center;">5% NaCl<br/>95% H<sub>2</sub>O</div> | <p>a. Water will flow _____ (into the cell, out of the cell, in both directions).</p> <p>b. The cell will _____ (shrink, burst, stay the same).</p> |
|---|---|---|
  
3.
 

|   |   |   |
|---|---|---|
| <div style="border: 1px solid black; border-radius: 50%; width: 150px; height: 150px; margin: 0 auto; display: flex; align-items: center; justify-content: center;"> <div style="text-align: center;">95% NaCl<br/>5% H<sub>2</sub>O</div> </div> | <div style="text-align: center;">5% NaCl<br/>95% H<sub>2</sub>O</div> | <p>a. Water will flow _____ (into the cell, out of the cell, in both directions).</p> <p>b. The cell will _____ (shrink, burst, stay the same).</p> |
|---|---|---|