

## Movement Across the Cell Membrane

## More Practice Problems -

Use chapter 5 to answer the following application questions. Circle the letter of your answer.

1. A cell is placed in a solution of sugar water. What is the solute in the solution?  
A) Sugar      B) Water      C) Sugar and Water      D) Neither
2. A cell is placed in a solution of salt water. What is the solvent in the solution?  
A) Salt      B) Water      C) Sugar      D) Sugar and Salt  
B)
3. Osmosis is the movement of \_\_\_\_\_ with the concentration gradient.  
A) Particles      B) Water      C) Large Particles      D) Cells
4. Diffusion is the movement of \_\_\_\_\_ with the concentration gradient.  
A) Particles      B) Water      C) Large Particles      D) Cells
5. Facilitated diffusion is the movement of \_\_\_\_\_ with the concentration gradient using \_\_\_\_\_.  
A) water, energy  
B) particles, water  
C) particles, proteins  
D) water, proteins
6. Active transport is the movement of \_\_\_\_\_ against the concentration gradient using \_\_\_\_\_.  
A) particles, a carrier protein  
B) particles, a channel protein  
C) water, a carrier protein  
D) water, a channel protein
7. Which statement describes a cell after it has been placed in a saltwater solution?  
A) It is larger b/c water entered the cell by osmosis.  
B) It is smaller b/c water left the cell by osmosis.  
C) It is larger b/c salt entered the cell by diffusion.  
D) It is smaller b/c salt left the cell by diffusion
8. A cell with a 5% saltwater solution inside is placed inside a beaker with fresh water. The membrane is not permeable to salt. What will happen?  
A) It will swell b/c water will enter by diffusion  
B) It will shrink b/c water will leave by diffusion  
C) It will swell b/c water will enter by osmosis  
D) It will shrink b/c water will leave by diffusion
9. A cell is placed in a solution of sugar and water. The cell has a 5% sugar concentration and the outside has a 35% sugar concentration. The cell membrane is permeable to both water and sugar. Which statement MOST accurately describes what will happen to the cell?  
A) Water will move into the cell while sugar will move out of the cell.  
B) Sugar will move into the cell while water will move out of the cell.  
C) Both the water and the sugar have reached equilibrium.  
D) Both water and sugar will move into the cell.
10. A cell is placed in a solution of sugar and water. The cell has a 10% sugar concentration and the outside has a 5% sugar concentration. The cell membrane is permeable to both water and sugar. Which statement MOST accurately describes what will happen to the cell?  
A) Water will move into the cell while sugar will move out of the cell.  
B) Sugar will move into the cell while water will move out of the cell.  
C) Both the water and the sugar have reached equilibrium.  
D) Both water and sugar will move into the cell.

11. A cell is placed in a solution of sugar and water. The cell has a sugar solution made-up of 15mg of sugar and the outside has a sugar solution made-up of 20mg of sugar. The cell membrane is permeable to both water and sugar. Which statement MOST accurately describes what will happen to the cell.

- A) Water will move into the cell while sugar will move out of the cell.
- B) Sugar will move into the cell while water will move out of the cell.
- C) Both the water and the sugar have reached equilibrium.
- D) Both water and sugar will move into the cell.

12. A cell is placed in a solution of sugar and water. The cell has a 10% sugar concentration and the outside has a 10% sugar concentration. The cell membrane is permeable to both water and sugar. Which statement MOST accurately describes what will happen to the cell.

- A) Water will move into the cell while sugar will move out of the cell.
- B) Sugar will move into the cell while water will move out of the cell.
- C) Both the water and the sugar have reached equilibrium.
- D) Both water and sugar will move into the cell.

13. A cell is placed in a solution of sugar and water. The cell has a 10% sugar concentration and the outside has a 35% sugar concentration. The cell membrane is not permeable to sugar. Which statement MOST accurately describes what will happen to the cell.

- A) Water will move into the cell while sugar will move out of the cell.
- B) Sugar will move into the cell while water will move out of the cell.
- C) Only water will move out of the cell and cell will shrink/shrivel.
- D) Only water will move into the cell and will swell-up.

14. Active transport refers to particles moving from \_\_\_\_\_ to \_\_\_\_\_ concentration.

- A) even to uneven
- B) high to low
- C) low to high
- D) equal to unequal

15. To say particles move down their concentration gradient is to say

- A) the particles are moving from low to high concentration
- B) the particles are moving from high to low concentration
- C) this is a type of active transport
- D) this process requires energy

Bonus1: How can you distinguish a plant cell from an animal cell?

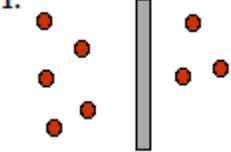
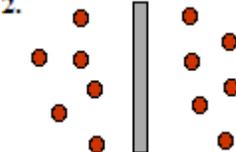
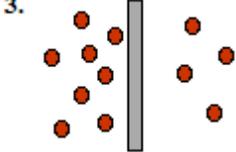
- A) Animal cells have cell walls
- B) Plant cells have plasma membranes
- C) Plant cells have cell walls and plasma membranes
- D) Animal cells have cell walls and plasma membranes

## Even More Practice

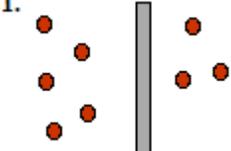
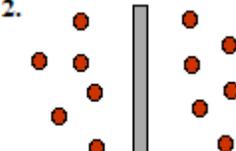
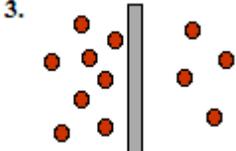
16. Based on what you've learned, in your own words, answer the following questions regarding movement of materials through a cell membrane.

- What does semi-permeable mean?
- What is the net movement of molecules from high to low concentrations?
- What is the term for the diffusion of water?
- What does dynamic equilibrium mean?
- What is a hypertonic solution?
- What is a hypotonic solution?
- What is an isotonic solution?

17. Observe the diagrams in the table below. Assume that the dots are dissolved particles on either side of the cell membrane. They are like oxygen molecules that can go across the membrane. Do the following situations represent concentration gradients? If so, in which direction would diffusion occur?

1.		2.		3.	
gradient? Yes or No		gradient? Yes or No		gradient? Yes or No?	
movement left, right, or none		movement left, right, or none		movement left, right, or none	

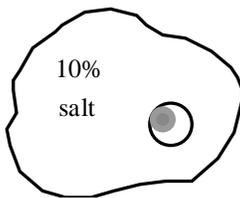
18. Observe the diagrams in the table below. Assume that the dots are dissolved particles (like protein or carbohydrate molecules) on either side of the cell membrane. Do the following situations represent concentration gradients? If so, in which direction would osmosis occur?

1.		2.		3.	
gradient? Yes or No		gradient? Yes or No		gradient? Yes or No?	
movement left, right, or none		movement left, right, or none		movement left, right, or none	

19. Observe the table below. For each pair of solutions, determine if the **EXTRACELLULAR** fluid is hypotonic, hypertonic, or isotonic to the intracellular fluid? Which way will water mostly move? (some situations may have water moving **equally**)

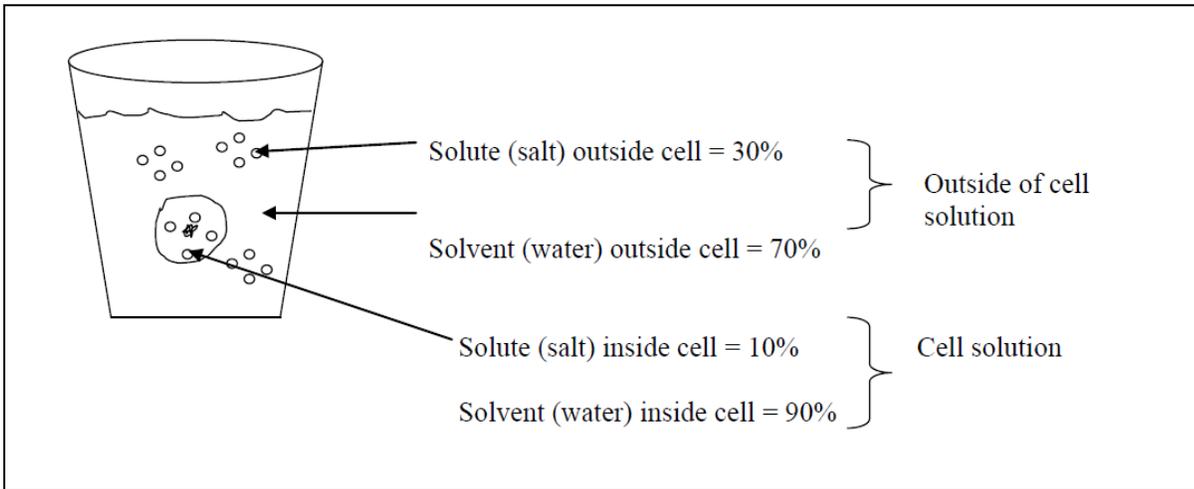
<i>intracellular fluid (inside the cell)</i>	<i>extracellular fluid (outside of the cell)</i>	<i>Hypotonic, Hypertonic, Isotonic</i>	<i>water moves mostly inside or outside the cell</i>
5% salt	10% salt		
10% salt	10% salt		
3% glucose	1% glucose		
2% protein	1% protein		
9% salt	9% salt		
13% water	25% water		
59% water	45% water		
90% water	92% water		
74% glucose	87% glucose		

20. Observe the diagram below and answer the questions.



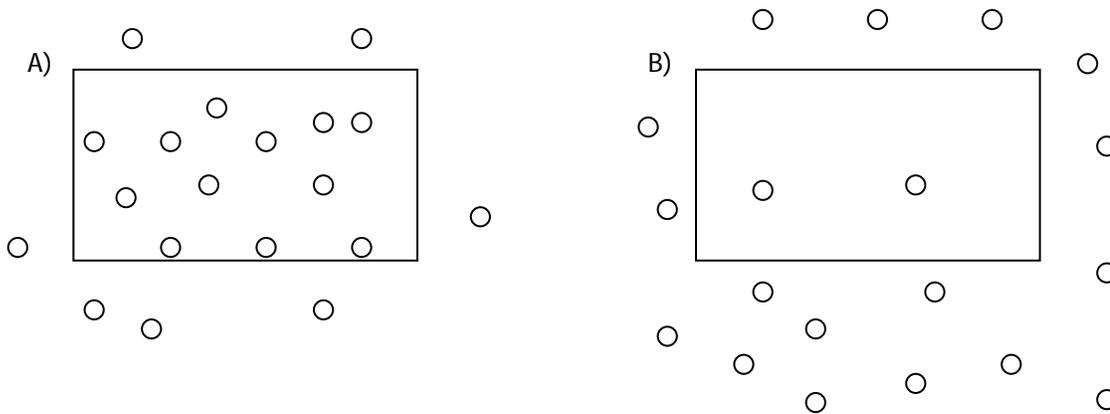
- Can you tell if the cell is in a hypertonic, hypotonic, or isotonic solution? EXPLAIN!
- What will happen to the cell if it is placed in a 50% salt solution?
- What will happen if the cell is placed in pure water?

21.

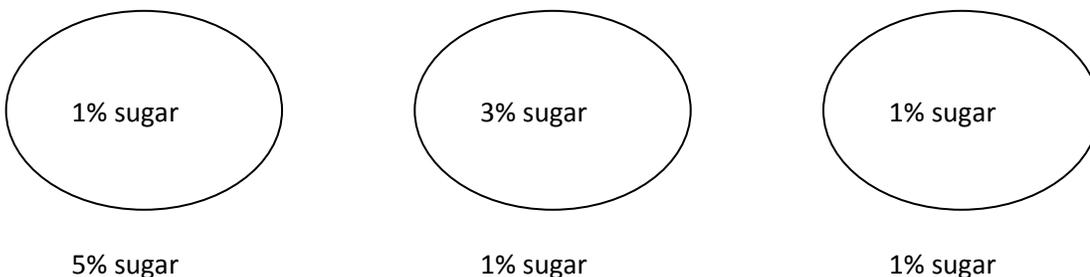


- Where is the highest water concentration? \_\_\_\_\_
- Where is the lowest water concentration? \_\_\_\_\_
- Where is the lowest salt concentration? \_\_\_\_\_
- Where is the highest salt concentration? \_\_\_\_\_
- Which direction would the water move because of osmosis? \_\_\_\_\_

22. Use arrows to indicate the direction of diffusion in each case: ○ is a molecule that can pass through the cell membrane. □ a cell membrane.



23. For each of the situations below use an arrow to indicate the net movement of sugar into or out of the cell. (Assume that the sugar molecules can pass through the cell membrane in each case.)



24. The cell membrane is \_\_\_\_\_ permeable. This means that \_\_\_\_\_

25. Diffusion always causes particles to move from a region of \_\_\_\_\_ concentration to a region of \_\_\_\_\_ concentration.

26. Does a cell expend energy when molecules diffuse in or out of the cell?

27.

A cell has 75% water (solvent) and 25% salt (solute). The solution outside the cell (Solution A) has 50% water (solvent) and 50% salt (solute). Is the solution outside the cell *hypertonic* or *hypotonic*?

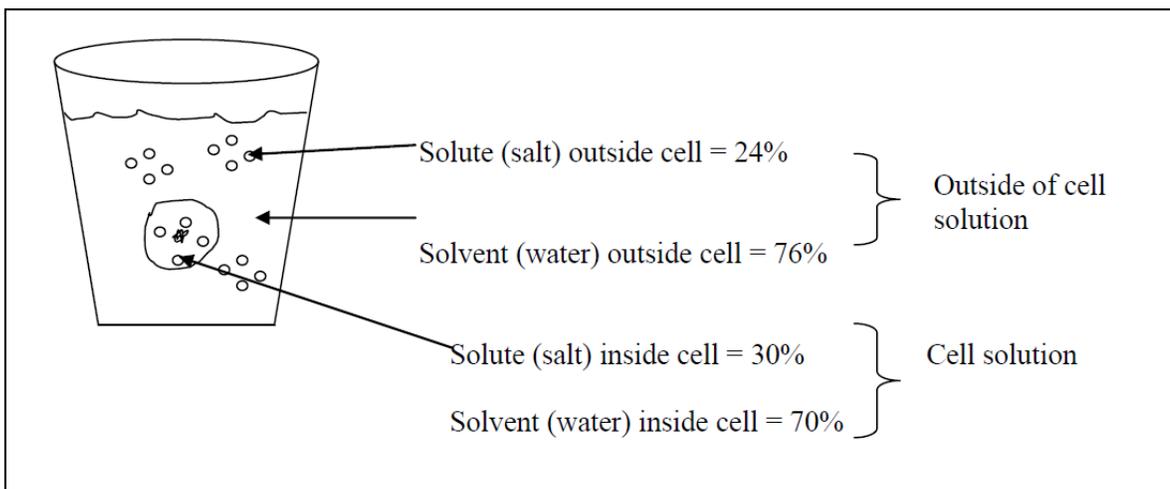
28.

A solution has 75% salt therefore it has \_\_\_\_\_% water. The cell has 75% water and therefore \_\_\_\_\_% salt.

a. Is the solution outside of the cell hypertonic or hypotonic? \_\_\_\_\_

b. Which direction will the water move due to osmosis? \_\_\_\_\_

29.



a. What type of solution is outside of the cell? \_\_\_\_\_

b. Which direction will the water move due to osmosis? \_\_\_\_\_

c. Will the cell shrink or swell? \_\_\_\_\_

## Biology 1

### Movement Across the Cell Membrane

#### More Practice Problems - **SELECTED ANSWERS**

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A) **Sugar**      B) Water      C) Sugar and Water      D) Neither
2. A cell is placed in a solution of salt water. What is the solvent in the solution?  
A) Salt      B) **Water**      C) Sugar      D) Sugar and Salt
3. Osmosis is the movement of \_\_\_\_\_ with the concentration gradient.  
A) Particles      B) **Water**      C) Large Particles      D) Cells
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A) water, energy  
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C) **particles, proteins**  
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10. A cell is placed in a solution of sugar and water. The cell has a 10% sugar concentration and the outside has a 5% sugar concentration. The cell membrane is permeable to both water and sugar. Which statement MOST accurately describes what will happen to the cell?  
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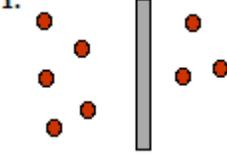
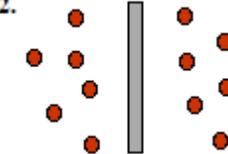
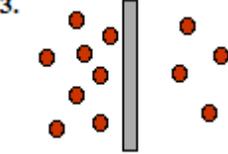
- E) Animal cells have cell walls
- F) Plant cells have plasma membranes
- G) Plant cells have cell walls and plasma membranes
- H) Animal cells have cell walls and plasma membranes

## Even More Practice

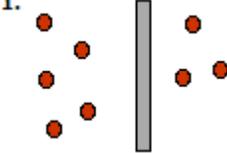
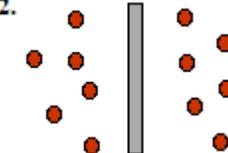
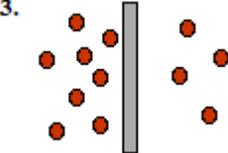
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- What is the term for the diffusion of water?
- What does dynamic equilibrium mean?
- What is a hypertonic solution?
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17. Observe the diagrams in the table below. Assume that the dots are dissolved particles on either side of the cell membrane. They are like oxygen molecules that can go across the membrane. Do the following situations represent concentration gradients? If so, in which direction would diffusion occur?

1. 		2. 		3. 	
gradient? Yes or No	YES	gradient? Yes or No	NO	gradient? Yes or No?	
movement left, right, or none	RIGHT	movement left, right, or none	NONE	movement left, right, or none	

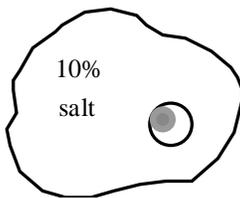
18. Observe the diagrams in the table below. Assume that the dots are dissolved particles (like protein or carbohydrate molecules) on either side of the cell membrane. Do the following situations represent concentration gradients? If so, in which direction would osmosis occur?

1. 		2. 		3. 	
gradient? Yes or No		gradient? Yes or No	NO	gradient? Yes or No?	YES
movement left, right, or none		movement left, right, or none	NONE	movement left, right, or none	LEFT

19. Observe the table below. For each pair of solutions, determine if the **EXTRACELLULAR** fluid is hypotonic, hypertonic, or isotonic to the intracellular fluid? Which way will water mostly move? (some situations may have water moving **equally**)

intracellular fluid (inside the cell)	extracellular fluid (outside of the cell)	Hypotonic, Hypertonic, Isotonic	water moves mostly inside or outside the cell
5% salt	10% salt	HYPER	OUTSIDE
10% salt	10% salt	ISO	BOTH/No Net Movement
3% glucose	1% glucose	HYPO	INSIDE
2% protein	1% protein		
9% salt	9% salt		
13% water	25% water		
59% water	45% water		
90% water	92% water		
74% glucose	87% glucose		

20. Observe the diagram below and answer the questions.



a. Can you tell if the cell is in a hypertonic, hypotonic, or isotonic solution? EXPLAIN!

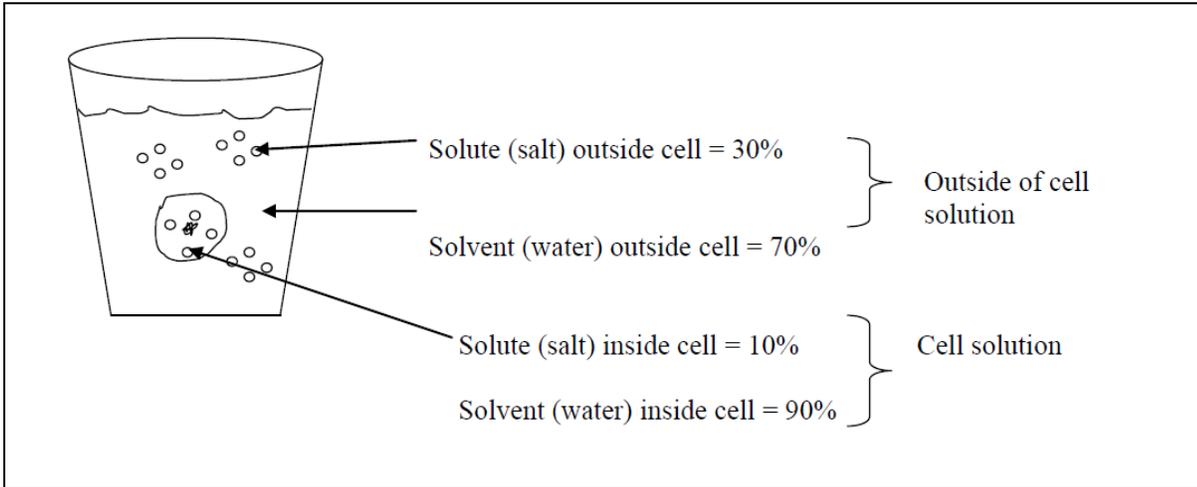
**NO! It's all relative. I need something to compare my 10% solution to before I know if it's HYPER OR HYPOTONIC**

b. What will happen to the cell if it is placed in a 50% salt solution?

c. What will happen if the cell is placed in pure water?

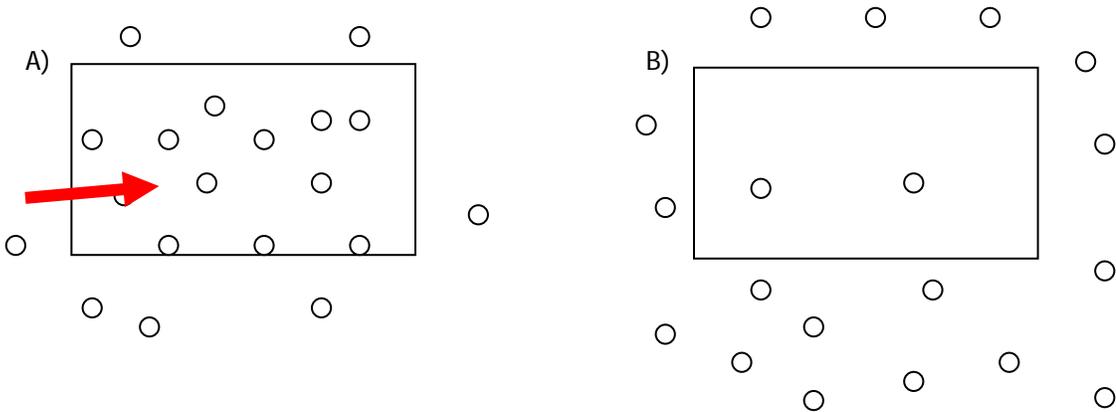
**Pure water is hypotonic. Water will enter the cell. Cytolysis is likely to occur.**

21.

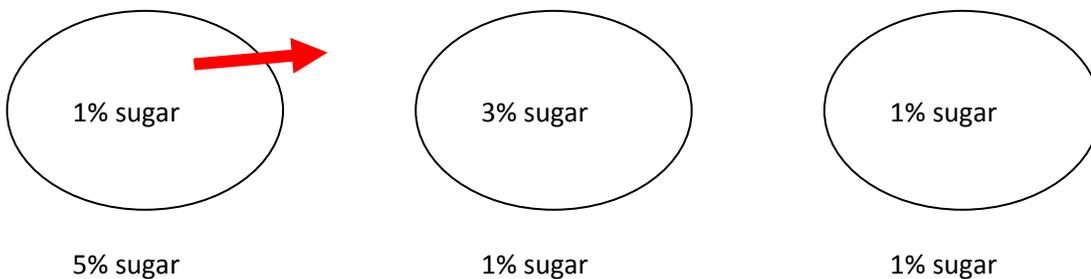


- Where is the highest water concentration? \_\_\_\_\_
- Where is the lowest water concentration? \_\_\_\_\_
- Where is the lowest salt concentration? \_\_\_\_\_
- Where is the highest salt concentration? \_\_\_\_\_
- Which direction would the water move because of osmosis? OUT of the cell

5. Use arrows to indicate the direction of diffusion in each case: ○ is a molecule that can pass through the cell membrane. □ a cell membrane.



6. For each of the situations below use an arrow to indicate the net movement of sugar into or out of the cell. (Assume that the sugar molecules can pass through the cell membrane in each case.)



7. The cell membrane is \_\_\_\_\_ permeable. This means that \_\_\_\_\_

8. Diffusion always causes particles to move from a region of \_\_\_\_\_ concentration to a region of \_\_\_\_\_ concentration.

9. Does a cell expend energy when molecules diffuse in or out of the cell?

**NO! IT IS A PASSIVE PROCESS**

27.

A cell has 75% water (solvent) and 25% salt (solute). The solution outside the cell (Solution A) has 50% water (solvent) and 50% salt (solute). Is the solution outside the cell *hypertonic or hypotonic*?

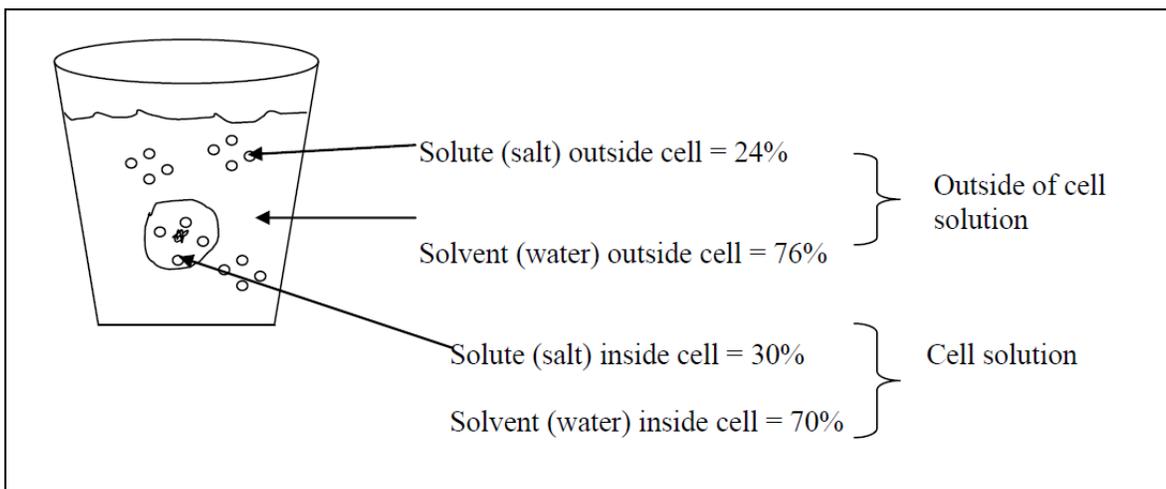
28.

A solution has 75% salt therefore it has \_\_\_\_\_% water. The cell has 75% water and therefore \_\_\_\_\_% salt. **25, 25**

a. Is the solution outside of the cell hypertonic or hypotonic? \_\_\_\_\_ **HYPER** \_\_\_\_\_

b. Which direction will the water move due to osmosis? \_\_\_\_\_ **OUT** \_\_\_\_\_

29.



a. What type of solution is outside of the cell? \_\_\_\_\_ **HYPO** \_\_\_\_\_

b. Which direction will the water move due to osmosis? \_\_\_\_\_ **IN** \_\_\_\_\_

c. Will the cell shrink or swell? \_\_\_\_\_ **SWELL** \_\_\_\_\_