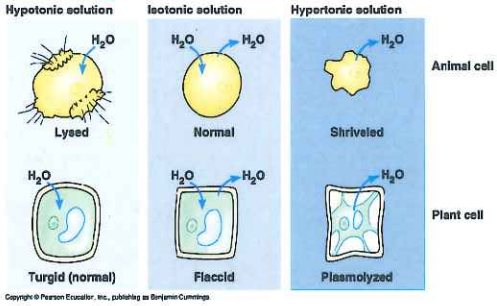
# Chapter 5 – Transport Study Guide

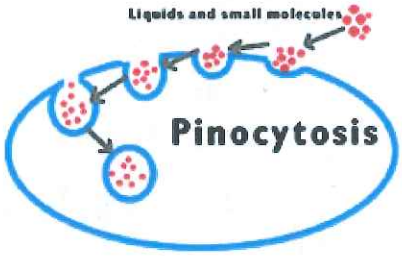
1. Explain the difference between plasmolysis and turgor pressure in plant cells.

As turgor pressure decreases, a plant cell shrinks from the cell wall. This shrinkage is called plasmolysis.



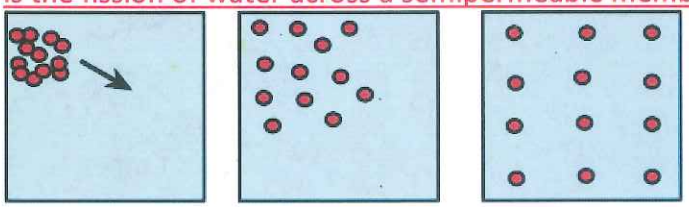

2. The prefix *pino-* means "to drink," *phago-* means "to eat," *cyto-* means "cell." Using this information explain why the words *pinocytosis* and *phagocytosis* are good names for the processes they describe.

In pinocytosis the cell is "drinking." In phagocytosis the cell is "eating"



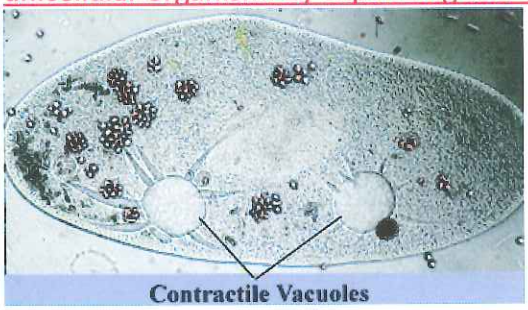

3. Distinguish between diffusion and osmosis.

Diffusion is the movement of molecules from a higher to lower concentration. Osmosis is the fission of water across a semipermeable membrane.



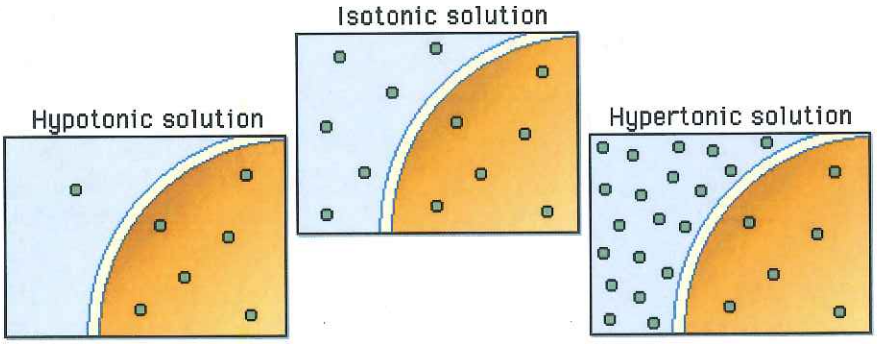
4. Define the term *contractile vacuole.* What is the contractile vacuole's function?

A contractile vacuole is an organelle that collects water from the cytoplasm of a unicellular organism. By expanding and expelling water, it helps maintain homeostasis.




5. Describe how hypotonic, hypertonic, and turgor pressure are interrelated.

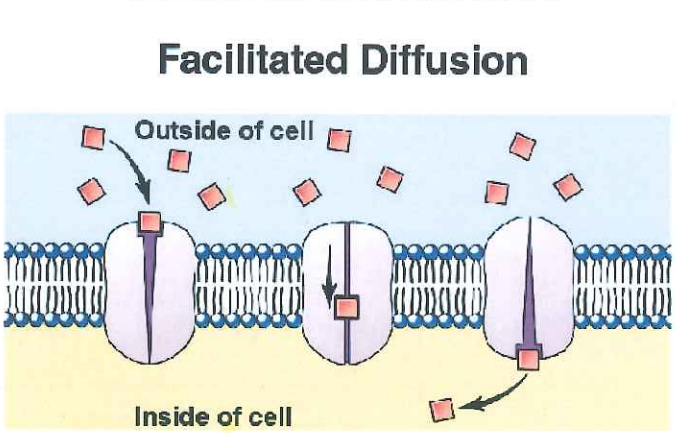
In a hypertonic environment, water leaves the cell through osmosis. Consequently, the cells shrink away from the cell walls, and turgor pressure is lost. Turgor pressure is higher in a hypotonic environment.



6. Explain how substances cross a cell membrane through facilitated diffusion.

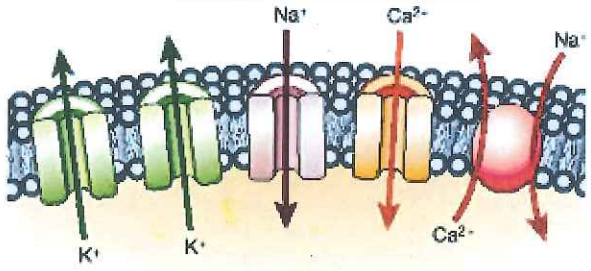
Carrier proteins help large or hydrophilic substances move down the concentration gradient.





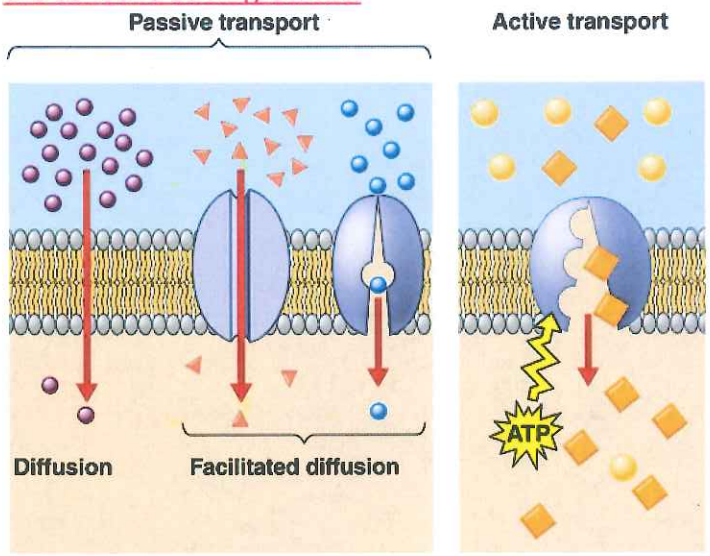

7. Describe how ion channels assist in the diffusion of ions through a cell membrane.

Ion channels shield substances from the hydrophobic nature of a cell membrane.



8. Distinguish between active and passive transport.

Passive transport moves substances down a concentration gradient with no energy use by the cell. Active transport requires energy use by the cell to move substances against the concentration gradient.



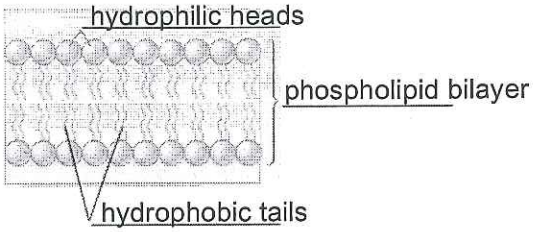
Name _____

## MOVEMENT ACROSS THE CELL MEMBRANE

All cells need to move materials across the cell membrane.

- $O_2$, glucose, and $K^+$ need to move into the cell.
- $CO_2$, waste, and $Na^+$ need to move out of the cell.

a. The cell membrane is made of a double-sided lipid layer.

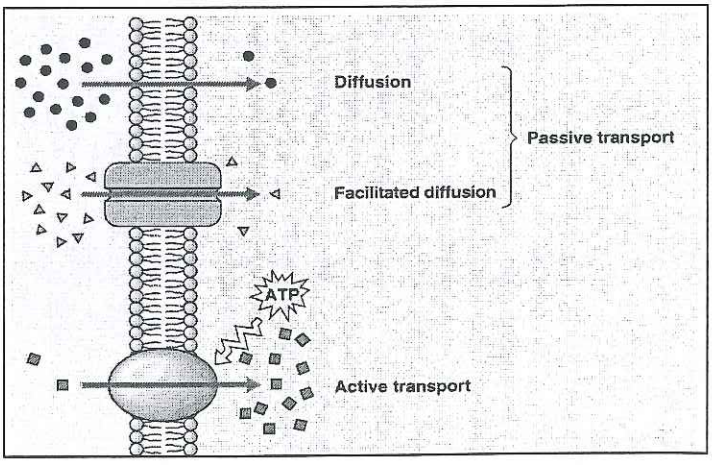


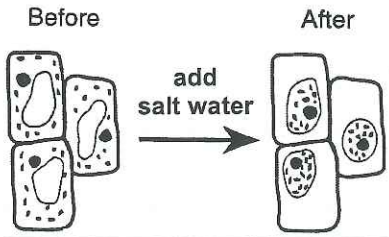

b. Passive Transport

- Diffusion: movement of molecules from an area of high conc. to an area of lower concentration
  - Since the flow of materials is from high concentration to low concentration, diffusion requires no energy.
  - Lipids move directly through the membrane, so we call that process **simple diffusion** ($CO_2$ + $O_2$)
  - Other small molecules (like glucose) cannot flow directly across the lipid layer, so there must protein channels that allow them to diffuse through the cell membrane. We call this process **facilitated diffusion** (diffusion with help).
- Osmosis: the diffusion of $H_2O$ across a membrane.
  - Since osmosis is just a special case of diffusion — the flow of **water** is still from high concentration of water to low concentration of water, osmosis requires no energy.

c. Active Transport

- When cells need to move material in the opposite direction as diffusion, from low concentration to high concentration, they need to pump it, so this **requires energy**.
- ATP is the molecule that all cells use as energy.
- Proteins in the cell membrane act as the active transport pumps.



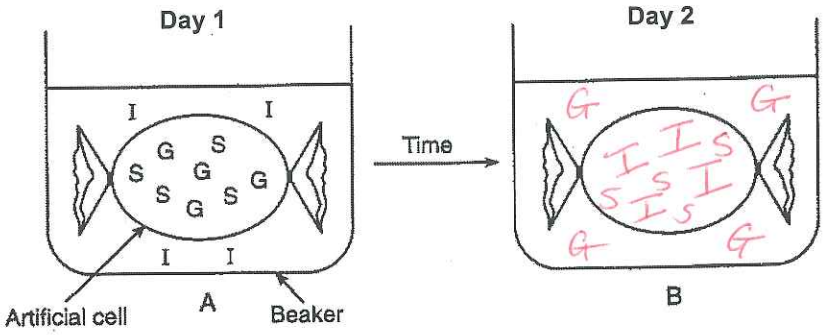




**Osmosis: $H_2O$ diffused out of the cells**

Name _____

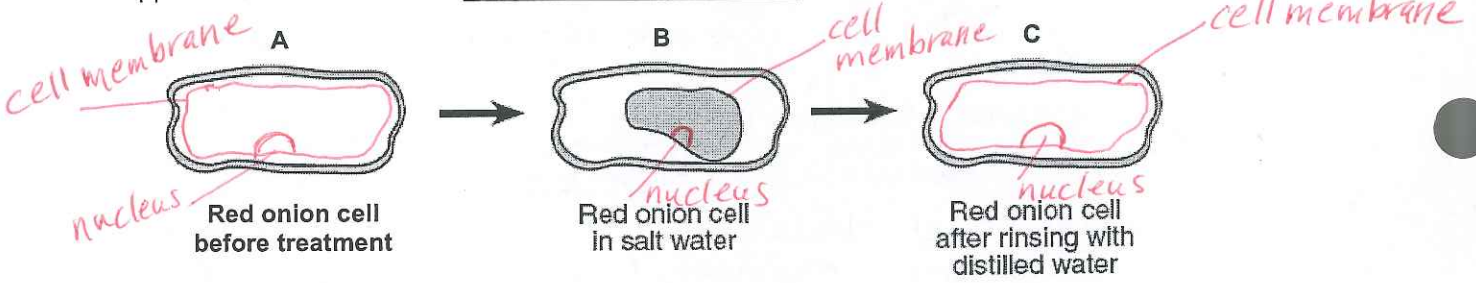
Complete the diagram based on the results from the Osmosis and Diffusion Lab we completed this year.

I = iodine
G = glucose
S = starch

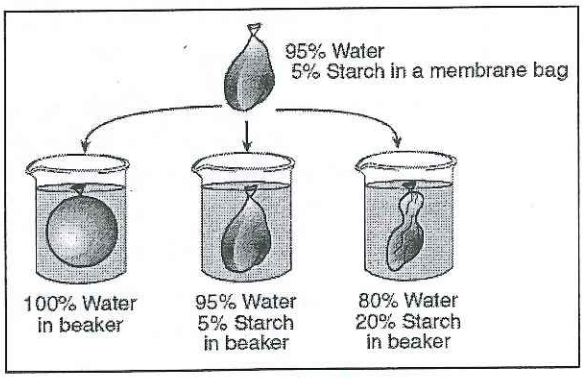



glucose = small molecule
starch = large molecule

A student prepared a wet-mount slide of some red onion cells and then added some salt water to the slide. The student observed the slide using a compound light microscope. Diagram *B* is typical of what the student observed after adding salt water. Complete diagram *A* to show how the contents of the red onion cells should appear ***before*** the salt water treatment. Complete diagram *C* to show how the contents of the red onion cells should appear if the cell were then ***rinsed with distilled water*** for several minutes.




An investigation was set up to study the movement of water through a membrane. The results are shown in the diagram at the right.




Based on these results, which statement correctly predicts what will happen to red blood cells when they are placed in a beaker containing a water solution in which the salt concentration is much higher than the salt concentration in the red blood cells?

$H_2O$

a. The red blood cells will absorb water and increase in size.

b. The red blood cells will lose water and decrease in size.

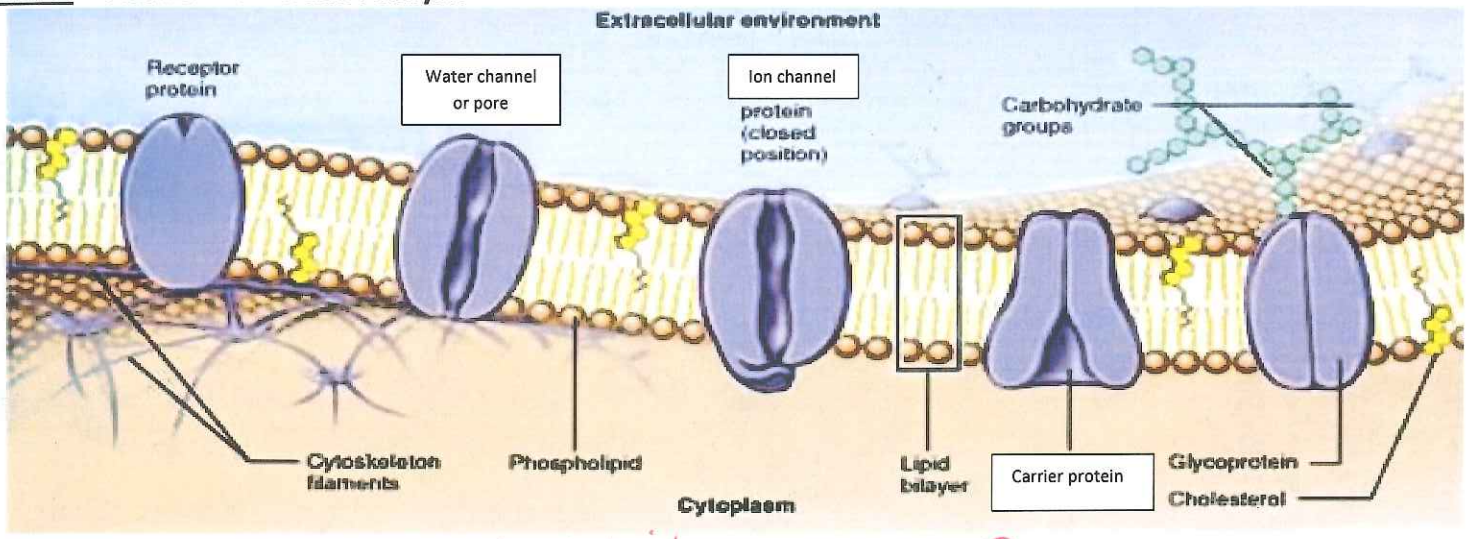
c. The red blood cells will first absorb water, then lose water and maintain their normal size.

d. The red blood cells will first lose water, then absorb water, and finally double in size.

# Passive and Active Transport Review

Name Key

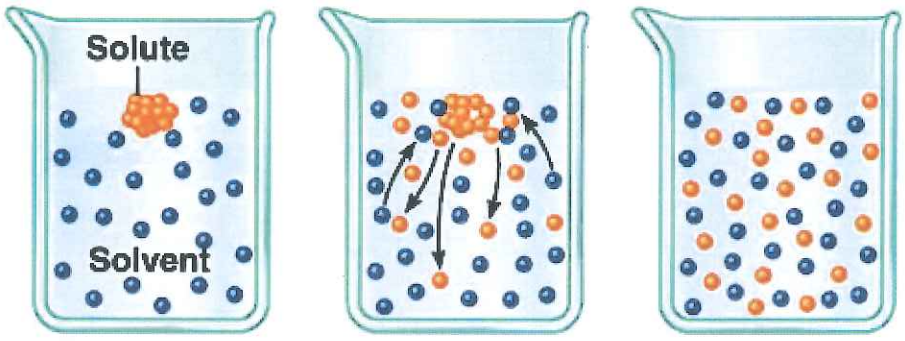
## PART A – Plasma membrane Analysis




1. The plasma membrane is made of phospholipids How many layers? 2.
2. Water moves across the membrane by travelling through pores or water channels.
3. In facilitated diffusion, carrier proteins transport substances down their concentration gradient.
4. How do the membrane proteins prevent substances for entering or exiting the cell?

Ion channels can be open or closed. Carrier proteins require a specific shape of substance being transported.

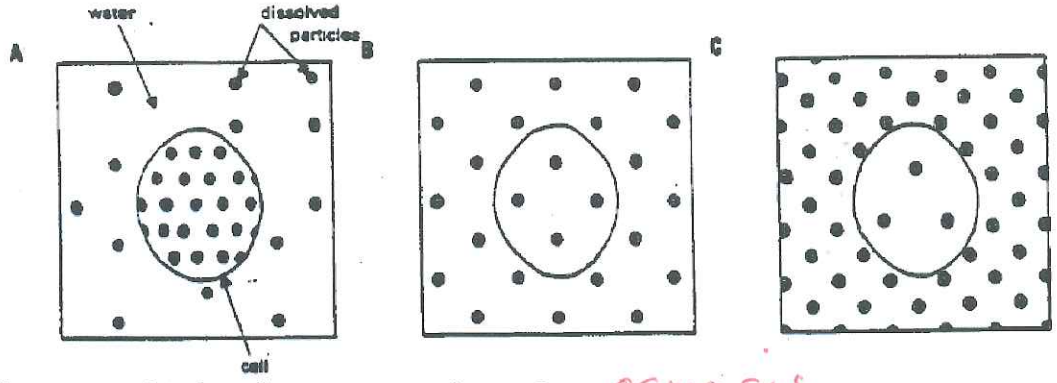
## PART B –




A. B. C.

1. What process is taking place from diagram A to diagram C? Diffusion
2. What state or condition has been reached in diagram C? equilibrium
3. What is an example of a solute? salt, sugar
4. What is an example of a solvent? water, alcohol
5. What direction did the solute move from? high to low concentration
6. When this process happens across a cell membrane, does it use energy provided by the cell? no

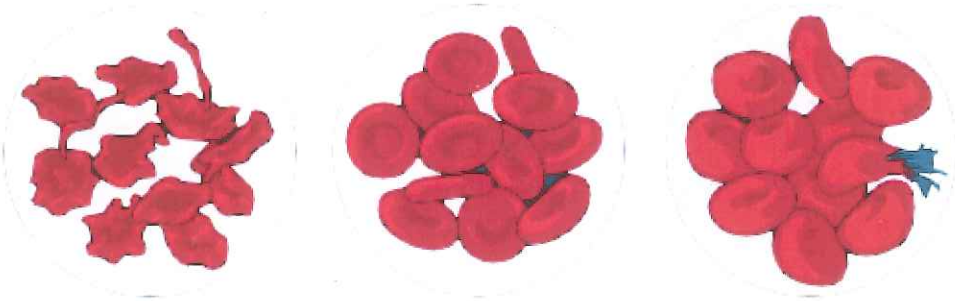
**PART C- The diagrams below represent cells in three different solutions.**




1. What process involves the movement of water? osmosis
2. In which diagram would the cell tend to swell up due to water moving in? A
3. What type of solution is that cell in? hypotonic
4. Which diagram shows no concentration gradient? B.
5. What is the name given to that type of solution? isotonic
6. In which diagram would the cell tend to shrivel up due to water moving out? C.
7. What type of solution is the cell placed in for that to occur? hypertonic
8. In which diagram are dissolved particles highly concentrated in the cell? A

solute

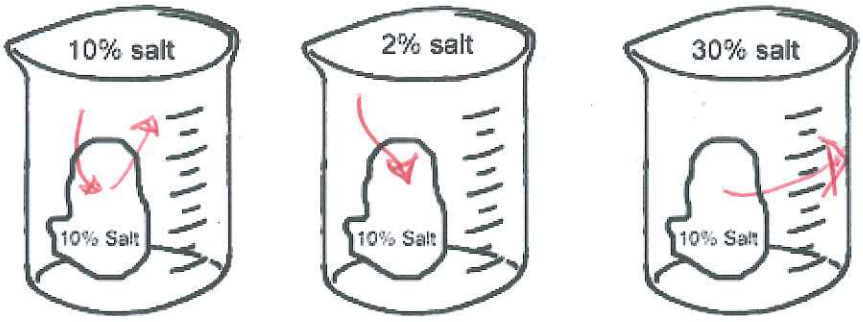
**PART D – Each diagram shows red blood cells in a beaker. Diagram B shows normal red blood cells.**



**A.** **B.** **C.**

1. What can you say about the concentration of dissolved molecules in and out of the cells in diagram B? Isotonic solution – cells are at equilibrium.
2. Why do the cells in diagram A look the way they do? water moved out / in hypertonic sol.
3. Why do the blood cells in diagram C look the way they do? water moved in / in hypotonic sol. cell

**PART E** – Use the salt concentrations to determine the water concentrations and what directions the water will move.

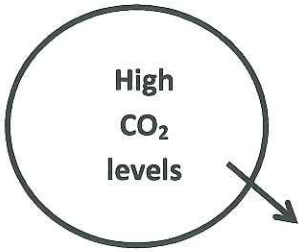



A. B. C.

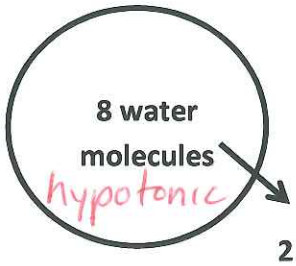
no net gain

| Beaker | % of Salt inside the cell | % of water Inside the cell | % of Salt outside the cell | % of water outside the cell | Direction water Will Move in | Type of Solution |
|---|---|---|---|---|---|---|
| A | 10% | 90% | 10% | 90% | in + and passively | isotonic |
| B | 10% | 90% | 2% | 98% | into cell | hypotonic |
| C | 10% | 90% | 30% | 70% | out of cell | hypertonic |

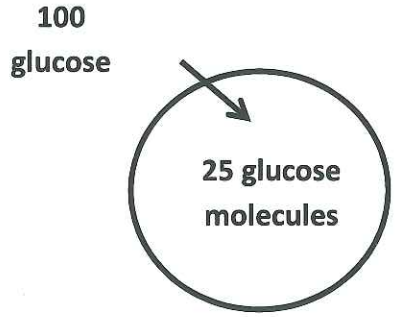
**PART F** Use the following terms to fill in the blanks below each diagram of a cell: active transport, diffusion, facilitated diffusion, osmosis, equilibrium. If the process is osmosis, write if it is a hypotonic, hypertonic, or isotonic environment solution below.



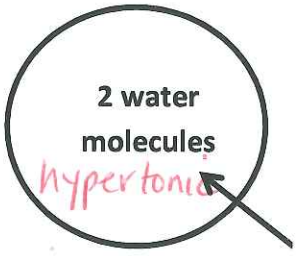

diffusion



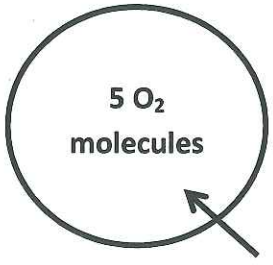

osmosis hypertonic environment



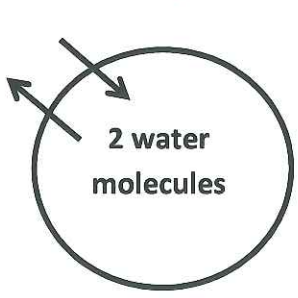

facilitated diffusion




Osmosis hypotonic environment

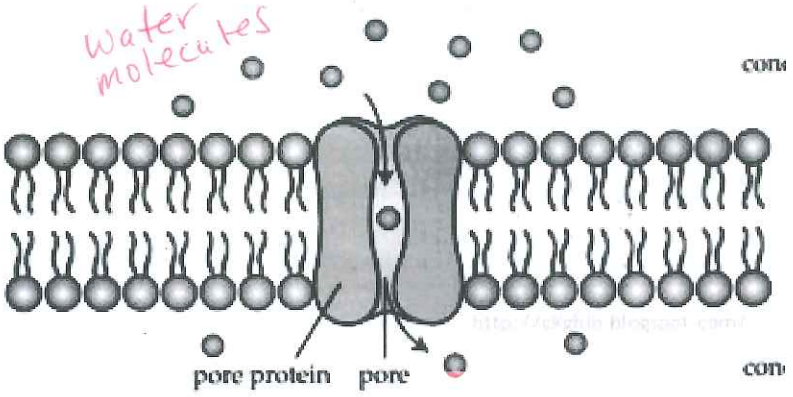



diffusion



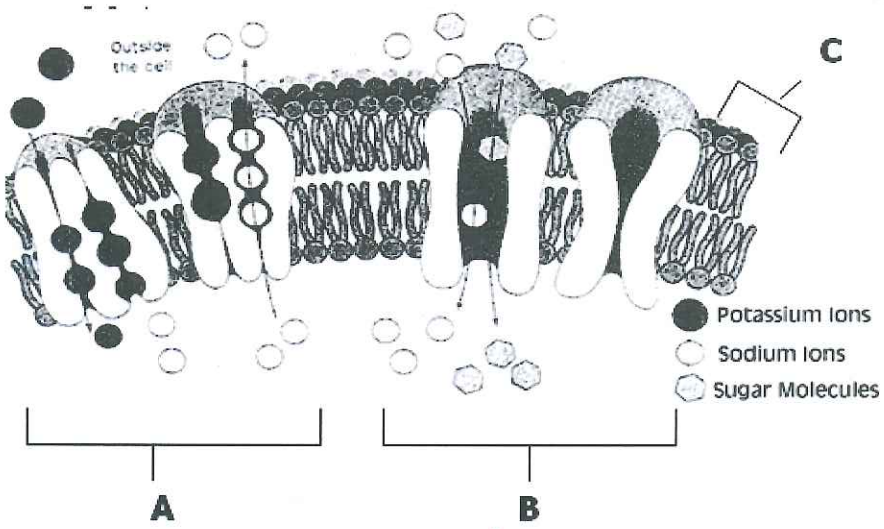

osmosis - isotonic environment

**PART G**




1. The process represented in the diagram above is? facilitated diffusion – osmosis
2. Give evidence on why you picked the process you did in question #1.
   $H_2O$ Molecules diffuse from a high to low concentration through a pore protein
3. Is it passive or active transport? passive
4. Can this process go through the protein in both directions? yes

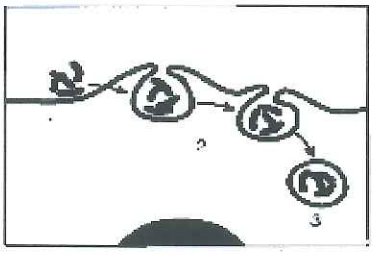
**PART H**



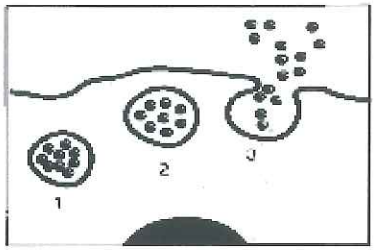

1. The picture represents both active and passive transport.
2. The sodium-potassium pump removes 3 sodium ions while taking in 2 potassium ions
3. Active transport involves the use of ATP, or energy.
4. The black circles in the diagram represent potassium
5. Carrier proteins are used in passive transport and do not require the cell to expend energy.
6. Which area represents passive transports (A, B or C) B
7. Glucose moves [ up / down ] the concentration gradient.
8. Name two molecules that move across the membrane by facilitated diffusion: glucose and amino acids

**PART I**

A



B




1. **Which process is being demonstrated in Diagram A?** endocytosis
2. **What specific name would be given to Diagram A if it were engulfing a solid?** phagocytosis
3. **What specific name would be given to Diagram A if it were engulfing a liquid?** pinocytosis
4. **Which process is being demonstrated in Diagram B?** exocytosis
5. **Does this process require energy?** yes
6. **Endocytosis is common in**

   a. nerve cells  b. plant cells  c. unicellular organisms  d. algae

**PART J – Complete the following tables below by checking the correct column for each example.**

| Example | Passive Transport | Active Transport |
|---|---|---|
| The random movement of ions | ✓ | |
| Net movement of particles from a region of low concentration to a region of greater concentration | | ✓ |
| The movement of oxygen and carbon dioxide across cell membranes | ✓ | |
| Energy is needed to move particles through the membrane | | ✓ |
| Cells in the gills of marine fish actively pump out salts | | ✓ |
| Water molecules move across a membrane without any energy input from the cell. | ✓ | |

| | Endocytosis | | Exocytosis |
|---|---|---|---|
| | Phagocytosis | Pinocytosis | |
| Are substances taken into the cell? | yes | yes | no |
| Are substances being expelled from the cell? | no | no | yes |
| What types of substances are taken into or expelled from the cell? | large particles cells bacteria viruses | fluids | proteins waste toxins |