

Osmosis practice

Directions: below are animal cells (circles) placed in beakers of various concentrations.

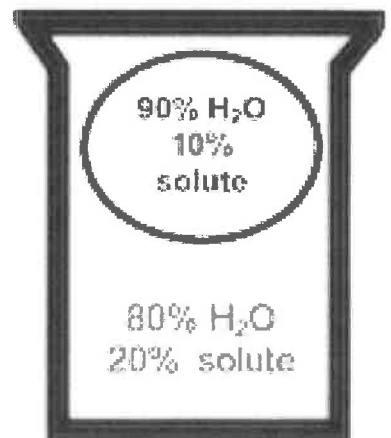
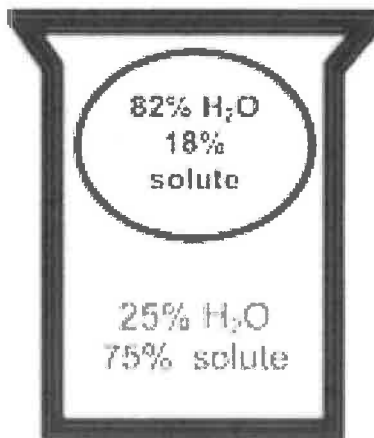
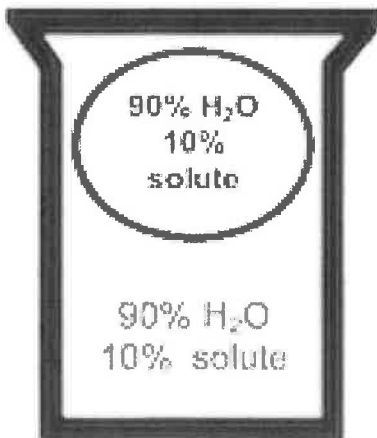
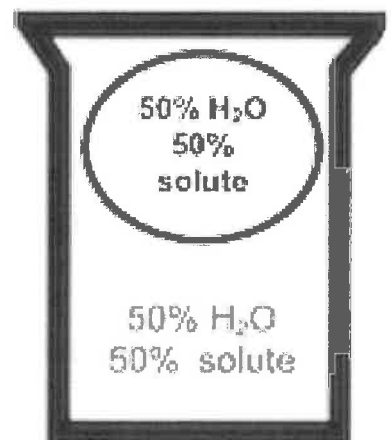
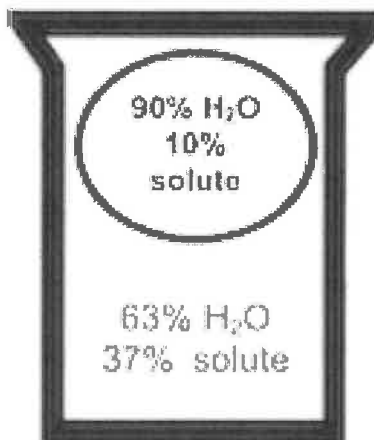
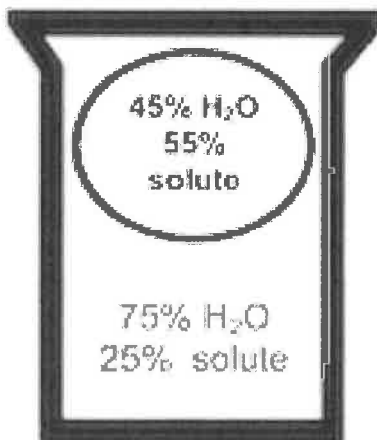
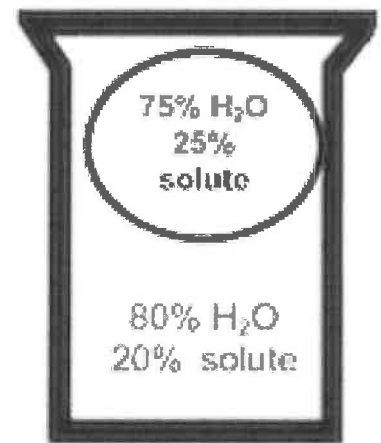
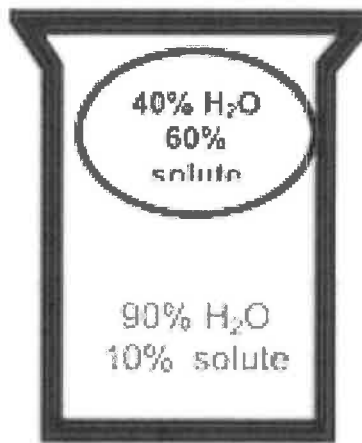
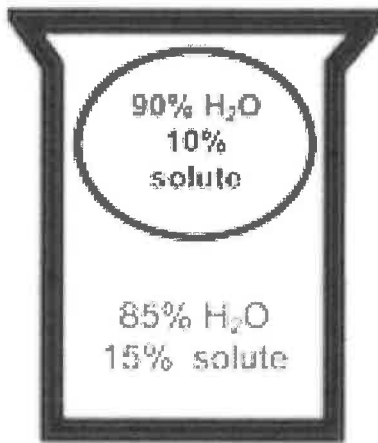
1. Draw an arrow to show which way water will diffuse (move) due to osmosis.
2. Highlight which is the more concentrated solution in each diagram (has the most solutes).
3. Circle the beaker that has **no** concentration gradient.

Questions

1. Define: **osmosis**

.....

..... [3]



Diffusion practice

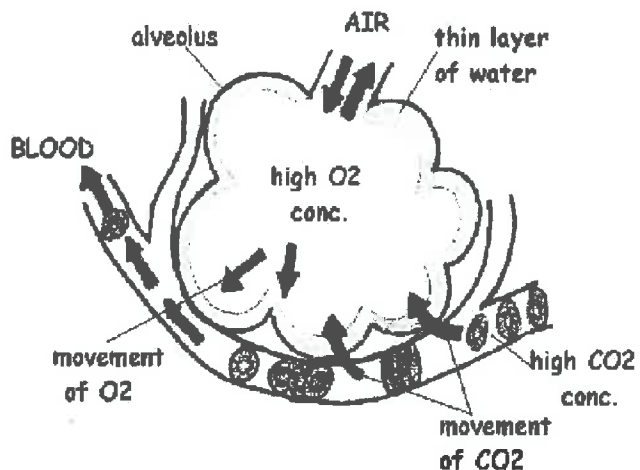
Osmosis is considered by many scientists to be a form of diffusion.
Suggest two ways in which diffusion is different from osmosis.

1.
..... [2]
2.
..... [2]

An example of **diffusion** in your body occurs during breathing in your lungs.

1. Define: **diffusion**
..... [2]
2. You breathe in and breathe out [2]
3. The specialized cell that carries the molecules you breathe in and out around your body are called [1]
4. Use the diagram below to help you answer this question.

In the lungs there are stretchy air sacs called alveoli (plural for alveolus). They contain a concentration of the molecule that you breathe in, which will diffuse into the (specialized cells) where there is a concentration of it. (specialized cells) coming back from the rest of the body, are carrying a concentration of the molecule which you breathe out; this molecule will diffuse into the where there is a concentration of it. [9]



TRANSPORT IN CELLS

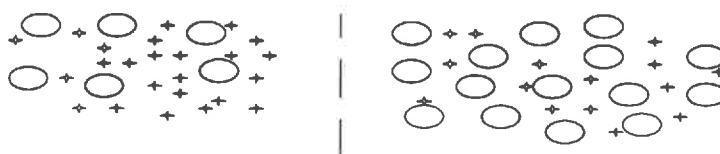
How do water molecules move?

Why?

Water accounts for over 70% of the human body. If water levels are not regulated and maintained there can be disastrous consequences. Cells and tissues can swell, blood cells burst and your brain expands so much it pushes on the skull, leading to brain damage and death. So what exactly is the process that allows organisms to regulate and maintain their water content?

MODEL 1: Movement of Water – a type of diffusion.

Schematic Diagram of Transport of Water in a Sugar Solution:



Key:



Sugar molecules (solute)



Water molecules (solvent)

Selectively permeable membrane

For each question use the above diagram:

1. Complete the following table:

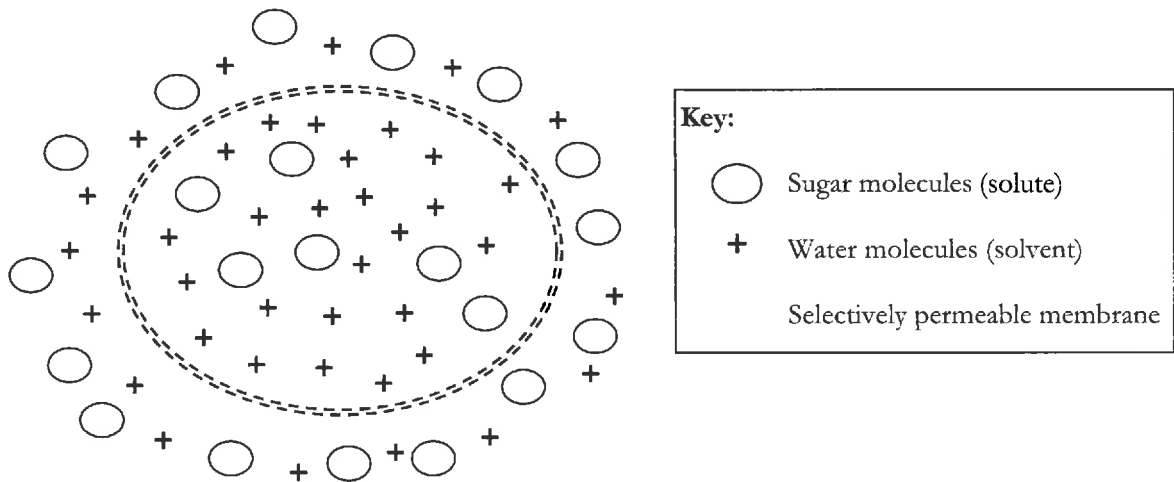
	Left side of membrane	Right side of membrane
Number of water molecules		
Number of sugar molecules		
Ratio of water to sugar		

2. a. What is the **solvent** in the diagram?
- b. What is the **solute** in the diagram?
3. Using the terms from Question 2, define a solution (use complete sentences).

Read This!

A **concentrated solution (strong solution)** is one where the ratio of solute to solvent is high. A **dilute solution (weak solution)** is one where the ratio of solute to solvent is low. Note: for Model 2, the diagram in Model 1 was modified so that the molecules on the left side of the membrane are inside the cell, and the molecules on the right side of the membrane are outside the cell.

MODEL 2: Movement of Water in and out of Cells.



4. Model 2 shows a cell bounded by a selectively permeable membrane. There is a sugar solution inside the cell and outside the cell. (Circle the correct responses.)
- Which side of the membrane has a more concentrated sugar solution?
Inside/outside
 - In a concentrated solution there is **more/less** water.
 - Which side of the membrane has a more dilute sugar solution?
Inside/outside
 - In a dilute solution there is **more/less** water.
5. Looking **only** at the diagram and key:
- Which molecule(s) will be able to move through the membrane? Explain your reasoning.
 - Which molecule(s) will NOT be able to move through the membrane? Explain your reasoning.

Read This!

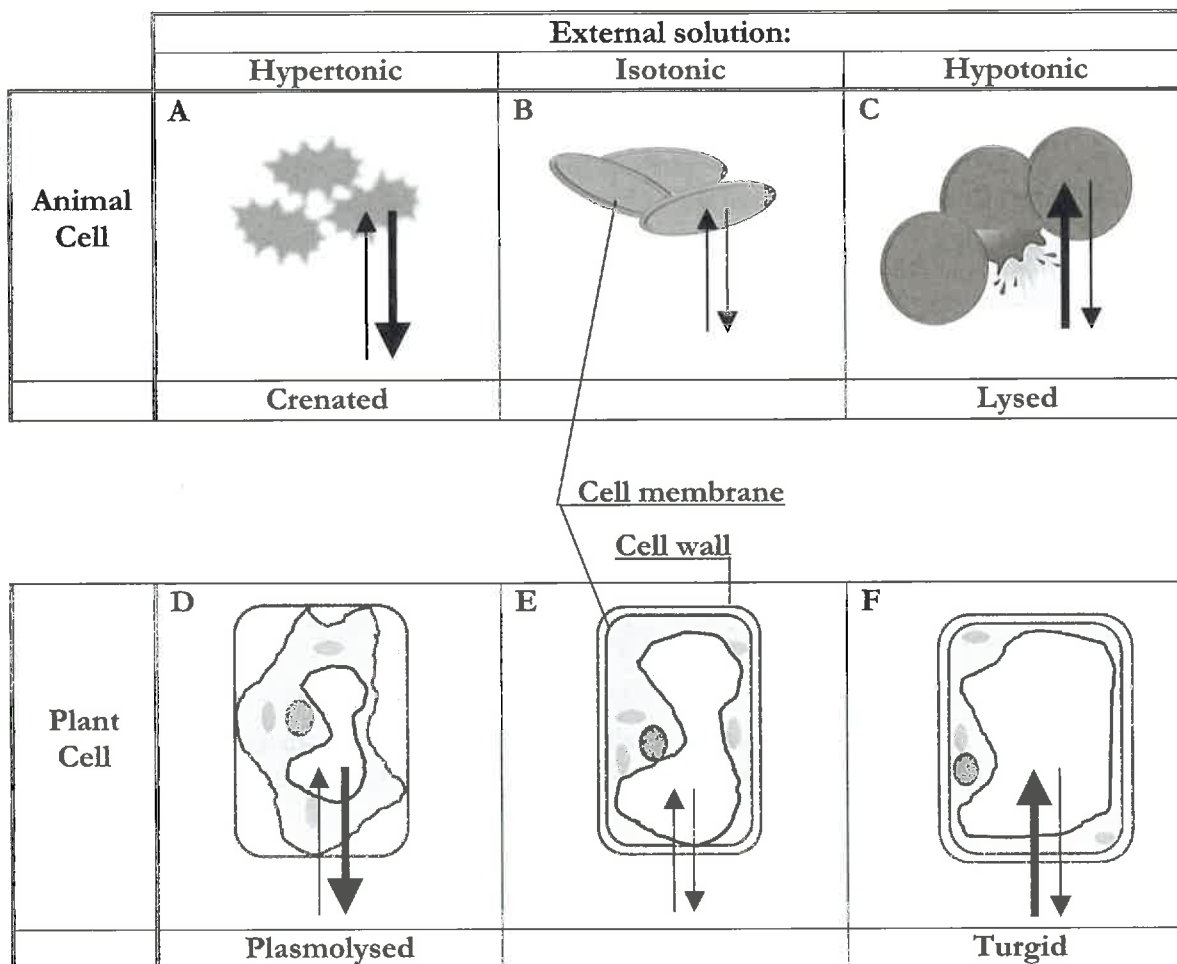
Molecules are in constant random motion, moving in all directions. However, depending on the concentration of molecules there can be an overall direction of movement, called the NET direction.

6. Predict the **net** direction of movement of the molecule that crosses the membrane by drawing an arrow into or out of the cell on the diagram in Model 2.
7. How will the concentration of the sugar solution on each side of the membrane change as this molecule moves?
 - a. On the inside it will become
 - b. On the outside it will become...
8. Applying what you already know about diffusion and the random movement of molecules, what will eventually happen to the concentration on both sides of the membrane?
9. Using your responses to the questions above, summarize what your group has learned so far about the movement of water through a selectively permeable membrane.

Definition:

OSMOSIS is

MODEL 3: Osmosis in Plant and Animal Cells



Read This!

The diagram above shows how cells can be altered due to osmosis. Water is constantly moving across cell membranes by random motion. The relative amount of water movement into and out of the cells is indicated by the size of the arrows. Note that both plant and animal cells are surrounded by a selectively permeable membrane, and that plant cells are also surrounded by a permeable, rigid, outer cell wall.

12. For each question use diagrams A-F above. Which cells have:

- Taken in water?
- Lost water?
- No change in water?

13. If osmosis is the movement of water from a high concentration of water (dilute solution) to an area of lower concentration of water (concentrated solution), then
- Describe the concentration of the solution surrounding cells A and D (extracellular), relative to the concentration of the solution inside cells A and D (intracellular).
 - Describe the concentration of the solution surrounding cells C and F (extracellular), relative to the concentration of the solution inside cells C and F (intracellular).
 - Describe the concentration of the solution surrounding cells B and E (extracellular), relative to the concentration of the solution inside cells B and E (intracellular).

14. Using the answer to the previous question, develop definitions for the following words:



- A hypertonic extracellular solution is...
- A hypotonic extracellular solution is...
- An isotonic extracellular solution is...



15. Describe what has happened to a plant cell that is placed in a hypertonic solution.
16. What word is used to summarize these changes to the plant cell?

17. What word would be used if the cell were from an animal?
18. Describe the changes to the plant cell when it is placed in a hypotonic solution.
19. What word summarizes these changes?
20. What is different about a plant cell placed in a hypotonic solution and an animal cell?
21. Considering the difference in the structure of plant & animal cells, do you think that if water were continually added, the plant cell would eventually undergo lysis? Use complete sentences to explain your answer.
22. Using the concept of osmosis, explain why water is sprayed over produce in a grocery store and what change in appearance this might cause to the produce and why it is desirable.
23. Plants that live near the sea can often get flooded with seawater. This causes them to wilt. Using the principals of osmosis explain why this happens.

