

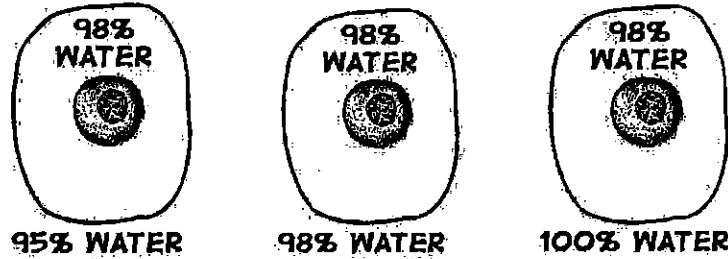
Define osmosis. _____

In which direction does water move across membranes, up or down the concentration gradient? _____

Define these 3 terms:

- a. isotonic- _____
- b. hypertonic _____
- c. hypotonic _____

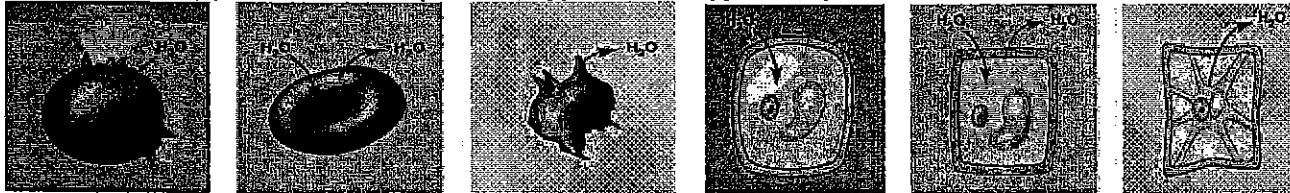
Use **arrows** to show the direction of water movement into or out of each cell. **Color and label** the cell in an isotonic environment light blue, the hypotonic environment yellow, and the hypertonic environment light green.



Match the description or picture with the osmotic condition:

- A. Isotonic _____ solution with a lower solute concentration
- B. Hypertonic _____ solution in which the solute concentration is the same
- C. Hypotonic _____ condition plant cells require
- _____ condition that animal cells require
- _____ red blood cell bursts (cytolysis)
- _____ plant cell loses turgor pressure (Plasmolysis)
- _____ solution with a higher solute concentration
- _____ plant cell with good turgor pressure
- _____ solution with a high water concentration

Label the tonicity for each solution (isotonic, hypotonic, or hypertonic):

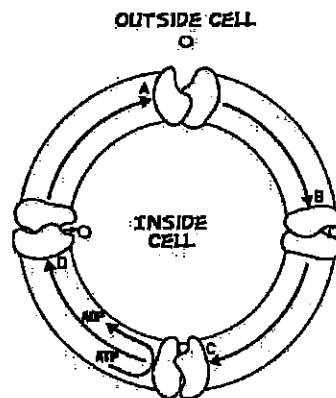


Transport Requiring Energy

What type of transport is represented by the following picture? _____

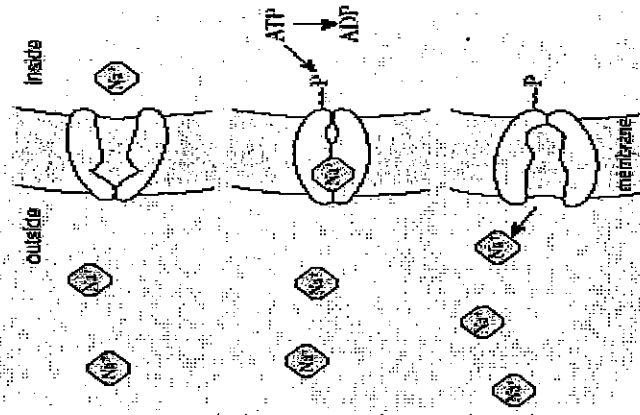
What energy is being used? _____

In which direction (concentration gradient), is the movement occurring? _____



Color the internal environment of the cell yellow. Color and Label the transport proteins red and the substance being moved blue.

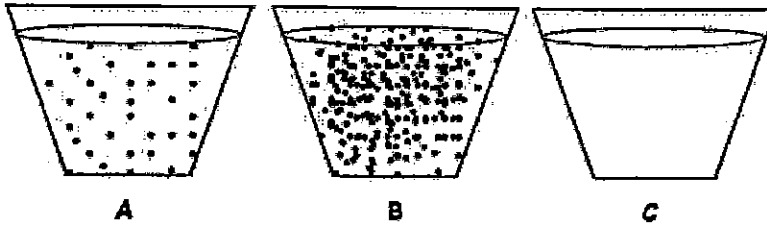
One type of active transport is called the _____ pump which helps muscle cells contract. This pump uses _____ to move ions _____ the concentration gradient. The protein that is used to pump the ions through is called a _____ protein and it changes its _____ to move the ions across the cell membrane.



Label and color the carrier proteins red and the ions green.

TONICITY AND OSMOSIS

key:
 solute particle •
 cell membrane - - - - -
 cell wall = = = = =
 in all solutions, the solvent is H₂O



plant cell



animal cell

Part I – Fill in the blanks.

- A _____ is a fluid in which a substance is dissolved.
 A _____ is a substance dissolved in a solvent.
 A _____ is a combination of solute and solvent.
 The process by which water diffuses across a membrane called _____.

word bank
 Solution
 Solvent
 Solute

Part II – Look at the solutions illustrated above and fill in the blanks.

- Solution B is _____ to Solution A. This is because Solution B has a greater concentration of _____ in it than does Solution A. Solution C has no solutes dissolved in it, therefore it is _____ to both Solutions A and B.
- As a relative concentration of solutes in two solutions increases, of necessity the concentration of water in the same two solutions _____. Solution A has a lower concentration of _____ than does Solution C; Solution A is also hypertonic to Solution C.
- If you wanted to make Solution A isotonic to Solution B, you could add water to Solution _____ or you could add solute to Solution _____. If you took all three solutions, put them into a large container and mixed them thoroughly, then redistributed the solution among three containers, Solution A would be _____ to Solution B. Solution A would also be _____ to Solution C, and Solution C would be _____ to Solution B.

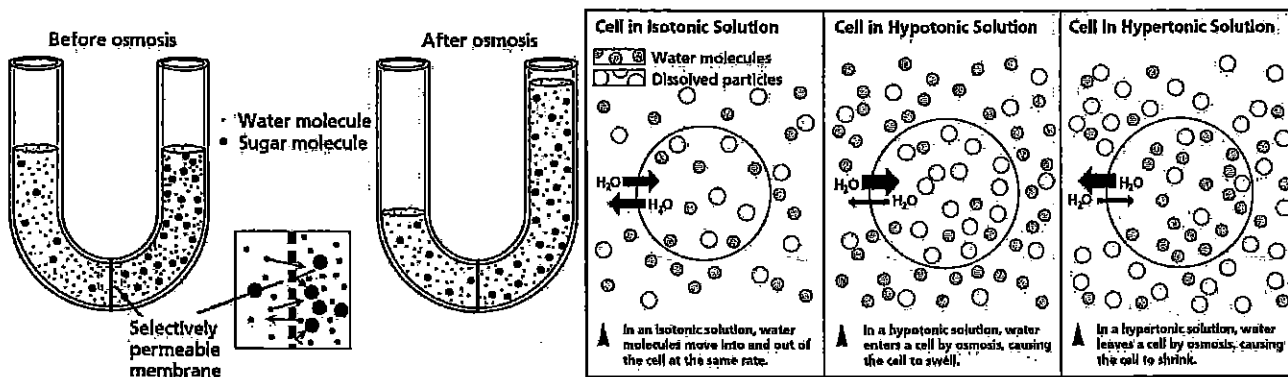
Part III – Look at the solutions and cells illustrated above and fill in the blanks.

- Because the cytoplasm of the plant and the animal cell have equal concentrations of solutes, we can say their cytoplasm are _____ to each other. If we put both the plant and the animal cells into

Solution A, we would expect no change in the cells, because **Solution A** is _____ to the cytoplasm of each cell.

2. Let's put both cells into **Solution B**. Because **Solution B** is **hypertonic** to the cytoplasm of the cells, we would expect water to _____ the cells through the process of _____. This would result in the cytoplasm of both cells shrinking.

3. Now we'll put both the plant and animal cell into **Solution C**, which, because it contains **no solutes** at all, is _____ to the cytoplasm of both cells. _____ will enter both cells through osmosis. The animal cell is likely to _____, unfortunately. The plant cell, however, is protected from this because of the presence of its _____.



Refer to the U-tube pictures above when answering the questions below.

- Why did the number of water molecules on each side of the membrane change, whereas the number of sugar molecules stayed the same?
- How does the plasma membrane of a cell compare with the membrane in the U-shaped tube?
- Explain the behavior of water molecules in the isotonic solution.
- Does osmosis occur if a cell is placed in an isotonic solution?
- Why does water enter a cell that is placed in a hypotonic solution?
- What happens to the pressure inside a cell that is placed in a hypertonic solution?
- What can happen to animal cells when placed in a hypotonic solution? Explain.
- What causes a plant to wilt?

Osmosis: Below are animal cells placed in beakers of various concentrations.

1. Draw an arrow to show which way the water would move by osmosis.
2. Identify the type of solution: Isotonic, hypertonic or hypotonic.

