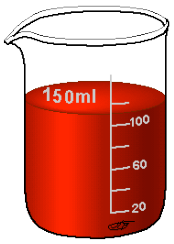
Name _____ Period ____

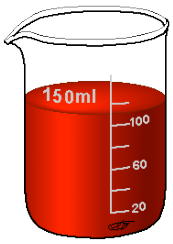
# Cellular Transport Problem Set

1. Compare (tell how they are similar) and contrast (state how they are different) the terms *diffusion* and *osmosis*.

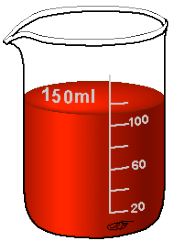
2.




**Beaker A**
100 % Water




**Beaker B**
____% Sugar
90% Water

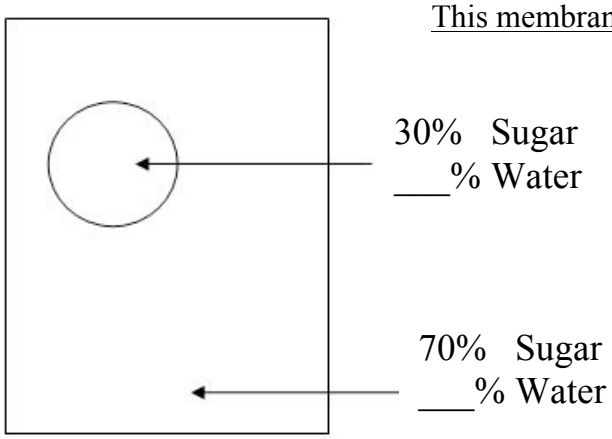



**Beaker C**
40% Sugar
___% Water

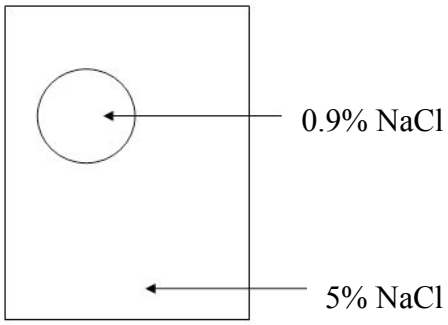
a. What is the solute concentration of Beaker A?
b. What is the solvent concentration of Beaker C?
c. What would the solvent concentration be for a solution that is isotonic to Beaker B?

3. Below is a diagram of a cell submerged in a solution.
   a. What is the *solution* in this example – hypotonic, hypertonic or isotonic?
   b. How do you know?

   c. What *process* is going to take place in this example? (diffusion or osmosis)
   d. Describe exactly what is going to happen to the cell in this example.



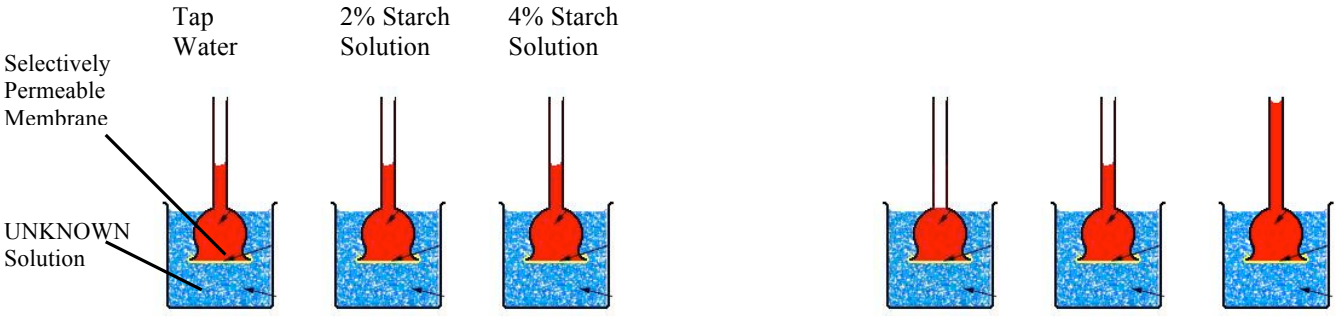
4. The cell in this beaker is bathed in a 5% NaCl solution. <u>The membrane is permeable to water</u> but <u>not to NaCl</u>.




i. In which direction is the net movement of water here?

ii. How will this affect the cell?

5. Three funnels containing three different starch solutions were placed for 24 hours into a beaker that contained a starch solution of UNKNOWN concentration. The end of each funnel was covered by a selectively permeable membrane.
   a. What can you say about the *concentration of the solution in the beaker* based on the results shown in the diagram?

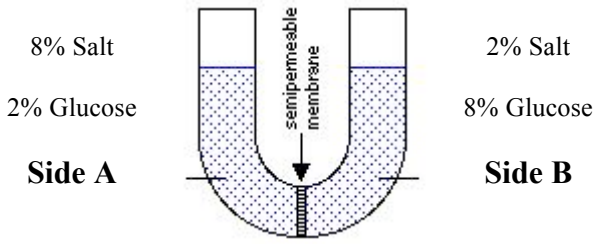



6. A U-tube is divided into 2 halves, A and B, by a membrane which is freely permeable to water and salt, but NOT to glucose. Side A is filled with a solution of 8% salt and 2% glucose, while side B is filled with 2% salt and 8% glucose.
   a. In terms of <u>glucose</u> concentration, which side is a hypotonic solution?

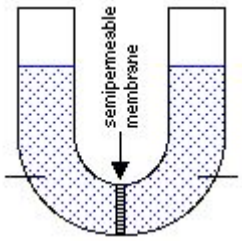
   b. What could you say about the <u>water</u> concentration on side A relative to side B?

   c. Which molecule(s) will move across the membrane and in which net direction(s)?

   d. Notice that the levels of liquid in both A and B are equal. Do you think they will appear this way when the system reaches <u>equilibrium</u>? **Explain.**



7. The solutions in the arms of the U-tube (at right) are separated by a selectively permeable membrane that is *permeable to water and solute A, but not to solute B*. 40g of solute A and 20g of solute B have been added to the water on side 1 of the U-tube. 20g of solute A and 40g of solute B have been added to the water on side 2 of the U-tube. Assume that after a period of time, equilibrium is reached.




**Side 1** **Side 2**

   a. How many grams of solute A will be in solution on side 1 of the U-tube?
   b. How many grams of solute A will be in solution on side 2 of the U-tube?
   c. Explain your answers to questions a & b.

   d. How many grams of solute B will be in solution on side 1 of the U-tube?
   e. How many grams of solute B will be in solution on side 2 of the U-tube?
   f. Explain your answers to questions d & e.

   g. What has happened to the water level in the U-tube? Explain your answer.

8. Flasks X, Y, and Z contain solutions with different concentrations of the solute NaCl. Flask X has 0.5% NaCl, flask Y has 0.9% NaCl, and flask Z has 1.5% NaCl. Red blood cells (0.9% NaCl) will be placed into each flask.

   a. Predict what will happen to the red blood cells in flask X (hint: draw out the situation).

   b. Predict what will happen to the red blood cells in flask Y (hint: draw out the situation).

   c. Predict what will happen to the red blood cells in flask Z (hint: draw out the situation).