

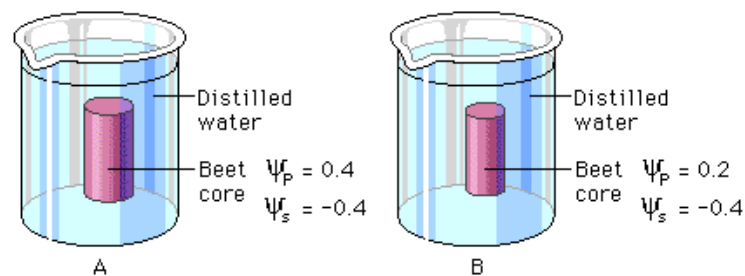
## WATER POTENTIAL and OSMOSIS WORKSHEET

- Write the formula for water potential. Explain the meaning of each symbol.
- Water potential is measured in what two units of measurement?  
\_\_\_\_\_ and \_\_\_\_\_
- What two factors determine water potential? (See equation you wrote above)
- Explain what direction water will move regarding water potential.
- Can solute potential be a positive number? Explain.
- Pure water has a water potential of = \_\_\_\_\_
- If water potential is = -2 bars and solute potential = -2 bars, then pressure potential = \_\_\_\_\_.
- If solute potential is = -3 bars and water potential = 0 bars and, then pressure potential = \_\_\_\_\_.
- If water potential is = -9 bars and pressure potential = +4 bars, then solute potential = \_\_\_\_\_.
- Which beaker(s) contain(s) a solution that is hypertonic to the bag? \_\_\_\_\_



- Arrange the beakers above in order of the mass of the bags inside them after the experiment has run for 30 minutes. List the bag that loses the most mass first.
- From the beakers below, in beaker B, what is the water potential of the distilled water in the beaker, and of the beet core?

Beaker water potential = \_\_\_\_\_ Beet Core water potential = \_\_\_\_\_



- Which of the following statements is true for the diagrams above?
  - The beet core in beaker A is at equilibrium with the surrounding water.
  - The beet core in beaker B will lose water to the surrounding environment.
  - The beet core in beaker B would be more turgid than the beet core in beaker A.
  - The beet core in beaker A is likely to gain so much water that its cells will rupture.
  - The cells in beet core B are likely to undergo plasmolysis.

14. If a cell has a water potential of -3 and the solution it is in has a water potential of -2. Which way will the water move?
15. All of the following problems will deal with solution in a U-tube separated by a semi-permeable membrane. Pressure may be applied to either side (acts as pressure potential).
- On side A of a U-tube the solution has a solute potential of -.5 and side B has a solute potential of 0. Which way will the water move if a positive pressure of .25 is added to side A?
  - On side A of a U-tube the solution has a solute potential of -.3 and side B has a solute potential of 0. Which way will the water move if a positive pressure of .3 is added to side A?
  - On side A of a U-tube the solute potential is -.6 and the solute potential on side B is 0. Which way will the water move if a negative pressure of -.7 is added to side B?
16. A plant cell is placed in a solution with a solute potential of -.2. The cell itself has a solute potential of -.4. Which way will the water move? To reach an equilibrium what pressure must the cell wall exert?
17. A cell is placed in a hypertonic environment and plasmolyzes. If the cell's original solute potential is -.1 and the solution is -.3. What will the solute potential be of the cell at equilibrium?

### Practice Problems – Osmosis and Water potential

Use this key to answer all the problems below. If you choose B or C, rewrite the statement so that it is complete and true.      A = TRUE    B = FALSE    C = NOT ENOUGH INFORMATION

**PROBLEM ONE:** The initial molar concentration of the cytoplasm inside a cell is 2M and the cell is placed in a solution with a concentration of 2.5M.

- Initially, free energy is greater inside the cell than outside
- It is possible that this cell is already in equilibrium with its surroundings.
- Initially, solute concentration is greater outside the cell than inside.
- Water will enter the cell because solute potential is lower inside the cell than outside.
- The cell will become flaccid because the pressure potential is greater outside the cell than inside.
- The cell is already in equilibrium with its surroundings because of the combination of pressure potential and solute potential inside and outside the cell.
- Initially, the cytoplasm is hypertonic to the surrounding solution.
- Initially, the numerical value of the solute potential is more negative inside the cell than outside.
- Net diffusion of water will be from inside the cell to outside the cell.
- At equilibrium, the molarity of the cytoplasm will have increased.