Water Potential Practice Problems:

Show your work:

1. A solution in a beaker has sucrose dissolved in water with a solute potential of
-0.5MPa. A flaccid cell is placed in the above beaker with a solute potential of -0.9MPa.   a) What is the pressure potential of the flaccid cell before it was placed in the beaker?

b) What is the water potential of the cell before it was placed in the beaker?

c) What is the water potential in the beaker containing the sucrose?

d) How will the water move?

e) What is the pressure potential of the plant cell when it is in equilibrium with the sucrose solution outside? Also, what is its final water potential when it is in equilibrium?

f) Is the cell now turgid/flaccid/plasmolysed?

g)   Is the cell hypotonic or hypertonic with respect to the outside?

h) If it is hypo/hyper (choose one) tonic – this means that its water potential is higher/lower (choose one) than the outside.

Still confused – do the Case study for Chapter 36

The equation for Water potential is $\Psi = \Psi_s + \Psi_p$
Solute potential $(\Psi s) = -iCRT$
i =   The number of particles the molecule will make in water; for NaCl this would be 2; for sucrose or glucose, this number is 1
C =   Molar concentration (from your experimental data/problem)
R =   Pressure constant = 0.0831 liter bar/mole K
T =   Temperature in degrees Kelvin = 273 + °C of solution
Drawing pictures to show water potential inside and outside the cell will be helpful.
1. Calculate the water potential of a solution of 0.15 M sucrose @ 20C.

2. If a flaccid cell $(\Psi p = 0)$ having a solute potential of -0.65 MPa is placed in the above solution, what will be its pressure potential at equilibrium?

3. If the cell above is removed from that solution of 0.15 M sucrose and placed in a solution of 0.35 M sucrose, will the pressure potential of the cell increase or decrease? What will be the new value?

4. You measure the total water potential of a cell and find it to be -0.24 MPa. If the pressure potential of the same cell is 0.46 MPa, what is the solute potential of that cell?