NAME \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
  
 WATER POTENTIAL PROBLEMS  
 *SHOW ALL WORK !*

1. You place a piece of potato weighing 0.3 gram with a water potential of 1 MPa in a beaker of Pepsi. After 10 minutes, you remove the potato piece, and it now weighs 0.25 gram. You conclude that   
 a). Pepsi Cola has a water potential greater than 1 MPa.   
 b). Pepsi Cola has a water potential of 0 MPa.   
 c). Pepsi Cola has a water potential less than 1 MPa.   
 d). Pepsi Cola does not have turgor pressure, and so you cannot conclude anything about its water potential.

2. Zucchini cores are measured and determined to have a sucrose concentration of 0.36 M. Calculate the solute potential Ψs of these cells. Look on your Appendix A sheet in Lab Manual for the correct equation to use.

Plant cell

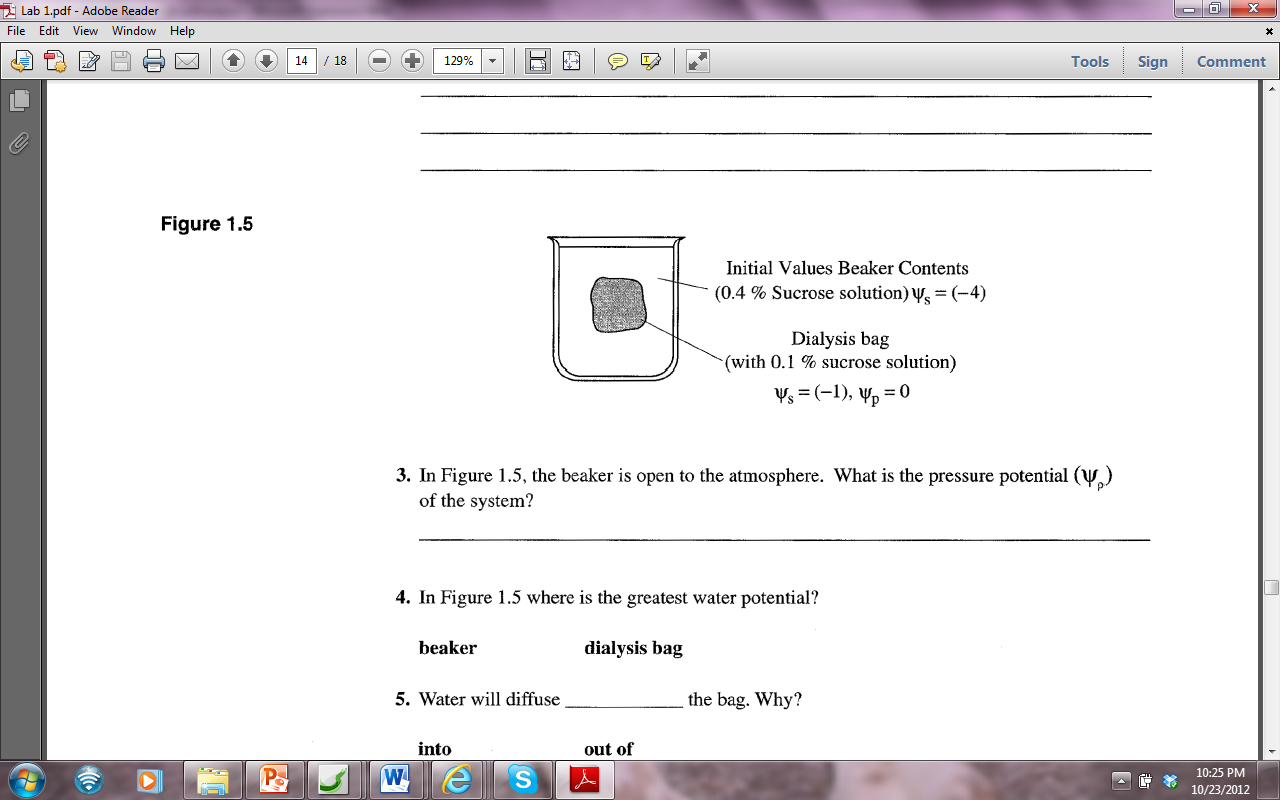
pure water

3. If solute potential in the plant cell above is –6.25 bars and pressure potential is 0, what is water potential of the plant cell?

What does this indicate in terms of water movement?

4. If solute potential in the plant cell above is –6.25 bars and pressure potential is 6.25 bars, what is the water potential of the plant cell?

What does this indicate in terms of water movement?

5. A dialysis bag containing 0.1% sucrose is placed in a beaker containing 0.4% sucrose. The beaker is open to the atmosphere. What is the pressure potential Ψp of the system ?

What is the water potential of this dialysis bag?

Water will move \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the dialysis bag.  
 into out of

6. If a potato is allowed to dehydrate by sitting in the open air, would the water potential of the potato cells decrease or increase? Why?

7. What is the water potential for a solution that is 0.1M? (assume i = 1, and a temperature of 22°C)

8. What is the solute potential for a solution that is 0.5M? (assume i = 1, and a temperature of 10°C)

9. A plant cell has a solute potential of –4.0 bars and a pressure potential of 1.0 bar. What is its water potential?

If this cell is placed in a solution with a water potential of –5.0 bar. What will happen to this cell?

10 A plant cell has a solute potential of –2.0 and a pressure potential of 0.0. What is its water potential? Show your work

It is placed in a solution with a water potential of –1.0. What will happen to this plant cell?

11 A cell with a pressure potential of 0.8 MPa and an osmotic potential of -1.6 MPa is placed in a beaker of pure water. What is the water potential in the beaker and in the cell initially? In which direction will water flow?

After equilibrium, what will the solute potential, pressure potential, and water potentials be in the beaker and cell?

Hint: Look at the example in your slide show and draw a picture.

12. What is the highest water potential a solution in an open beaker can have? Explain

BONUS: You are asked to estimate if a certain species of plant could live in a salt marsh. You collect the following data:

a. The overall Ψ of the soil (Ψsoil): -25.0 bar

b. Solute concentration of plant cell contents: 0.1M (assume i=1, and 13°C)

c. Pressure potential of the plant cells is: -19.0 bar

Do you think the plant could grow in this environment? Why or why not?

Includes problems from:   
-Water Potential Problems by Ann Brokaw  
- http://highered.mcgraw-hill.com/sites/0072437316/student\_view0/chapter37/answers\_to\_text\_questions.html  
-http://www.travismulthaupt.com/page1/page25/files/Water%20Potential%20Problems.pdf  
- http://www.youtube.com/watch?v=lYlGqWuiegM