Osmosis Prelab:

Read the entire lab. There are several parts most of which we will demo. In your lab book be sure to denote which section you are in. First of all have your notes on Background information.

Background info: water potential etc….

BK: Calculate these problems:

1. Calculate the solute potential of a 0.1 M NaCl solution at 25 °C. If the concentration of NaCl inside the plant cell is 0.15 M, which way will the water diffuse if the cell is placed into the 0.1 M NaCl solutions?

2. What must the turgor pressure equal if there is no net diffusion between the solution and the cell?

Getting Started

These questions are designed to help you understand kinetic energy, osmosis, and diffusion and to prepare for your investigations.

3. What is kinetic energy, and how does it differ from potential energy?

4. What environmental factors affect kinetic energy and diffusion?

5. How do these factors alter diffusion rates?

6. Why are gradients important in diffusion and osmosis?

7. What is the explanation for the fact that most cells are small and have cell membranes with many convolutions?

8. Will water move into or out of a plant cell if the cell has a higher water potential than the surrounding environment?

9. What would happen if you applied saltwater to a plant?

10. How does a plant cell control its internal (turgor) pressure?

■Procedure 1: Surface Area and Cell Size (read but do not do a prelab)

Cell size and shape are important factors in determining the rate of diffusion. Think about cells with specialized functions, such as the epithelial cells that line the small intestine or plant root hairs.

11. What is the shape of these cells?
12. What size are the cells?
13. How do small intestinal epithelial and root hair cells function in nutrient procurement?

Step 1

13. Which solution is an acid?
14. Which solution is a base?
15. What color is the dye in the base? In the acid?
16. What color is the dye when mixed with the base?

Step 2 In class: Look at the link:
http://www.youtube.com/watch?v=xuG4ZZ1GbzI&feature=edu&list=PLD84FB4ECF83A6062

17. What is the surface area of each of your three cells?
18. What is the total volume of each of your cells?
19. If you put each of the blocks into a solution, into which block would that solution diffuse throughout the entire block fastest? Slowest? How do you explain the difference?

Procedure 2: Modeling Diffusion and Osmosis

You are in the hospital and need intravenous fluids. You read the label on the IV bag, which lists all of the solutes in the water.
20. Why is it important for an IV solution to have salts in it?
21. What would happen if you were given pure water in an IV?
22. How would you determine the best concentration of solutes to give a patient in need of fluids *before* you introduced the fluids into the patient's body?

Write out the procedure for this section however, we will be using different concentrations of sucrose instead of the lab solutions. The solutions will be 0.2 M, 0.4M 0.6 M, 0.8 M and 1.0 M

Record these questions and work on them while you wait for your results

23. Which pair(s) that you tested did not have a change in weight? How can you explain this?
24. If you compare 1 M solutions, was a 1 M NaCl solution more or less hypertonic than a 1 M sucrose solution? What would be your evidence? What about1 M NaCl and 1 M glucose and 1 M sucrose?
25. Does protein solution have a high molarity? What is evidence for your conclusion?
26. How could you test for the diffusion of glucose?
27. Based on your experiment, how could you determine the solute concentration inside a living cell?

Procedure 3: Observing Osmosis in Living Cells

28. What would happen if you applied saltwater to the roots of a plant? Why?
29. What are two different ways a plant could control turgor pressure, a name for internal water potential within its cells? Is this a sufficient definition for turgor pressure?
30 Will water move into or out of a plant cell if the cell has a higher water potential than its surrounding environment?
Step 1 Start by looking at a single leaf blade from either *Elodea* (a water plant) or a leaflike structure from *Mnium hornum* (a moss) under the light microscope. If you need assistance, your teacher will show you how to place specimens on a slide.
http://www.youtube.com/watch?v=VK-_YHakvho

31. Where is the cell membrane in relation to the cell wall? Can you see the two structures easily? Why or why not?
32 What parts of the cell that you see control the water concentration inside the cell?
Back in Procedure 2 you tested diffusion and osmosis properties of several solutions.
Now you are going to determine how they affect plant cell turgor pressure.
33. What changes do you expect to see when the cells are exposed to the solutions?
34. How will you know if a particular treatment is increasing turgor pressure? If it is reducing turgor pressure?
35. How could you determine which solution is isotonic to the cells?