Cell Structures: Osmosis in Potato Sticks

Osmosis is the movement of water in response to solute concentrations. Water will always move to the region of higher solute concentration. In this activity you will examine the movement of water using potato sticks.
Here are some quick bullet points relevant to this activity.

1. Potatoes are plants and as such their cells are enclosed by a cell wall.
2. Under isotonic conditions water moves into and out of a cell at the same rate. There is no net movement of water.
3. Under hypertonic conditions, the solute concentration in the environment is greater than the solute concentration in the cytoplasm of the cell, therefore water flows from the cell into the environment. The plasma membrane will collapse and the cell may shrivel.
4. Under hypotonic conditions, the solute concentration in the environment is less than the solute concentration of the cytoplasm of the cell, therefore water flows from the environment into the cell. The central vacuole enlarges and the plasma membrane presses against the cell wall. The cell is turgid.

In this activity, you will be immersing potato sticks in distilled water and a salt water solution. Write your hypothesis for this activity here: _____

_____

Materials

Potato sticks
10 % NaCl solution
Distilled water
Paper towels
Test tube rack
Test tubes – 2
Beaker - 24 mL

Procedure

1. Pick up 2 test tubes, 2 potato sticks, and a test tube rack from the supply table and return to your bench.
2. Label the test tubes, DI water and 10% NaCl.
3. Blot the potato sticks dry with a paper towel. Insert one potato stick into each test tube.
4. Add distilled water to the test tube labeled DI water. Add enough water to completely cover the potato stick.
5. Pour about 10 mL of 10% NaCl from the supply table into the beaker. Then pour the NaCl into the test tube labeled 10% NaCl. Make sure to cover the potato stick.
6. Incubate the potato sticks on the bench top for 20 minutes.
7. After 20 minutes carry your test tube rack to the sink. Invert each tube over the sink to drain the water and salt water. Return to your desk.
8. Invert the test tube labeled DI water and remove the potato stick. Bend the potato stick till it breaks. Does the potato stick break? _____ Does it snap crisply or bend flexibly? _____
9. Repeat step with the test tube labeled 10 % NaCl. Does the potato stick break? _____ Does it snap crisply or bend flexibly? _____

1. How would you describe the distilled water environment (isotonic, hypotonic, hypertonic) with respect to the cells in the potato? If there is a net movement of water, is it into or out of the potato stick?

2. How would you describe the 10 % NaCl environment (isotonic, hypotonic, hypertonic) with respect to the cells in the potato? If there is a net movement of water, is it into or out of the potato stick?

3. Draw below how cells in the potato stick incubated in distilled water would appear? What would you expect? You didn't do this activity (microscopic examination), but consider the tonicity and what you know about plant cell structure.

4. Draw below how cells in the potato stick incubated in 10 % NaCl would appear? What would you expect? You didn't do this activity, but consider the tonicity and what you know about plant cell structure.

5. Was your hypothesis supported? Why or why not?

6. Name the independent variable.

7. Name the dependent variable.

8. Before refrigeration, foods meats in particular were preserved using salt. Explain why this worked; how is salting a viable means of food preservation?