

Experiment 2

Tonicity and the Plant Cell

Experiment Inventory

Materials

16 g Sodium Chloride (Salt), NaCl

(2) *Potatoes (these must be different types; e.g., Russet, Idaho, Sweet, etc.)

(1) Permanent Marker

* Water

Labware

(2) Pipettes

(4) Test Tubes

(1) Test Tube Rack

(1) 100 mL Graduated Cylinder

(1) Ruler

(1) *Stopwatch

(1) *Cutting Board

(1) *Kitchen Knife

Note: You must provide the materials listed in *red.

EXPERIMENT 2: TONICITY AND THE PLANT CELL

Plant cells are able to generate osmotic pressure while other cells cannot. This is due to specialized plant structures such as the cell wall which prevent lysis caused by osmosis. By taking advantage of this system, you will be able to look at the effects of tonicity in a biological system.

PROCEDURE

1. Use the permanent marker to label two test tubes as A, and two test tubes as B. Place the test tubes in the test tube rack.
2. Identify the two potato types in the first two cells of the first column in Table 3. Then, select one potato to test first and record observations about the physical characteristics in Table 3.

Note: Be sure to include observations which acknowledge the texture, color, and any other distinguishing factors.

3. Use a knife to carefully cut two strips of the potato on a cutting board. These will be referred to as Sample A and Sample B. The strips should be as close to 10.0 cm. long and 1.0 cm. wide as possible to ensure that the strips fit in the test tubes.
4. Fill the 100 mL graduated cylinder with 50 mL of water. Place the first potato strip (Sample A) into the graduated cylinder and record the initial displacement in Table 3.

Note: Displacement is a measurement of change. It is calculated by subtracting the original volume (50 mL) from the final volume after the potato is added to the 50 mL of water. For example, 57 mL - 50 mL = 7 mL of displacement.

5. Remove Sample A from the graduated cylinder and place it in Test Tube A. If any water was lost in the graduated cylinder, refill it to the 50 mL graduation mark.
6. Place the second potato strip (Sample B) into the graduated cylinder. Record the initial displacement in Table 3.
7. Remove Sample B from the graduated cylinder and place it in Test Tube B. If any water was lost in the graduated cylinder, refill it to the 50 mL graduation mark.
8. Repeat Steps 2 - 7 for the second potato type, using the remaining test tubes in the test tube rack.
9. Use a pipette to add water to each of the test tubes with the A samples in them until the water covers the potato strips.
10. Refer to the instructions provided on the bottle with 16 g of sodium chloride in it to create a 20% sodium chloride solution. Use a pipette to add the 20% sodium chloride solution to each of the test tubes with the B potato samples in them until the solution covers the potato strips.
11. After an hour, pour out the liquid from the test tubes.
12. Repeat Steps 4 - 7 for each sample and type, and record the final displacement values in Table 3.
13. Complete the last column of Table 3 by subtracting the initial displacement from the final displacement.

Data Sheet

Experiment 2 Data Sheet

8

Table 3: Water Displacement Per Potato Sample

Potato Type	Potato Observations	Sample	Initial Displacement (mL)	Final Displacement (mL) - Step 11	Net Displacement (mL)
		A			
		B			
		A			
		B			