

How do Hypotonic Hypertonic and Isotonic Solutions Affect the Water movement of a cell

Purpose

The purpose of this activity is to learn about osmosis and the effects of hypotonic, hypertonic, and isotonic solutions on animal cells.

Objectives

You will be able to describe osmosis and differentiate between the effects of hypotonic, hypertonic, and isotonic solutions on animal cells and determine the isotonic point for a chicken egg in corn syrup. You will also be able to apply this knowledge to human epithelium, and the effects and consequences hypotonic, hypertonic, and isotonic solutions would have on these cells.

Materials

raw eggs	corn syrup (Karo syrup)
vinegar (approximately 5% acetic acid)	water
beaker or container	graduated cylinders
paper towels (or tissues)	tape
balance - electronic	pen
	graph paper or Excel

Procedures

1. Label your beakers with the sugar solution percentage your group has been assigned (4%, 6%, 8%, 10%, 12%, 14%, 16%). Percent solution will be determined by volume. Be sure and include enough information on the beaker label that will allow you to identify it later. (Period, lab station, etc.)
2. Place an egg carefully in each beaker so as not to break the egg shell. Fill the beaker with vinegar until the egg is covered.
3. After the shell is dissolved (overnight) you will carefully rinse the egg underwater and softly to remove the remaining egg shell. Carefully dry the egg and place it on a moist paper towel on the lab station. This mass will be recorded on the data sheet and beaker label as Beginning mass(Mb). Mass is measure to the nearest .01gram. **(MAKE SURE YOU KEEP TRACK OF WHICH EGG IS ASSIGNED TO WHICH BEAKER.)**
4. Make your assigned concentration of corn syrup solution. Percent solution will be based on volume. Each beaker will have 300ml of sugar solution. **Make sure the beaker is labeled with group number, the date, the beginning mass of the egg, and the concentration of corn syrup**
5. Place the eggs carefully in the beakers. **(MAKE SURE YOU KEEP TRACK OF WHICH EGG IS ASSIGNED TO WHICH BEAKER.)**
6. After waiting for 1 days measure the ending dry mass of the eggs. Using hands, water and paper towels, gently rinse the egg, dry off the outside of the egg and mass it. This is the After mass (Ma).
7. Record your data on the white board for the entire class.
8. Complete Sections 1 and 2 using the data on the white board.
9. Complete Sections 3 and 4 of the Data Sheet.
10. Calculate the "average percent change" in mass.
11. **Construct a graph of "average percent change" in mass versus "percent corn syrup" from the data you have copied of the board.** Be sure to provide a title and include labels and units for each axis of the graph. Draw a best fit line for all data points.

Please note the following point:

The eggs are raw. If they are mishandled, especially after the shell has been dissolved, it could be messy.

Safety

You will be working with store-bought vinegar (approximately 5% acetic acid), raw eggs, distilled water, and corn syrup. You need to wear goggles while working with the vinegar. Salmonella, a bacterium commonly found in poultry and eggs, causes food poisoning. To minimize the risk of Salmonella, make sure you wash your hands with soap after handling the egg.

Analysis.

1. What are possible sources of error? Human error does not count.
2. When determining the mass of the egg, it must be dry. What are the reasons?
3. Why is an egg being used for this experiment?
4. What is the difference between diffusion and osmosis?
5. Was your corn syrup solution a hypotonic, hypertonic, or isotonic solution on the egg?
6. Explain your corn syrup solution's effect on the egg.
7. What will happen to the egg in a hypotonic solution? Explain
8. What will happen to the egg in a hypertonic solution? Explain
9. What will happen to the egg in an isotonic solution? Explain
10. "If you were stranded on a desert island, why is it worse to drink the ocean water than no water at all?" "Why does salt water make a good weed killer?" or "Why is sugar used to preserve fruit?"
11. What limits the possible change in mass? BE SPECIFIC!

Conclusion

At the conclusion of this activity, you will have a graph based on data points from the entire class. By drawing a best fit line on the graph. ***What does the x-intercept represent? Be SPECIFIC!***