

ANSWER HINTS

EGG-SPERIMENT (Egg-Cell Osmosis)

Mr. Galloway

FILE: LS-Egg-Experiment-Osmosis-Galloway



BACKGROUND: During this scientific experiment, you will determine whether solutions of different concentrations are hypotonic, isotonic, or hypertonic compared to the solution inside of a chicken egg/cell. If the solution outside the egg/cell is hypotonic then the solution inside the egg/cell is hypertonic by comparison (and vice-versa). **Hypotonic** = solution with less dissolved substances. **Hypertonic** = solution with more dissolved substances. Isotonic = solution with EQUAL amount. Water molecules will diffuse (osmosis) from mostly from the hypotonic side of a membrane to the hypertonic side. Mr. Galloway will soak the eggs in vinegar for a few days. This will remove calcium from the shell. This allows the egg to act as a single cell surrounded by a selectively permeable membrane. This allows molecules in solution to move across the membrane.

MATERIALS

- vinegar-soaked chicken eggs
- water (sink to rinse eggs)
- gram scale
- 1 disposable plastic cup
- 5 cm masking tape
- marker
- 500-mL beaker
- 50% Glucose solution
- 0% solution (Distilled Water)
- plastic wrap
- 2 rubber bands

PROBLEM/Question: Are the tested solutions hypotonic, isotonic, or hypertonic to the egg?

HYPOTHESIS: (testable prediction) IF _____, THEN _____

Your "If---Then" prediction should say what will happen to an egg (shrink or swell) in one of the two solutions.

PROCEDURES:

1. You will test (compare) two SOLUTIONS: one is DISTILLED water and the other is a 50% GLUCOSE solution. You will determine whether each is hypotonic, isotonic, or hypertonic relative to the inside of a chicken egg.

2. Identify the VARIABLES you will measure and the constants you will maintain during the investigation. Examples of constants include the amount of solution used for each egg.

INDEPENDENT Variable = *This is the thing that your scientists group did differently in each cup. So describe it here.*

DEPENDENT Variable = *This is what your scientists group looked for or measured at the end of the experiment.*

CONSTANTS = *THESE are the factors that must be the SAME/constant for all cups. List as many factors as can think of.*

3. **USE** the data **TABLE** on the next page to organize your results.

4. **RINSE** each egg, **WEIGH** them in a plastic cup. Record their INITIAL (starting) masses in the table below.

5. **LABEL** each cup with the appropriate **SOLUTION** name.

6. **POUR** one of the solutions you are testing into each cup until it **COVERS** the egg.



50% Glucose Solution



0% Solution (= Distilled Water)

6. **THE NEXT CLASS**, remove each egg and GENTLY dry it. Note any changes in APPEARANCE. Then determine the FINAL mass of each egg and record it in the table below. Record your findings in the table below.

TABLE 1. CHANGES IN EGG MASS		
	Distilled Water Solution 0 %	Glucose Water Solution 50 %
INITIAL mass of egg (g)	This is the weight in grams of the cup & egg BEFORE you added liquid.	This is the weight in grams of the cup & egg BEFORE you added liquid.
FINAL mass of egg after soaking in solution (g)	This is the weight in grams of the cup & egg AFTER your egg sat in liquid for days.	This is the weight in grams of the cup & egg AFTER your egg sat in liquid for days.
CHANGES in egg APPEARANCE	Describe how the egg LOOKED AFTER it had sat in liquid for days. INCLUDE size, color, shape.	Describe how the egg LOOKED AFTER it had sat in liquid for days. INCLUDE size, color, shape.



ANALYZE AND CONCLUDE:

- How can you determine whether a solution you tested was hypotonic, isotonic, or hypertonic? *Go back and READ the BACKGROUND material at the top of p. 1. It tells you what will happen to an egg in each type of solution (hypo, iso, hyper). Then whatever happened to an egg in a solution shows you what type of solution it was in. So your answer here should explain what should happen in EACH type of solution.*
- Which solution made the egg swell or look bigger? *Just write either Distilled or Glucose*
- Which solution made the egg shrink or look smaller? *Just write either Distilled or Glucose*
- Calculate the changes in the mass of the eggs. Explain how this may relate to your findings. Subtract the FINAL mass from the INITIAL mass (INITIAL Mass – FINAL Mass = CHANGE IN MASS).

TYPE OF SOLUTION	Distilled Water Solution 0 %	Glucose Water Solution 50 %
- INITIAL mass of egg & cup BEFORE soaking	= same as in chart above	= same as in chart above
- FINAL mass of egg & cup AFTER soaking	= same as in chart above	= same as in chart above
- CHANGE in mass of egg	= SUBTRACT the final grams from the initial to get this amount of change. Your answer might be positive or negative. INITIAL – FINAL = CHANGE	= SUBTRACT the final grams from the initial to get this amount of change. Your answer might be positive or negative. INITIAL – FINAL = CHANGE

- Which solution caused the egg to GAIN mass? Write *Distilled OR Glucose?*, LOSE mass *Distilled OR Glucose?* *You determine this based on your answers from the subtraction problem above. INITIAL – FINAL = CHANGE*
- Which solution was hypotonic? *Distilled OR Glucose* isotonic *Distilled OR Glucose* hypertonic *Distilled OR Glucose*
- Experimental Design Evaluation: List possible reasons for inconsistent results you may have observed. *Many of the eggs in DISTILLED water DID NOT change the way we expected. We talked about one of the possible reasons in class. This reason had to do with the fact that the eggs in distilled water floated to the top of the water and so part of the egg was STICKING POKING INTO THE AIR in the cup. How might this have impacted the water in that egg?*

* **WHAT OTHER POSSIBLE FACTORS MAY HAVE CAUSED ANY OTHER INCONSISTENCIES IN THE RESULTS OF THE GROUPS?**

8. On the NEXT PAGE, **WRITE** a final paragraph summarizing WHY the results logically led to the conclusion. **SEE BELOW NEXT PAGE →→→**

THIS is the PAGE, where you are to **WRITE** a final paragraph summarizing WHY the results logically led to the conclusion.

THIS LAST SECTION SHOULD BE WRITTEN OR TYPED CAREFULLY.

Look over what you did in this experiment.

Think about WHAT we were testing.

Then WRITE a paragraph EXPLAINING logically WHY (this means the reasons) your experiment ended with the RESULTS you saw with your eggs (*this means the ending change in appearance and mass of your eggs*).

In other words, explain why your egg got bigger (gained mass) or shrank (lost mass)?