Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Period \_\_\_\_\_Date\_\_\_\_\_\_\_\_\_\_\_\_

GROWING AND SHRINKING AN EGG

**Question**: What will happen to the size and weight of an egg when placed in different liquids?

**Background**:

* An egg’s shell can be dissolved by placing the egg in vinegar over a 24-hour period. The vinegar’s acetic acid reacts with the calcium carbonate of the egg shell to produce carbon dioxide, calcium, and water. While you won’t notice the water, and might not see the calcium, you’ll definitely notice the bubbles of carbon dioxide gas form on the egg and release to the surface. The result is “naked,” or shell-less, eggs.
* NOTE: Distilled Vinegar is ~95% water & ~5% acetic acid.
* Cells have an outer covering called the cell membrane. This membrane is selectively permeable; it has tiny pores or holes that allow objects to move across it AND it chooses what to let in and out.
* Let’s talk **OSMOSIS**: We have learned that **osmosis** is the diffusion of water across a selectively permeable membrane. It does not require energy. The cell membrane maintains homeostasis with water; the cell membrane wants to balance the amount of water molecules on each side of the cell membrane. Water molecules will move from areas of high concentration to areas of low concentrations.

**Introduction**:

* In this lab you will be using an egg with the shell removed. The shell-less egg will represent a cell and its selectively permeable membrane. The shell of the egg is removed by soaking the egg in vinegar. The egg shell is made up of the mineral calcium carbonate. Calcium carbonate dissolves in acids such as vinegar. During this process it releases the gas carbon dioxide. After the shell has been dissolved, only the membrane will remain around the egg.

**Pre lab Questions:**

1. What do you think would happen to a shell-less egg if water passed into the egg through the membrane? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. What do you think would happen to a shell-less egg if water passed out of the egg through the membrane? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. What substance must pass through the shell and membrane in order for a chick to develop correctly? \_\_\_\_\_\_\_\_\_\_\_\_\_\_

CONTROL: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

INDEPENDENT VARIABLE: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

DEPENDENT VARIABLE:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Hypothesis**: THINK: Which has the highest concentration of water?

1. If I place a shell-less egg in vinegar, then the size of the egg will \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the weight will \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

2. If I place a shell-less egg in water, then the size of the egg will\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the weight will\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

3. If I place a shell-less egg in salt water, then the size of the egg will \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

and the weight will\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

4. If I place a shell-less egg in syrup, then the size of the egg will \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the weight will\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **liquid** | **Circumference before mm** | **Circumference after mm** | **Weight (g) before** | **Weight (g) after** |
| **water** |  |  |  |  |
| **salt water** |  |  |  |  |
| **syrup** |  |  |  |  |

**Analysis: Explain your results of the effect of each liquid below.**

**The vinegar egg \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

**The water egg \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

**The salt water egg \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

**The syrup egg \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

GROWING AND SHRINKING AN EGG

**Materials**: Raw egg, vinegar, tap water, food coloring, salt water, syrup, string, metric ruler, balance, beaker.

**Procedure after soaking egg in vinegar for 2-3 days,**

**Remove egg from vinegar.**

**EGG STEPS**

1. Measure and record the circumference of the egg by wrapping a piece of string around the equator of the egg. Grasp the string between thumb and finger exactly at the point where the end of the string meets the rest of the string after circling the egg. Use a metric ruler to measure the distance from the end of the sting to the point at which you are holding.

2. Record the weight in grams of the shell-less egg.

**WATER and FOOD COLORING**

1. Repeat steps 1. and 2. From the “EGG STEPS” above.

2. Measure 50 ml of water in a beaker.

3. Add three drops of food coloring to the beaker.

4. GENTLY add the egg to the beaker of water.

5. LET SIT FOR 24 HOURS.

**SALT WATER**

1. Repeat steps 1. and 2. From the “EGG STEPS” above.

2. Measure 50 ml of water in a beaker.

3. Add one tablespoon of salt to the water.

4. GENTLY add the egg to the beaker of water.

5. LET SIT FOR 24 HOURS.

**SYRUP**

1. Repeat steps 1. and 2. From the “EGG STEPS” above.

2. Measure 50 ml of syrup in a beaker.

3. GENTLY add the egg to the beaker of water.

4. LET SIT FOR 24 HOURS.

After waiting the designated time for each egg, measure and record the circumference and weight of each egg.