

- **Aim: To model how cells do diffusion and osmosis**

**NOTE:** This is an extended activity it will take multiple days to complete.

- **Materials required:**

- ✓ 2-3 eggs
- ✓ 2-3 cups
- ✓ Vinegar
- ✓ Corn Syrup or Pancake Syrup
- ✓ Water
- ✓ Optional: food scale

- **Questions to think about before you start:**

- ✓ Why do eggs have a shell and inner membrane?
- ✓ How do you think a chicken egg is similar or different from human cells?

- **Instructions:**

Make sure to perform the experiment as a team (parent and student).

- **Student:** Gently place an egg in the bottom of each cup covered
- **Parent:** Fill each cup with vinegar until the egg is completely covered.
- **Student:** After 24 hours you will notice that the shell of the eggs is dissolved and just the membrane is left.
- **Parent or Student:** Carefully remove your eggs and let them dry. Rinse out each cup.
- **Optional:** Weigh each egg and write down the weight for reference later
- **Parent:** Gently place an egg in the bottom of each cup
- **Student:** Cover one of the eggs in corn/pancake syrup. Cover the other egg in plain water
- **Student:** After 24 hours you will notice that one of the eggs has shrunk and the other has gotten bigger.
- **Parent or Student:** Carefully remove your eggs and let them dry. Rinse out each cup.
- **Optional:** Weigh each egg and write down the weight

- **Extensions Activities:**

- ✓ Try putting the eggs in different liquids for a third day and notice any changes in weight, shape or color
- ✓ Try the activity again and put one egg in vinegar in the fridge and leave the other out or put it in a warm environment for 24 hours. Notice if the temperature made the eggshell dissolve faster or slower
- ✓ Try the activity again using different size and colored eggs, did it make a difference in how fast or slow the eggshell dissolved?

### HELPFUL TIPS

You may need to replace the vinegar after 8-12 hours to speed up the shell removal

Rinsing the eggs with water can remove any of the remaining shell

Remember to handle eggs very carefully as they can break easily.



- **The science behind the fun:** The vinegar is an acid that dissolves the eggshell which is made of calcium carbonate. You may have seen bubbles form on the egg, this was carbon dioxide gas produced by the reaction. The membrane of animal cells is semipermeable and allows for the movement of water in and out. The egg placed in the sugary syrup got smaller because water moved from inside the egg into the syrup from an area of low to high concentration. The sugar molecules are too big to move into the egg, so water moves out to balance the amount of sugar. The egg that was in plain water got bigger because water moved from outside of the egg into the egg from an area of high to low concentration. The other molecules inside the egg are too big to move through the membrane so water moved into the egg to balance out.
- **Vocabulary:**
- **Semi-permeable:** Having openings or pores that allow select liquids, gases or molecules to move through
- **Osmosis:** The movement of water through a membrane from an area of low concentration of molecule to an area of higher concentration of molecules.
- **Diffusion:** The movement of molecules/material from an area of high concentration of molecules to an area of low concentration of molecules.
- **Real world application:** All animal cells have semipermeable membranes just like the egg does, medical professionals need to understand how these membranes work for developing medications and treatments for sick people. Reverse osmosis is a common process used to treat and clean water for drinking, turning into energy or for agricultural purposes.

#### Did you know?

- Oxygen diffuses from our lungs into our blood stream to provide the oxygen to our muscles and organs.
- The calcium carbonate that makes up an eggshell is similar to shells in the ocean and the exoskeletons of crustaceans like crabs and lobsters.

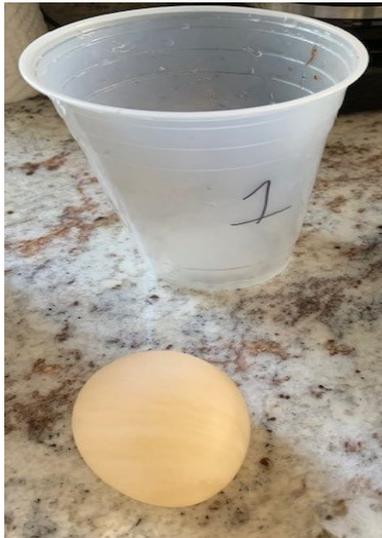
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## Osmosis Eggs Photo Guide

Gently place eggs in cups and cover with vinegar.

You may want to replace the vinegar after 8-12 hours



After 24 hours gently rinse eggs with water, dry them off and weigh them.



After you weight the eggs place them back in the cups, cover one egg with plain water. Cover the other egg in pancake/corn syrup. Wait 24 hours then, rinse and dry of your eggs, weigh them and note any changes.