

Science: Naked Eggsperiment!

Ages: 7 - 13

Hello everyone. This is Bill from the Okanagan Regional Library System. Welcome to the fun and inventive world of making STEAM projects in your own home. Each week, I will share a fun and interesting project that you can make using materials commonly found in your own home.

Even though we can't be together right now, we can still learn how to make exciting projects each week!

This week's project is Making Naked Eggs.

Naked Eggs

An eggshell is the outer covering of a hard-shelled egg. The structure and composition of the eggshell serves to protect the egg against damage and germ contamination. Eggshells are mostly made out of a chemical compound called calcium carbonate.

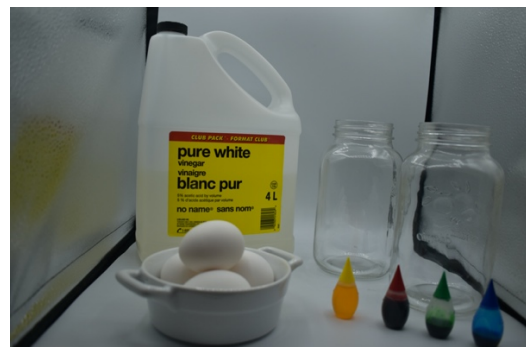
When placed in vinegar, the calcium carbonate in the eggshell dissolves, leaving the inner part of the egg intact. Once you have the egg in this form, you can conduct this week's Eggsperiment.

Safety Note:

Remember to wash your hands after handling the naked eggs at any point in this experiment. Eggs can contain salmonella, so scrub away. Do not eat this egg. This is not a safe way to prepare an egg for consumption.

Materials Needed:

- Eggs - 4
- White Vinegar – 2 cups per jar
- Food Colouring – 10 drops (optional)
- Jars
- Different clear liquids – 2 cups per jar
 - Corn syrup
 - Carbonated water
 - Vegetable Oil
 - Salt water
 - Etc



Time: 30 to 60 minutes a day for three days.

Steps – Day #1: Preparing Your Eggs

1. For this Eggsperiment, you only need 3 eggs. However, I would suggest that you use 4 eggs for this part of the experiment, just in case one of them breaks.
2. Take the 4 eggs and place one each in a clear glass container like a jar.



3. Pour 2 cups vinegar over each egg so that it is totally immersed in the liquid.
4. Each egg will float to the top. You will notice bubbles forming on the eggshell almost immediately. These bubbles are carbon dioxide gas forming due to the reaction between the vinegar (which is acidic) and the calcium carbonate shell. The vinegar is actually dissolving the shell.



5. Place the jars in a safe place and leave for 24 hours. Check to see if the egg shell has dissolved completely. If not, drain the vinegar and add some fresh vinegar to each container.
6. Optional: At this point you can add 10 drops of food colouring per jar if you want a coloured naked egg.



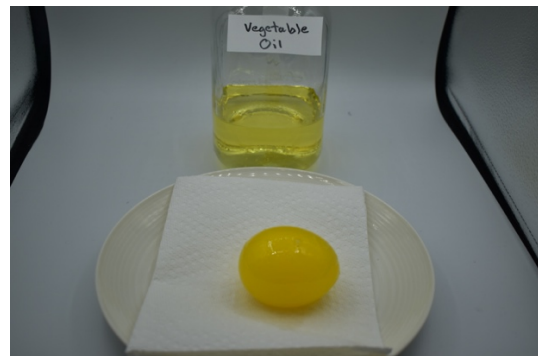
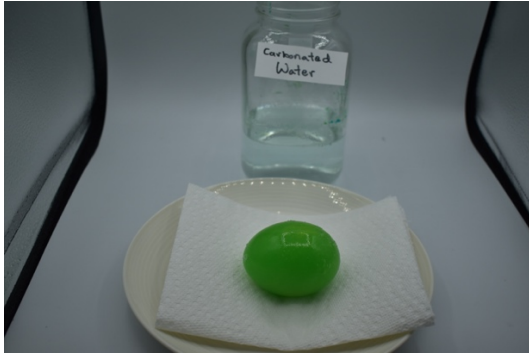
Steps – Day 2: The Eggsperiment

1. What happens when you put your naked eggs in other liquids besides vinegar?
2. Fill see-through containers with different clear liquids. I am using corn syrup, carbonated water, vegetable oil and salt water.
3. Label each container with the type of liquid inside. Let the containers sit for another 24 hours.



Steps – Day 3: The Eggsperiment Results!

1. Carefully take each egg out of its liquid and place on a paper towel.
2. What does each egg look like? Why do you think it looks the way it does?



3. With my eggs, three things happened:
 - a. Three of the eggs became very plump.
 - b. One egg looked like it wilted.
 - c. The egg that had been in the salt water lost a lot of its food colouring.
4. Why do you think I got these three results?

The Science behind the Naked Egg Experiment

1. The membrane of a cell (in this case the egg) is semipermeable, meaning that small particles can go in and out of the cell while large particles stay out.
2. Water and other nutrients (and food colouring) are small enough to travel in and out of the cell.
3. When the concentration of water in the cell is different than the concentration of water outside of the cell, the water will move either in or out of the cell to balance the concentration inside and out. This is called osmosis.
4. Osmosis explains why the egg in the corn syrup shriveled up. Corn syrup has a very low concentration of water in it, so some of the water from inside the egg traveled through the membrane into the corn syrup, making the egg shrink.
5. Salt water, carbonated water, and vegetable oil have similar concentrations of water as the inside of the egg. As a result, these eggs stayed plump.

One Step Further:

1. Place the egg that shriveled up into a new container of clean water. Again, let it sit for 24 hours.
2. What happened to this egg?

STEAM

This activity includes everything you need for a comprehensive STEAM project.

Science: Discover how an acidic liquid can dissolve an organic compound. Learn how osmosis works and how this is an example of how the cells in our bodies work.

Technology: Acid rain occurs when acidic chemicals in the atmosphere mix with water and turn the rain acidic, like our vinegar. In some parts of the world, this is so severe that birds are having trouble making eggshells. They drink the acidic rainwater, and the acid in their bodies dissolves the eggshells as they make them. Environmental issues like this can have far-reaching and unexpected consequences.

Engineering and Art: What other objects are your house can be used to demonstrate osmosis?

Math: Measuring recipe amounts.