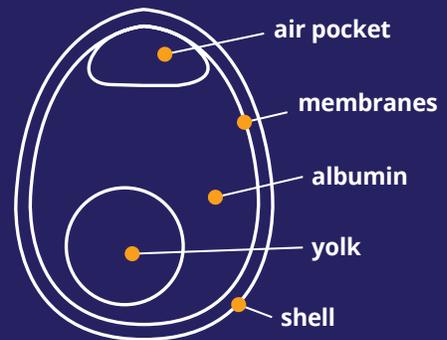


EGGS

EXPERIMENT

Reptiles, insects, amphibians, fish, birds, and even a couple mammals, lay eggs to reproduce. Some eggs have soft shells like frog eggs, some have leathery coverings like snake eggs, while others have hard shells like bird eggs.

Bird eggs have a hard shell made almost entirely of calcium carbonate. The shell functions as a hard barrier against bacteria. Although it appears solid, it is covered with thousands of tiny pores to allow oxygen in and release carbon dioxide and moisture out.



So what would happen to an egg if that hard outer shell is removed? We know that the egg's hard outer shell is made of calcium carbonate and that a mild acid, like vinegar, can remove the calcium carbonate. So if we remove the hard outer shell from the egg, will the egg change?

Let's Experiment!

Materials

- Clear container with lid
- Vinegar
- Raw chicken egg
- Safety goggles
- Science notebook
- Pen or pencil



1

Wash your hands before beginning the experiment. Put on the goggles. Observe the egg. Gently feel the hardness of the outer shell. Make notes in your science notebook for each step of the experiment.

2

Gently place the egg in a container and cover the egg with vinegar. Put on the lid. Vinegar can be stinky. Wash your hands and remove the goggles. Observe the egg in the vinegar. What do you see on the shell?



Now wait 24 hours

3

Wash your hands and put on the goggles. Carefully pour out the vinegar and replace it with fresh vinegar. Put on the lid back on the container. Wash your hands and remove the goggles.

Now wait another 24 hours

4

Look at the egg in the vinegar. What do you see on the shell? Does it appear different? Is there a foamy substance in the container?

5

Put on the goggles. Using a spoon, carefully remove the egg from the container and pour out the vinegar. Carefully rinse the egg in water to remove any residue. Gently feel the hardness of the outer shell. Has the egg changed? Does it look different? Does it feel different? Can you see the yolk inside the egg?



At this point you should notice that the hard shell has dissolved. The egg should still be intact and feel somewhat rubbery. But don't try to bounce the egg just yet!

So What Happened?

The technical answer is that there was a chemical reaction. The acetic acid in the vinegar reacted with the calcium carbonate in the eggshell to produce calcium acetate and carbonic acid. The calcium acetate, a calcium salt that is soluble in water, diffused out of the shell and into the water component of the vinegar. Carbonic acid is not stable at room temperature, so it broke down into water and carbon dioxide gas. The carbon dioxide gas was seen as the small bubbles around the eggshell. The frothy white substance on the surface of the vinegar was a remnant of the dissolved calcium.

The egg also might be a little larger than when you began. Once the shell of the egg was gone, the vinegar reacted with the egg's membranes. The membranes of a chicken egg are selectively permeable, meaning that some substances can pass through while others cannot. Water from the vinegar may have passed through the membranes, increasing the egg's size.



Do You Think It Will Bounce?

Since the egg felt rubbery, now it is time to test the egg to explore if it will bounce. Test the bounciness of the egg in a kitchen sink or in a bowl. First try bouncing the egg from an inch away from the surface. Then gradually bounce it farther away from the surface until it breaks. How high did you go?

What Did We Learn?

When the hard outer shell was removed, all that remained to hold the egg together were the semipermeable membranes of the egg surrounding the albumin and the yolk. The egg felt rubbery and soft. The membranes were strong, but not as hard or protective as the outer shell was. When the membrane tears, the yolk (the yellow part) and albumen (the clear part) will spill out, because the egg is still just a raw egg. So without the hard outer shell, bird eggs would not have the protection they need to develop. Remember do not eat this egg. It would not taste good!



Try this experiment again with a hardboiled egg! Make a prediction in your science notebook about what the results will be. What do you think will change? Will the hard outer shell still dissolve? Will the egg bounce higher? Follow the same steps and compare your results. Experiments can be so EGGciting!