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**Mission:** Raven Hill provides a place that enhances hands-on and lifelong learning for all ages by connecting science, history & the arts.

## Osmosis

In biology, osmosis is the movement of water through a semipermeable membrane from a place of high concentration to a place of low concentration to equalize the concentration of water. This is fun and easy to do at home using household ingredients, BUT it does take a couple of days, so BE PATIENT. You will need two glasses or jars (larger & smaller), vinegar, Karo or other syrup and a raw egg. An egg contains a semipermeable that lets some things, like water, through and not others. The membrane is underneath the shell and can be used to demonstrate osmosis. The eggshell is mostly made of calcium carbonate that will dissolve in an acid, such as vinegar. As this happens, bubbles of carbon dioxide are released. The vinegar takes a day or so and requires at least one change of vinegar, but in the end, the eggshell will dissolve, leaving just the membrane around the egg. Sometimes, we call it a “rubber egg”, because that’s what it feels like! Here’s what you need to do. Place an egg in a jar or glass, cover it with acid and weigh it down with a smaller glass with a little water in, just so the egg doesn’t float above the surface of the vinegar. Allow the egg to remain in the vinegar, until the shell completely dissolves. You might have to change the vinegar and reposition the egg once. There will be bubbles of carbon dioxide forming, as the shell dissolves. All that remains on the membrane is a powdery substance that can be gently rubbed off the membrane. Notice the size and feel of the egg & its membrane. Clean out your jar or glass and put the egg back in. This time, cover it with Karo syrup or honey or syrup or some liquid with lots of sugar in it. Leave the egg in the syrup for several hours or overnight. Next day, take the egg out and look at it. It is shriveled up, because the water inside the egg leaves the egg “trying” to dilute the syrup and make the water equal inside and outside the egg membrane. If you want, you can wash the shriveled egg off to remove all the syrup. Clean the syrup out of the jar and put the egg back in. Now, cover the egg with plain water and leave overnight or for several hours. You will find that the egg in water will have swollen up a lot, because the water is going into the egg, again trying to equalize the water inside and outside the membrane. If you carefully pierce the membrane with a pin or needle, sometimes a jet of water will shoot out! Be prepared. Clean everything up, when you are done.



1 Osmosis supplies



2 Egg in vinegar



3 Shell almost gone



4 Only membrane



5 Egg in syrup



6 Shriveled egg



7 Egg with extra water