

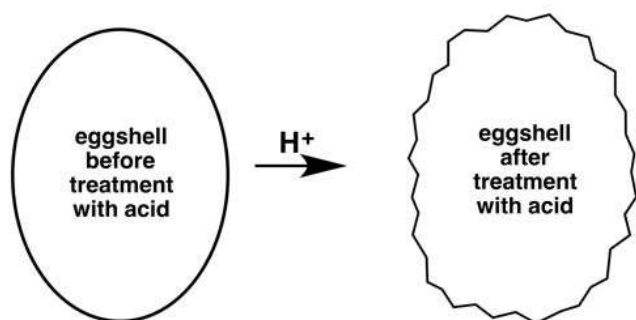
## Do Other Acids Besides Vinegar Work to Dye Eggs?

I don't know about you but I've had a hard time finding things in the grocery stores and it hasn't been just toilet paper. Last week flour was sold out at Meijer! So if you wanted to dye some eggs and can't find vinegar in the store you can do an experiment to see if other things would work.

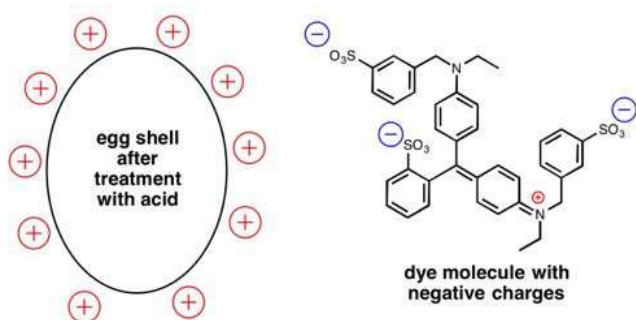
### Background Information:

When we apply a chemical dye to the surface of an object, we modify and rearrange the molecules on that surface. Doing this changes the wavelengths of light that the object typically absorbs and ultimately changes the color that the object appears to be. For example, a simple substitution of a hydrogen atom (H) with a hydroxyl group (OH) will change a blue-reflecting molecule into a green one.

Most instructions for dyeing an egg say to add vinegar to the dye mixture, but why? When an egg is soaked in an acidic mixture, two things happen. First, the eggshell reacts with the acid and produces carbon dioxide gas. (That's why bubbles form on the surface of the eggshell while it soaks.) The shell then starts to dissolve, which increases the surface area of the egg and exposes more of the egg to the dye.



Second, proteins in the thin layer of the eggshell's cuticle react with the acid. The proteins become protonated (i.e., they acquire extra hydrogen ions), which means that more positive charges collect on the shell's surface. Those positive charges easily bind to the dye molecules, which are negatively charged (opposites attract!), and the dye sticks to the egg surface.



### Lab Portion:

Do other acids besides vinegar work to dye eggs?

### Suggestions of Materials to Try Dyeing eggs in:

Orange juice

Lemon juice

Vinegar - control

Pop

Vitamin C - dissolve a vitamin C tablet in water

Any other things you think are acidic

**Procedure:**

1. Decide what you have on hand that you think is acidic that you want to test dyeing your eggs in. If you have vinegar on hand, use that as your control.
2. Hard boil as many eggs as needed. Let the eggs come to room temperature.
3. Put 2 tsp of vinegar into a cup and then add 1 cup of warm water. Add 5 drops of food coloring.
4. Repeat step 3 using your different household acids like pop, or orange juice in place of the vinegar.
5. Place the eggs into the different cups with the different solutions and wait 5 minutes.
6. Take the eggs out and compare the colors, which worked the best?

Solution	Resulting Egg Color Observations (insert pictures) Or write description
Vinegar	
_____ (solution of your choice)	
_____ (solution of your choice)	

Sources: Science Friday and Wired