Colorful Chem-eggstry

Discover why many store-bought dyeing kits recommend adding vinegar to the dye bath.

Collect

- 5 hardboiled eggs
- 5 cups
- Distilled vinegar
- Water
- Measuring cup
- Measuring spoons
- Food coloring
- Clock or timer

Prepare the dye baths

1. Fill each cup with a different amount of vinegar:
   - Cup #1 – 1 cup of water
   - Cup #2 – 1 cup of water, 1 teaspoon of vinegar
   - Cup #3 – 1 cup of water, 1 tablespoon of vinegar
   - Cup #4 – 1/2 cup of water, 1/2 cup of vinegar
   - Cup #5 – 1 cup of vinegar
2. Label the cups so that you know what concentration of vinegar is in each.
3. Choose one color of food coloring. Add six drops of coloring to each cup. Using only one color will make it easier to compare the final results.

Dye the eggs

3. Place one egg in each cup and set a timer for 10 minutes.
4. When ten minutes has passed, carefully remove the eggs and allow them to air dry.

Compare the colors!

5. Place the eggs next to each other and observe the colors. Do you notice a difference between the colors? Which eggs have a more vibrant color? Which eggs are paler in color?
6. Look carefully at the shells. Do you notice anything else?

What's happening?

Vinegar is also known as acetic acid. When you add vinegar to the dye bath it creates an acidic environment. In smaller concentrations, this helps the dye "stick" to the eggshell better.

While the eggs were soaking, you may have noticed small bubbles forming on the eggshell in the pure vinegar bath. These bubbles of carbon dioxide are a product of a chemical reaction that occurs between the acidic vinegar and the calcium carbonate in the egg shell. If you leave the egg in the pure vinegar long enough it will completely dissolve the calcium carbonate, leaving you with a shell-less rubbery egg!

Take it further!

Does the type of vinegar make a difference? Instead of distilled vinegar, try the experiment again using a few tablespoons of apple cider vinegar, red wine vinegar, balsamic vinegar, or rice vinegar. Do different types of vinegar change the final color?