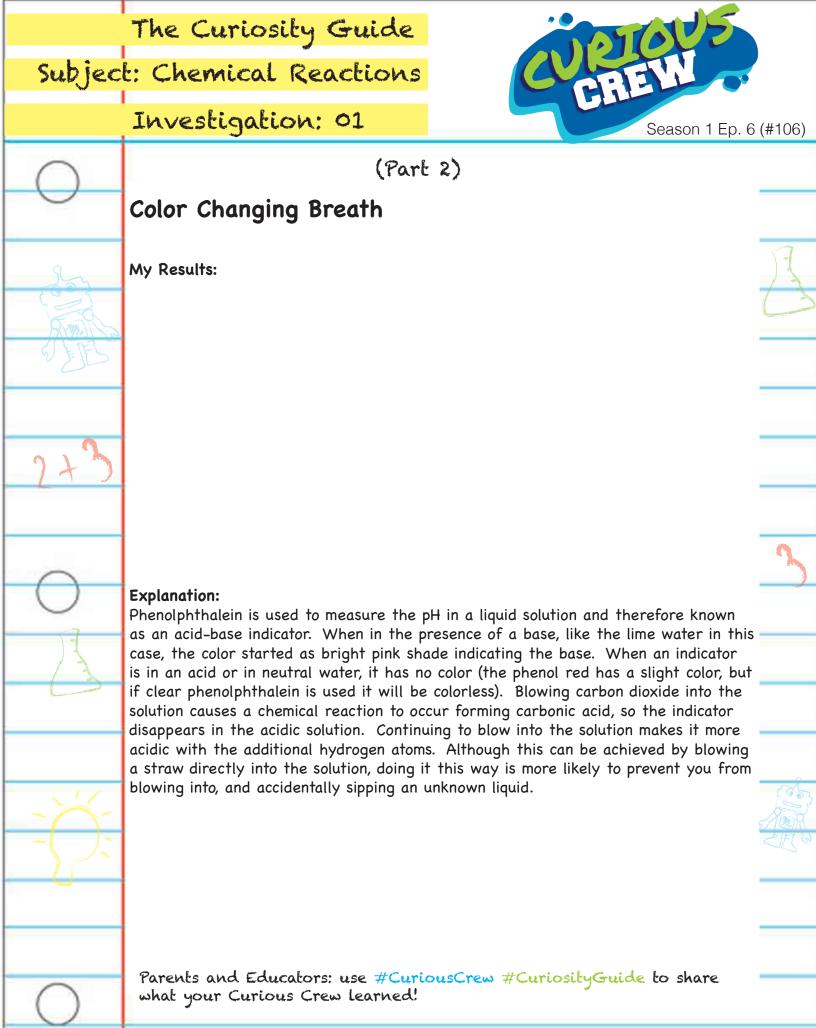
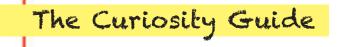


14) Clean up with soap and water

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# Subject: Chemical Reactions

## Investigation: 02



## Deshelled Egg

### **Description:**

See what vinegar does to an eggshell.

### Materials:

1 fresh egg Vinegar Container with lid

### Procedure:

- 1) Carefully place one raw egg into a container
- 2) Fill the container with vinegar so that the egg is completely covered
- 3) Observe the egg over successive days and note the change

### My Results:

### Explanation:

Vinegar is an acetic acid, while eggshells are calcium carbonate. The acid dissolves calcium so that after a week's time, the shell has disappeared leaving only the rubbery membrane holding the raw egg. This experiment can be done with chicken bones as well, which will leave the bones limp and flexible like rubber. When the egg is first submerged and throughout the first day, bubbles will appear on the egg indicating the carbon dioxide that is being produced with the combination of calcium carbonate in the acid.

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Curious Crew is an original production of WKAR at Michigan State University. Learn more at wkar.org.

## The Curiosity Guide

# Subject: Chemical Reactions

## Investigation: 03



## Inflating Balloon

#### **Description:**

A different way to inflate a balloon.

### Materials:

1 liter bottle Baking Soda Vinegar Balloon Funnel Tablespoon

### Procedure:

1) Insert funnel into the balloon

2) Measure 1.5 tablespoons of baking soda and pour through the funnel into the balloon

- 3) Fill the 1 liter bottle a little less than half full with vinegar
- 4) Carefully stretch the neck of the balloon over the top of the bottle being sure not to let the baking soda in the balloon bag fall in yet

5) Securely hold the balloon in place and lift the balloon up so the baking soda falls into the bottle with the vinegar

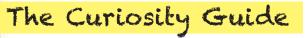
6) The released carbon dioxide will inflate the balloon

### My Results:

### Explanation:

Combining baking soda and water causes a chemical reaction in which hydrogen atoms from the vinegar (acetic acid) bond with the atoms in the baking soda. Baking soda (or sodium bicarbonate) is a base that can accept protons from an acid when mixed in a solvent. As a result, the bonds quickly change creating different molecules and freeing the carbon dioxide in a burst of bubbling and fizzing released energy that begins to inflate the balloon. Chemical reactions can be observed in multiple ways in addition to bubbling. It could give off heat, referred to as an exothermic reaction, give off light energy, change its state of matter from a liquid to a solid for example, or change colors. Once the hydrogen change has occurred, the remaining ions, which are oppositely charged, combine to form a salt.

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# Subject: Chemical Reactions

## Investigation: 04



### **Baking Bowl**

Description:

Some chemical reactions create heat.

#### Materials:

Jar Yeast Teaspoon Hydrogen peroxide Measuring cup Popsicle stick Thermometer

#### Procedure:

- 1) Measure 1 cup of hydrogen peroxide and pour it into the jar
- 2) Place thermometer in the peroxide and note the beginning temperature
- 3) Measure 1 teaspoon of yeast, add it to the peroxide, and stir with a popsicle stick
- 4) Observe the bubbling reaction

5) Note the increased temperature on the thermometer and feel the heat on the outside of the jar

6) Hypothesize the cause of the heat

### My Results:

### Explanation:

Adding yeast (a catalyst) to the hydrogen peroxide results in an exothermic reaction. Exothermic means that it produces heat as a result of the chemical changes taking place. It also produces oxygen as the peroxide begins to decompose when introduced to the yeast and forms oxygen gas and water. It is also possible to try a variation with salt or powdered sugar instead of yeast and compare the results.

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# The Curiosity Guide

# Subject: Chemical Reactions

## Investigation: 05

## Chemical Goo

**Description:** Make goo! Have fun with it!

### Materials:

Water White glue Measuring cup Spoon Bowl Teaspoon Cup Popsicle stick Borax Newspaper Tray

### Procedure:

1) Fill cup with 1/2 cup warm water

2) Measure and add 2 teaspoons of borax

3) Stir together with a spoon

4) In the bowl combine one cup white glue with  $\square$  warm water and stir with a popsicle stick until smooth

5) While one person stirs the glue mixture, a second person pours in the borax solution

6) Observe the changes

7) Pull out bits of the solid and test the material with respect to its bounce ability, its stretch ability, its viscosity or ability to flow (by holding it in an open palm to see if it maintains its shape), and by pressing it on newsprint to see if it picks up the ink

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### My Results:

### Explanation:

Some chemical reactions will result in a change of matter state, in this case from a liquid to a solid. The glue water forms a polymer (long molecular linked strands like wet spaghetti) that can easily be stirred. However, when the borax solution is added it acts as a cross linker connecting those polymers together into a solid mass. The material is stretchable, bouncy, and wonderfully fun to play with.

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