2014 Science Volunteer Training

4-H Fun with Food Science!

PURDUE EXTENSION | LOCAL FACES COUNTLESS CONNECTIONS

Pop Rocks Expander!

Introduction

Pop Rocks are one of the greatest candies of all time! You dump a few on your tongue and in an instant, they begin fizzing, popping and snapping in your mouth! What's going on here? What is the secret behind that fun candy?

Materials Needed

Pop Rocks (1 package per bottle of soda)
Balloon (1 per bottle of soda)
16 - 20 oz bottles of soda (the greater the variety, the better!)
A funnel

Method

1. Using the funnel, empty a bag of pop rocks into a balloon. Make sure all of the candies are in the balloon!
2. Place the balloon over the mouth of the bottle of soda, being careful to not dump the candy in the bottle.
3. Grab the balloon and dump the Pop Rocks into the soda. Make sure to observe what happens to the soda as it reacts with the candy. The balloon should be inflating.

How Does This Work?

The secret behind the popping of the Pop Rocks candy is pressurized carbon dioxide gas. Each of the tiny candy pebbles contains a small amount of gas. These carbon dioxide bubbles make the popping sound you hear when they burst free from their candy shells.
What causes the balloon to inflate? The carbon dioxide contained in the candy isn't enough to cause the inflation, but when combined with the carbon dioxide in the soda (soda also contains pressurized carbon dioxide) the gasses are released from the bottle and into the balloon, causing inflation!

Adapted from http://www.stevespanglerscience.com/lab/experiments/poprocks

The Science of Butter

Introduction
In this experiment, you will watch as a simple kitchen ingredient, heavy cream, is transformed into whipped cream and then magically into butter!

Materials Needed
2 clean 1/2 pint mason jars with lids
1 cup heavy cream
Small spatula
Bowls to separate buttermilk and butter

Method
1. Pour 1/2 cup of heavy cream into each jar and tightly close the lids.
2. Shake the jars continuously for a few minutes. After 3 - 4 minutes, open the jars to observe what is happening.
3. Close the lids and continue to shake, shaking until there is a noticeable change in the jar.
4. Open the jars and observe. You have just made buttermilk and butter!

How Does This Work?
Cream is an emulsion. This means that the fat particles that are in heavy cream are evenly dispersed throughout the liquid, in this case, water. By shake the jar you are reversing the emulsion. As the fat particles hit each other they stick together. As bigger and bigger particles stick together, butter is formed!

Adapted from http://www.scientificamerican.com/article/bring-science-home-shaking-butter/

Tie Dyed Milk

Introduction

The art and science worlds collide with this color changing experiment that teaches you about primary and secondary colors using the property of surface tension.

Materials Needed

Shallow bowls, foam paper plates or aluminum pie pans
Gallon of Milk (Whole Milk or Half & Half work best!)
Food Coloring
Dawn Dish Soap
Toothpicks, Cotton Swabs, or Droppers

Method

1. Pour a thin layer of milk into the bowl or plate.
2. Drop two drops of food coloring on opposite sides fo the bowl. Use a different color on each side.
3. Use a toothpick, cotton swab or dropper to place a drop of soap in the center of the bowl.
4. Watch as the colors mix to make another color!
5. Repeat, changing food coloring to create new colors!

How Does This Work?

You probably first noticed that the drops of food coloring just sat on the surface where you placed them. That's because food coloring is less dense than milk, so it floats on the surface, and the colors do not mix because you didn't stir the milk.

Then the action began with a drop of soap! The soap reduces the surface tension of the milk by dissolving the fat molecules, which is why fattier milk works better. The surface of the milk outside the soap drop has a higher surface tension, so it pulls the surface away from that spot. The food coloring moves with the surface, streaming away from the soap drop. Due to the convection that results from the moving surface, the food coloring may be drawn down into the liquid, only to appear rising again somewhere else.

As the soap becomes evenly mixed with the milk, the action slows down and eventually stops. Addition of another drop of soap may start the process again.

Adapted from http://www.coolscience.org/CoolScience/KidScientists/tiedyemilk.htm

Them Bones, Them Bones, Them Turkey Bones!

Introduction

In this experiment you will see why calcium is important for keeping our bones strong.

Materials Needed

A jar large enough to hold a chicken or turkey bone
A chicken or turkey bone (legs or drumsticks work best)
Vinegar

Method

1. Remove any meat from the bone and rinse well in warm water.
2. Try to bend the bone and test its hardness.
3. Put the bone in the jar and cover it with vinegar. Put a lid on the jar and let it sit for three days.
4. Remove the bone from the jar, rinse and feel.

How Does This Work?

Calcium is what keeps our bones hard. Vinegar is a mild acid but it is strong enough to dissolve the calcium in the bone. Once the calcium was dissolved, there was nothing left except the soft bone tissue.

Adapted from “Six Easy Bites,” Purdue Extension, 2002

The Rubber Egg

Introduction

The art and science worlds collide with this color changing experiment that teaches you about primary and secondary colors using the property of surface tension.

Materials Needed

Raw Egg
Tall Glass or Graduated Cylinder
Vinegar
Patience

Method

1. Place the egg in the glass/cylinder and cover the egg with vinegar.
2. Look closely at the egg… do you see any bubbles forming on the shell? Leave the egg in the vinegar for 24 hours.
3. After 24 hours, carefully pour the old vinegar down the drain and cover the egg with fresh vinegar. Place your glass in a safe place for seven days.
4. After seven days, pour off the vinegar and carefully rinse the egg with water. The egg looks translucent because the outside shell is gone! The only thing that remains is the delicate membrane of the egg. (Handle carefully!)

How Does This Work?

The bubbles that were created on the shell were carbon dioxide - vinegar is an acid, and the shell of an egg is made of calcium carbonate. The vinegar reacted to break the egg shell into two parts: calcium and carbonate. The calcium floated in the solution while the carbonate reacts to form carbon dioxide bubbles.

Adapted from http://www.stevespanglerscience.com/lab/experiments/naked-egg-experiment

Candy Science - Dissolve the 'M' off an M&M!

Introduction

The art and science worlds collide with this color changing experiment that teaches you about primary and secondary colors using the property of surface tension.

Materials Needed

M&Ms
Bowl of Water

Method

1. Place four M&Ms in the water with the M side up and watch what happens!

How Does This Work?

Some parts of the M&M candies are water-soluble and the others are not. After a short time of soaking, the colored dyes begin to dissolve and mix together. These dyes are water-soluble. After a while longer, the 'hard-shell' and 'M' float to the top; this is because they are not water-soluble.

Adapted from http://www.stevespanglerscience.com/lab/experiments/floating-letters

Turning Salt into Glue

Introduction

Can you lift an ice cube into the air using nothing but a piece of string?

Materials Needed

A glass filled with water
An ice cube
A piece of string
Salt

Method

1. Place the ice cube into the glass of water.
2. Take your string and lay it across the ice cube. Can you pick it up? No. Let's make some glue!
3. Get the string wet and place it on top of the ice cube.
4. Sprinkle some salt over the ice cube and wait one minute.
5. After a minute, life the string by holding it at each end.

How Does This Work?

Salt lowers the freezing point of water, so where the salt meets the ice cube, the ice melts quickly. It only take a few seconds for the water to refreeze into ice and surround the string. When this water refreezes, the string is now stuck to the ice cube and can be used to lift it out of the water.

Adapted from http://kidsactivitiesblog.com/28671/experiment-with-salt

Lava Lamps

Introduction
Have some groovy fun with this science experiment!

Materials Needed
3 empty water bottles
Food Coloring
Vegetable Oil
Alka Seltzer

Method
1. Fill each bottle a little more than half with vegetable oil. Then, fill the rest of the way with water, leaving about an inch at the top.
2. Add 10 drops of food coloring.
3. Break an Alka Seltzer tab into four pieces and drop them in the bottle, one piece at a time. Wait until the first piece stops bubbling before you put in the next.

How Does This Work?

We all know that oil and water don't mix. When the two are poured into the bottle, the oil floats because water is heavier than oil. When the Alka Seltzer is added, it creates tiny bubbles of carbon dioxide gas which attach to the drops of color in the water and cause them to float to the surface. When they reach the surface and pop, the color blob sinks back to the bottom of the bottle.

Adapted from http://www.stevespanglerscience.com/lab/experiments/bubbling-lava-lamp