Season 1 Ep. 6 (#106)

Color Changing Breath

Description:
Blow into a liquid and change its color.

Materials:
Water (400 ml)
Phenolphthalein (phenol red available online or local pool supplies stores)
Lime water (calcium hydroxide purchased at health food stores)
Straw
Graduated cylinder
Safety goggles
Balloon
Straw
Tape

Procedure:
1) Set up the solution before the lesson
2) Measure 400 ml of water in graduated cylinder and pour into the glass
3) Add 10-12 drops of phenolphthalein to the water
4) Add 3 ml (about 1/2 teaspoon of lime water to the solution and stir)
5) The solution should turn a pinkish purple color
6) Prepare a balloon by cutting off the ring at the mouth piece
7) Insert a straw 1 inch into the balloon
8) Securely tape the straw to seal the opening into the balloon
9) Present the solution to your friends and discuss your amazing ability to change a liquid's color with your breath
10) Put on safety goggles
11) Inflate the balloon by blowing into the straw
12) Insert the straw into the solution and let the air escape from the balloon
13) The color will change to a light tan color
14) Clean up with soap and water

Season 1 Ep. 6 (#106)

(Part 2)

Color Changing Breath

My Results:

Explanation:
Phenolphthalein is used to measure the pH in a liquid solution and therefore known as an acid-base indicator. When in the presence of a base, like the lime water in this case, the color started as bright pink shade indicating the base. When an indicator is in an acid or in neutral water, it has no color (the phenol red has a slight color, but if clear phenolphthalein is used it will be colorless). Blowing carbon dioxide into the solution causes a chemical reaction to occur forming carbonic acid, so the indicator disappears in the acidic solution. Continuing to blow into the solution makes it more acidic with the additional hydrogen atoms. Although this can be achieved by blowing a straw directly into the solution, doing it this way is more likely to prevent you from blowing into, and accidentally sipping an unknown liquid.

Parents and Educators: use #CuriousCrew #CuriosityGuide to share what your Curious Crew learned!

Season 1 Ep. 6 (#106)

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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Season 1 Ep. 6 (#106)

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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Season 1 Ep. 6 (#106)

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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WKAR

The Curiosity Guide

Subject: Chemical Reactions

Investigation: 05

Season 1 Ep. 6 (#106)

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 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

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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WKAR

Season 1 Ep. 6 (#106)

Elephant Toothpaste

Description:
Even if you don't have an elephant, you can have its toothpaste

Materials:
16-20 oz. empty plastic bottles
3% hydrogen peroxide
Water
Dish soap
Food coloring
Yeast
Measuring cup
Funnel
Pan with deep sides
Small cup
Teaspoon
Tablespoon
Safety glasses

Procedure:
1) Dissolve 1 teaspoon yeast into 2 tablespoons of hot water
2) Place empty bottle in the center of the pan (to catch the mess)
3) Measure 1/2 cup of hydrogen peroxide
4) Add several drops of food coloring to the peroxide in the measuring cup
5) Place the funnel into the bottle and pour the peroxide mixture in
6) Add a good squirt of dish soap into the peroxide
7) Put on safety glasses
8) Pour in the yeast mixture
9) Feel the bottle for any temperature change, but then step back to observe the eruption

** Using 6% hydrogen peroxide (available at most beauty parlors) will yield an even bigger result.

WKAR

Season 1 Ep. 6 (#106)

Part 2

Elephant Toothpaste

My Results:

Explanation:
When the hydrogen peroxide reacts with the dish soap and yeast, it begins to release oxygen atoms. The yeast speeds up the process and because there was additional energy left over, it also emits heat as an exothermic reaction. The foam that is produced is completely safe to touch is it is nothing more than soapy water with bubbles of oxygen. The combination will produce the same outcome, so it is worthy of experimenting with the quantities of each.

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Season 1 Ep. 6 (#106)

Making a Chemical Car

Materials:
Plastic bottles with lids of various sizes (700ml +) and neck openings (reaction chambers)
Vinegar
Tissues
Baking soda
Measuring cups/graduated cylinders
K'Nex or Lego wheels
Rubber bands
Tape
Funnel
50 foot measuring tape
Small dry erase boards and markers

Procedure:
1) Design blueprints for their car chassis
2) Provide a variety of materials to use on the car body, wheels, and axles
3) Attach plastic bottle (reaction chamber) so that the cap can be easily accessed
4) Drill a hole through the center of the cap with a drill
5) Test car for alignment and good wheel rotation
6) Fill the bottle full of vinegar for a trial run
7) Separate the tissue into a single ply
8) Place 2 teaspoons of baking soda in the tissue and wrap it closed (establishing a make shift tube of aluminum foil may be more effective and prevent clogging the discharge hole)
9) Take the car outside to an area that has plenty of paved space (25 linear feet)
10) Insert the filled tissue/aluminum foil tube into the bottle and put on the cap
11) Vigorously shake the bottle with a finger firmly over the discharge hole and set the car down
12) Squat to the side of the bottle
13) Wait for foam to develop before moving your finger
14)Repeat runs with different amounts of vinegar and baking soda measuring the success of each and redesigning as necessary
15) Record distances and ingredients on paper or dry erase boards

Season 1 Ep. 6 (#106)

Making a Chemical Car

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, in this case water. 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 pressurize the bottle. When opening the cap, the released pressure erupts from the neck of the bottle, and according to Newton's third law of motion, the car reacts by rolling in the opposite direction.

Parents and Educators: use #CuriousCrew #CuriosityGuide to share what your Curious Crew learned!

WKAR