




Dow

Proudly presents



# Celebrate Chemistry



Do you know how to make a volcanic eruption  
using ingredients from your kitchen?

Or use science to hit a home run at the ball park?

These amazing feats aren't magic—they're the  
power of chemistry in action—chemistry that  
you can do at home!


***Look inside!***



# BAKING SODA VOLCANO

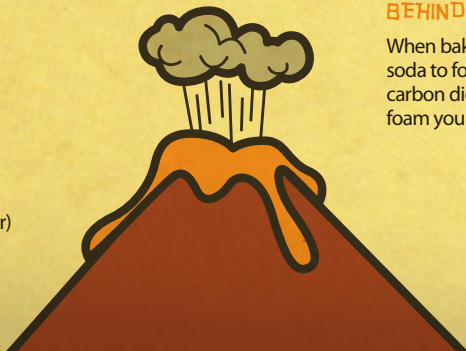
Recommended for grades 3-4

**Did you know?** Geologists generally group volcanoes into four main kinds – cinder cones, composite volcanoes, shield volcanoes and lava domes.

**Safety first!**  Ask your parents for help and see back panel.

## MATERIALS

- A model volcano – Talk to an adult about making a volcano out of paper-mâché or plaster.
- Two small glasses or baby food jars (must fit in the top of the volcano)
- Red and yellow food coloring (optional, but great to make it look real!)
- 1 ounce of white vinegar
- 1 teaspoon of liquid hand dishwashing soap
- 2 teaspoons of baking soda
- Teaspoon-sized measuring spoon (not copper)



## PROCEDURE

1. Put the small juice glass or baby food jar into the volcano at the top.
2. Add 2 teaspoons of baking soda.
3. In a separate juice glass or baby food jar, mix 1 ounce of vinegar, 1 teaspoon soap and 5 drops each of the red and yellow food coloring. Stir the solution carefully.

*Create the chemical reaction!*

4. Add the vinegar, soap and food coloring solution to your volcano and watch it come alive!

## BEHIND THE SCIENCE

When baking soda and vinegar are mixed, the vinegar reacts with the baking soda to form carbonic acid. The carbonic acid immediately breaks down into carbon dioxide and water, and it's the carbon dioxide that makes the bubbles and foam you see in your "lava" – which is really water!

# THE CHEMISTRY OF BLOOD

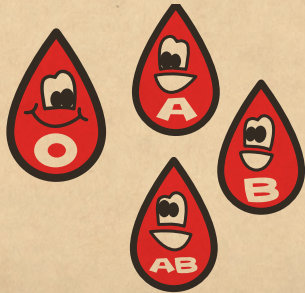
Recommended for grades 5-8

**Did you know?** If you have Type A blood, you can only receive Type A or Type O blood in a transfusion, and if you have Type B, you can only receive Type B or Type O blood. If you have Type AB, you are a **universal receiver** and can receive any blood type. If you have Type O blood, you can only receive Type O, however, you are a **universal donor**, and can give blood to anyone!

**Safety first!**  See back panel.

## MATERIALS

- 1 tablespoon-sized measuring spoon
- 1 measuring cup with labels for ounces
- 6 clear small jars
- 1 bottle of Pledge® Premium Finish with Future® Shine
- 1 small bottle of red food coloring
- Vinegar
- Water



## PROCEDURE

1. Mix 2 ½ tablespoons floor polish, 3 fluid ounces water and 5 drops of red food dye in one jar. Label the jar "Type A Blood."
2. Mix 2 ½ tablespoons vinegar, 3 fluid ounces water and 5 drops of red food dye in a second jar. Label the jar "Type B Blood."
3. Mix 1/2 cup water and 5 drops of red food dye into a third jar. Label the jar "Type O Blood."
4. In another empty jar, mix 1 tablespoon of "Type A Blood" and 1 tablespoon of "Type O Blood." What do you see?
5. In a third empty jar, mix 1 tablespoon of "Type B Blood" and 1 tablespoon "Type O Blood." What do you see?
6. In an empty jar, mix 1 tablespoon of "Type A Blood" and 1 tablespoon "Type B Blood." What do you see?

## BEHIND THE SCIENCE

All blood is made of the same basic elements and blood types are different depending on the presence or absence of certain antigens (substances or molecules) that trigger an immune response when they enter the body. "Self" antigens – those that match or are compatible with your body – are usually tolerated by the immune system. "Non-self" antigens are identified by the body as intruders and attacked by the immune system.

# JUST FOR THE SPORT OF IT

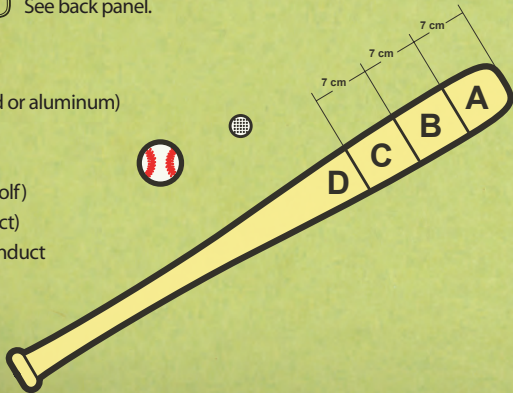
Recommended for grades 9-12

**Did you know?** The law of energy and conservation states that energy never disappears; it is just transferred from one object to another.

**Safety first!**  See back panel.

## MATERIALS

- 1 baseball bat (wood or aluminum)
- 3 one-meter sticks
- 2 textbooks
- Balls (baseball and golf)
- Tape (masking or duct)
- A partner to help conduct the experiment!



## PROCEDURE

1. Mark off four 7-centimeter sections on the bat as pictured.
2. Hold the bat straight down with one hand, loosely between your thumb and index finger, just below the knob on the bat's handle.
3. Have your partner tap the bat with the baseball, starting at wide end and moving toward the handle. Tap each separate section at a time. Can you hear and feel the section where the bat vibrates the least? Keep it in mind!
4. Make a ramp by taping two meter sticks together at right angles (making an "L").
5. Place the bat horizontally on books and ask your partner to firmly hold the handle.
6. Place the ramp perpendicular to and touching the bat.
7. Have your partner hold the bat tightly so the bat doesn't fall off the books.
8. Roll the golf ball down the ramp to the bat so that it bounces off the bat in *Section A*. Have your partner watch it bounce and measure the height of the bounce.
9. Continue this procedure for each section of the bat. Where does the ball bounce the highest? The spot on the bat where the ball bounces highest is the sweet spot!

## BEHIND THE SCIENCE

The sweet spot we found is called "the node," where vibration waves from the impact of bat and ball cancel each other out. At the node, more of the bat's energy goes to the ball because it's not used up in vibrations. When you hit a ball with the node of a bat, you don't feel any vibration in your hand and the ball goes further because it has more energy behind it.

# SAFETY FIRST!



## **Safety glasses are a must.**

The ingredients listed in these experiments are common household items, but should be handled safely. Although they are not harmful, these materials can irritate or sting eyes upon contact. If contact occurs, flush eyes with lots of water.

**Wash hands immediately after each experiment.** Do not put hands or fingers in mouth, or rub eyes, until after hands have been washed.

**Liquid materials used during the experiment** can stain and should not be allowed to remain on clothing, upholstery or wood.

**Clean up any spilled materials immediately,** as they can create a slip hazard.

As a global partner of the United Nations-designated 2011 *International Year of Chemistry* (IYC), Dow is helping to lead an effort to celebrate the achievements of chemistry and its contributions to humanity and the world.



International Year of  
**CHEMISTRY**  
2011

For more information visit <http://www.dow.com/iyc>  
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