

Fun with Chemistry

Project Skills:

Following directions

Life Skills:

Learning to learn, critical thinking

Academic Standards:

SC.A.1.2#2, #4, #5

Grade Level(s): 3-5

Time: 60-90 minutes

Supplies Needed:

Slime

- Borax powder
- 4 oz (1/2 cup) white glue (Elmer's works best)
- Teaspoon
- Bowl
- Measuring cup
- Jar
- Food coloring (optional)
- Water (not included)

Invisible Ink

- Baking soda
- Water
- Paper
- Cotton swabs
- Measuring cup

Not Supplied

- Light bulb or lamp
- Grape juice or concentrate

BACKGROUND

This lesson provides three activities that demonstrate how different materials are made by physically combining different substances, and that these materials will have different characteristics from the original substances:

- *Borax Slime*
- *Ice Cream in a Bag*
- *Volcano*

INTRODUCTION

Chemistry is the scientific study of matter, and how it works together with other matter and energy. Chemists are scientists that study what happens when they mix different substances together and how different substances change when they are heated or cooled. There are basically two types of chemical changes:

- *Physical changes*- this occurs when you mix, heat, or cool substances to change their shape, form, volume, or density.
- *Chemical changes*- when you mix, heat, or cool substances to create new substances with different characteristics.

Today, we will be chemists and will conduct three different experiments in our laboratory. To make sure you do the experiments correctly, you will need to listen carefully and follow directions exactly!

WHAT TO DO-

Borax Slime- Pour the glue into the jar. Add 1/2 cup of water and stir. If desired, add food coloring. Otherwise, the slime will be an opaque white. In the bowl, mix one cup of water with 1 teaspoon of borax powder. Slowly stir the glue mixture into the bowl of borax solution. Place the slime that forms into your hands and knead until it feels dry. (Don't worry about the excess water remaining in the bowl.) The more the slime is played with, the firmer and less sticky it will become.

Supplies Needed:

Volcano

- 6 cups flour
- 2 cups salt
- 4 Tbsp oil
- Plastic soda bottle
- Dishwashing detergent
- Food coloring
- Vinegar
- Baking dish or disposable pan
- 2 Tbsp baking soda
- Warm water (not included)

Advance Preparation:

- Read over the lesson plan and make sure you have all the supplies needed.

Tips: Store your slime in a zip-lock bag in the fridge (otherwise it will develop mold). Don't eat the slime - it isn't toxic, but not good for you either! Slime cleans up pretty easily. Remove dried slime after soaking with water.

Question- Did you create a chemical or physical change?

Invisible Ink- There are at least two methods to use baking soda as an invisible ink. Mix equal parts water and baking soda. Use a cotton swab, toothpick, or paintbrush to write a message onto white paper, using the baking soda solution as 'ink'. Allow the ink to dry. One way to read the message is to hold the paper up to a heat source, such as a light bulb. The baking soda will cause the writing in the paper to turn brown. A second method to read the message is to paint over the paper with purple grape juice. The message will appear in a different color.

Tips: If you are using the heating method, avoid using a halogen bulb. Baking soda and grape juice react with each other in an acid-base reaction, producing a color change in the paper. Grape juice concentrate results in a more visible color change than regular grape juice.

Question- Did you create a chemical or physical change?

Volcano- First, make the 'cone' of the volcano. Mix 6 cups flour, 2 cups salt, 4 tablespoons cooking oil, and 2 cups of water. The resulting mixture should be smooth and firm (more water may be added if needed). Stand the soda bottle in the baking pan and mold the dough around it into a volcano shape. Don't cover the hole or drop dough into it. Fill the bottle most of the way full with warm water and a bit of red food color (can be done before sculpting if you don't take so long that the water gets cold). Add 6 drops of detergent to the bottle contents. Add 2 tablespoons baking soda to the liquid. Slowly

pour vinegar into the bottle. Watch out – the eruption begins immediately!

Tips: The lava is the result of a chemical reaction between the baking soda and vinegar. In this reaction, carbon dioxide gas is produced, which is also present in real volcanoes. As the carbon dioxide gas is produced, pressure builds up inside the plastic bottle, until the gas bubbles (thanks to the detergent) out of the 'volcano'.

Question- Did you create a chemical or physical change?

TALK IT OVER

Sharing-

- Which experiment was your favorite? Why?
- What surprised you most about these experiments?

Processing-

- What problems did you have with the experiments?
- Why do you think it is important for you to know about chemistry?
- What did you learn from these experiments that you didn't know before?

Generalizing-

- How will learning about chemistry benefit you in the future?

Applying-

- How would you teach someone else about what you learned today?
- Describe a time or situation when you might need to use what you learned today.
- What would you do differently if you did these experiments again?

ENHANCEMENT

When you use the scientific method, you make observations before forming or testing a hypothesis. You've followed a procedure to make slime. Now you can experiment with the formula (or recipe) to make predictions about the effects of the changes. First, write down your observations about how sticky or goeey the slime is. You can even measure the slime to see how far it will spread on the table. Experiment with the amounts of glue and borax. Using more borax will produce a firmer slime. Adding more glue makes the slime more slimy. *This activity is adapted from the American Chemical Society's Meg A. Mole's Bouncing Ball, a featured project for National Chemistry Week 2005.*

TRAINER TIP

An icebreaker is a fun way to introduce a topic and excite the youth. Here are a couple of ideas:

- *Periodic Predicament*- Make up 2 sets of cards- one set that has the symbols of elements printed on them, and the other set should have the matching elements spelled out as words. Mix the cards up, and give one to each youth. See how many youth can find their match.