

Volcanic Acid-Base Reaction

Introduction: Materials found all around us, from the soil to household cleaners, can be identified as acidic, alkaline (or basic), or neutral. An acid is a sour-tasting compound that donates protons or hydrogen ions and/or accepts electrons. A base is a bitter-tasting compound that accepts protons and/or donates electrons. A reaction between an acid and a base is called neutralization.

Objective: In this activity, students will build a volcano by combining an acid and an alkaline substance. They will explore the properties of acids and bases and will learn to identify these substances in their environment.

What You Need:

- 1 tablespoon of fresh baking soda
- Modeling clay (like Plasticine)
- Newspaper
- 3 drops red food dye (optional)
- ¼ cup of vinegar
- 3 drops liquid soap
- Safety goggles



Safety:

- No eating or drinking is allowed during the lab activity.
- Put on your goggles before adding the vinegar to the reaction.

Procedure:

1. Cover the work surface with newspaper.
2. Form a volcano shape out of the modeling clay. It should be about 6" high.
3. Use red clay around the volcano's opening to simulate lava.
4. Poke an opening in the volcano, about 4" deep and 2" wide.
5. Add one tablespoon of fresh baking soda. (Stale soda will not create a proper alkaline reaction.) If available, add 3 drops of red food coloring to the baking soda, in order to enhance the eruption.
6. Next, add 3 drops of liquid soap.
7. Now, it's time to put on your safety goggles! Get ready to stand back.
8. Finally, add 1/4 cup of vinegar, and see what happens!

Discussion:

1. Why did the volcano erupt when the vinegar was added?
2. What gas are the bubbles observed made of?
3. What does the pH scale measure?
4. What number does pure water have on the pH scale?
5. What are some examples of common acids?
6. What are some examples of common bases?

The volcano “erupted” when the acidic vinegar came into contact with the alkaline (or basic) baking soda, which neutralized it. The volcano then emitted carbon dioxide, which created the bubbles and popping noises.

Strong acids and strong bases form corrosion on surfaces. When acids react with bases, they form salts and water. Acids and bases are measured by the pH scale, with acids ranging between 1 and 6. Bases range from 8 to 14. Seven on the pH scale is pure water, which is devoid of either acidity or alkalinity.

Some examples of acids are citric acid (from certain fruits and veggies), vinegar, carbonic acid (from carbonation of soft drinks), and lactic acid (in butter milk). Some examples of alkalis are detergents, soap, household ammonia, and lye (used for washing or cleansing).

Fun Volcano Fact:

What is the difference between lava and magma? Magma is underground liquid rock. As soon as magma shoots out of a volcano, it’s called lava!

Source: -Modified version of an education.com website activity, entitled “Make a volcano that really erupts!”