

ACTIVITY NO – 4 – Baking Soda and Vinegar Volcano

Subject	Chemistry
Class	XI
Chapter/Unit	Equilibrium
Topic	Acid and Base
Time	25 minutes
Nature of Activity	Pair Work

What will I learn (Learning Outcome)

To illustrate characteristics of acids and bases.

Skills: Applying, Analyzing and Creating.

What I have to do?

To demonstrate chemical reaction between baking soda (sodium bicarbonate) and vinegar (acetic acid) by neutralization reaction

What do I require?

- 3 cups flour
- 1 cup salt
- 1 cup water
- 2 tablespoons cooking oil
- Empty 20-ounce drink bottle
- Deep plate or a pan
- Gel food coloring
- Dishwashing detergent
- Baking soda (sodium bicarbonate)
- Vinegar (dilute acetic acid)

What do I need to know?

- The goal of this activity is for students to understand the If you **combine an acid and an alkali** they react together to neutralize each other. Acid are those substances which when dissolved in water produce hydrogen ions while bases are those substances which when dissolved in water , release hydroxide ions
- The reaction releases carbon dioxide gas, which can be detected in the form of effervescence or bubbles. If dish soap is also added then the bubbles make the liquid soap bubble up, giving the appearance of **lava erupting from a volcano**
- The baking soda and vinegar volcano erupts because of an acid-base reaction:

Baking soda (sodium bicarbonate) + vinegar (acetic acid) → carbon dioxide + water + sodium ion + acetate ion
$$\text{NaHCO}_3(\text{s}) + \text{CH}_3\text{COOH}(\text{l}) \rightarrow \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l}) + \text{Na}^+(\text{aq}) + \text{CH}_3\text{COO}^-(\text{aq})$$

➤ Teacher's Activity

Teacher will

1. Ask Student to recall the concepts of Acid and Base.
2. Make pairs of the students and will explain the steps of the activity.
3. Ensure that each participant of the pair performs the activity on his/her own.

How will I proceed?

➤ Student's Activity

1. Mix together 3 cups flour, 1 cup salt, 1 cup water, and 2 tablespoons of cooking oil.
2. Fill the empty drink bottle with hot tap water.

3. Add a squirt of dishwashing detergent and some baking soda (~2 tablespoons). If desired, you can add a few drops of food coloring.
4. Set the bottle in the center of a pan or deep dish and Press the dough around the bottle and shape it to look like a volcano.
5. add some food color in the bottle. When the volcano erupts, the "lava" will flow down the sides and will pick up the coloring.
6. pour some vinegar into the bottle (which contains hot water, dishwashing detergent, and baking soda).
7. Make the volcano erupt again by adding more baking soda. Pour in more vinegar to trigger the reaction.

(By now, you probably see why it is important to use a deep dish or a pan. You may need to pour some of the "lava" into the sink between eruptions.)

What have I observed?

Experiment	Result - eruption/No eruption
Mixing of baking soda and vinegar	

What have I learnt?

Chemical reaction between baking soda (sodium bicarbonate) and vinegar (acetic acid) is a _____.

What am I curious to learn?

- Can the similar result be obtained using a different set of acid and base? Suggest an activity for the same.

Let me evaluate myself

1. What is acid?

2. What is base?

3. What is Neutralization Reaction?

4. Why Baking Soda is known as Base?

5. Why Vinegar is known as Acid?

6. If we take Baking Soda with Citric Acid, does Volcano erupt?

7. How Neutralization Reaction is different from Redox Reaction?
