Baking Soda and Vinegar
Is it a Chemical Reaction?

Grade Level: 5

Standards:

1a. Students know that during chemical reactions the atoms in the reactants rearrange to form products with different properties.

1f. Students know differences in chemical and physical properties of substances are used to separate mixtures and identify compounds.

Description:

Students will learn about chemical reactions and the signs that a chemical reaction took place. This lesson was designed as a pre-lab to the Mystery Powders Lab.

Objectives:

Students will be able to:

- Write a lab report with the guidance of the teacher.
- Work as a class and wait for everyone to do the lab together.
- Identify the signs of a chemical reaction.
- Complete each experiment in a safe and responsible manner.

Materials:

- one empty Ziploc sandwich bag per group
- 50-mL graduated cylinder (or paper cup)
- vinegar in plastic cups for students to pour into graduated cylinder
- baking soda in salsa cups
- transfer pipettes (or eye droppers)

Background:

From the student textbook or other sources summarize the evidence of a chemical reaction: a change in temperature, gas is produced, light is produced, a change in color, a precipitate forms.
Vocabulary:

**react:** To undergo a reaction.

**reaction:** A process involving changes of substances.

**bubbles:** A thin film of something, usually spherical-shaped and filled with air or a gas

**vigorous bubbling:** Strong, energetic or active bubbling

**foam:** A mass of bubbles of gas or air on the surface of a liquid

**foaming:** To produce a mass of bubbles

**dissolve:** To cause to pass into solution: dissolve salt in water

**fizz:** To produce bubbles of gas

**fizzing:** The sparkling quality of a drink caused by bubbles of gas (e.g. carbonated drinks)

**foamy:** Covered with, full of, or consisting of foam

Procedure:

1. Guide the students through the process of writing a lab.
   - First, have the students write the main science standard that the lab addresses.
   - Show students how to write a list of materials.

2. Then explain and demonstrate the procedure using a different powder and liquid, such as flour and water.
   - Roughly pour in about 12-13 mL of a liquid into a graduated cylinder. Explain to students that after they have poured in about 12-13 mL of the liquid they can use the transfer pipette to add more liquid until it reaches the 15 mL mark.
   - Students will pour the baking soda from the salsa cups into a plastic bag. The teacher should pre-measure 2 tsp of baking soda into each salsa cup.
   - Partially close the Ziploc bag on both sides leaving approximately a one inch opening in the center, so that the 15 mL of liquid can be poured from the graduated cylinder into the bag.
   - Quickly close the Ziploc bag.
   - Demonstrate how to quickly seal the plastic bag once they have added the liquid.
   - Tell students that the powder they will be using is sodium bicarbonate, commonly known as baking soda and that the liquid will be acetic acid, which is vinegar.
3. After explaining and guiding the students through the steps of how to write a science procedure, tell students that the title of the lab is: *Is it a Chemical Reaction?* Then ask students to write a question and a hypothesis. You will need to guide the students through this process.

- **Question**: *What will happen to the baking soda when you pour vinegar on it?*

- **Hypothesis**: *If I pour vinegar on sodium bicarbonate, then ______ will ______.*

Most students wrote: If I pour vinegar on baking soda, then it will explode. then it will change color. then it will fizz. then it will turn gooey.

**Assessment:**

Students will notice that the baking soda and vinegar start to bubble, foam and fizz. They will also feel that the contents in the bag changes temperature. It gets colder as the bag begins to fill up with gas. Ask students to list orally what evidence they have that a chemical reaction took place. Write their responses on the board. They should have observed the following:

- Bubbling, foaming and fizzing
- Gas was formed – inflated the bag
- Temperature change – the bag and its contents got colder

Have students write the results and the conclusion. After they have finished writing, students draw the equipment they used, draw what they observed in their experiment, and label their drawings without teacher guidance. Allow students to discuss, help each other and ask you questions.

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