

## 5<sup>th</sup> Grade - Lesson 3.1

### What's the Difference between Baking Soda and Baking Powder?

#### Teacher Background

In Lesson 3.1, students do an investigation to see if there is any difference between baking soda and baking powder. Students test the substances with vinegar to see if they react the same way or differently.



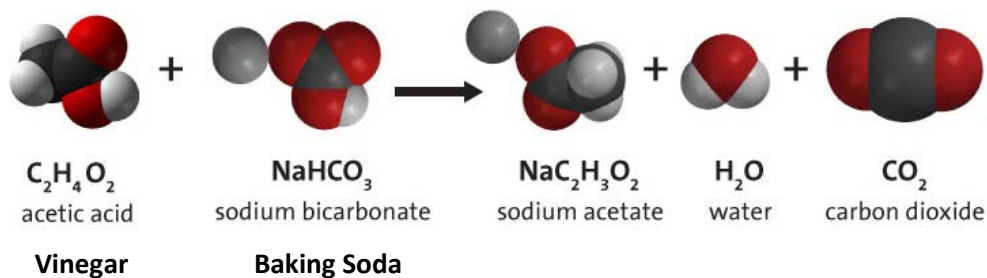
#### Designing and Conducting a Fair Test

One of the main goals of the lesson is for students to understand how to design and conduct a fair test. Understanding how to discover a difference between two substances is as important, if not more important, than what the difference is. Helping students realize the importance of using the same amount of the substances, and testing them with the same amount of vinegar, in the same type of container, at the same time, and in the same way is an important lesson. Helping students identify and control variables and understand why it matters can build a foundation of reasoning skills, which are applicable across many disciplines.

In the experiment, bubbles are observed in both cups as a result of a reaction between vinegar and baking soda. Baking soda bubbles more than baking powder because it is pure baking soda. Baking powder doesn't bubble as much because it contains other ingredients in addition to baking soda, so it has less baking soda than the pure baking soda.

#### Vinegar and Baking Soda on the Molecular Level

Here is the chemical equation showing models of the molecules involved in the reaction between vinegar (acetic acid) and baking soda (sodium bicarbonate). In any chemical reaction, the atoms of the reactants come apart, rearrange, and re-bond to form new substances as products. If you count the number of each type of atom on the left of the arrow (reactants), you'll notice that there are an equal number on the right (products), just bonded in different arrangements.



You can see that one of the products of the reaction on the far right is the gas carbon dioxide, which causes the bubbling in the reaction.

Each substance reacts chemically in a characteristic way. This makes sense since each substance is made from different atoms arranged in a unique way.