

5th Grade - Lesson 3.2

Exploring Baking Powder

Student Reading

Sometimes scientists need to figure out what substances in a mixture are causing a certain type of reaction. They can test different combinations of substances they know make up the mixture to see what causes the same reaction.

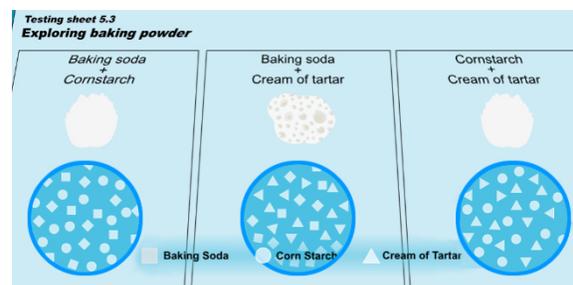
One example of a substance that is a mixture is homemade baking powder. Baking powder is a combination of three white powders: baking soda, cream of tartar, and cornstarch. When water is added to baking powder, it bubbles. But the bubbles result from a reaction between only two of the three powders.



Ingredients in baking powder

Process of Elimination

You can figure out which two powders make baking powder react with water by doing some scientific testing. Since you know the three powders in baking powder, you can make every possible combination of two different powders and test them with water. The combination that bubbles must be the two substances in baking powder that react with water.



Testing ingredients in baking powder

If you tried all the different combinations, you would see that baking soda and cream of tartar mixed together is the combination that reacts to form bubbles when water is added.

Cream of Tartar Reacts with Baking Soda

Cream of tartar is a dry acid. When water is added to a combination of cream of tartar and baking soda, the cream of tartar reacts with the baking soda to produce a gas that you see as bubbles. This reaction is very similar to a more familiar acid, namely vinegar (acetic acid), which reacts with baking soda to form bubbles.

The Self-Inflating Balloon

Mixing an acid with baking soda to produce a gas is also used in a fun product called a self-inflating balloon. These balloons come in all shapes and sizes. They are completely sealed so that they cannot be inflated by blowing air into them like a regular balloon. They can only be inflated by the substances trapped inside. Here's how it works:



Self-inflating balloon



Inside a self-inflating balloon

Inside the balloon there is baking soda and a separate little packet of an acid solution, such as vinegar or citric acid. To inflate the balloon, you press down on the packet until it breaks inside the balloon, releasing the acid. Then you shake the balloon to mix the acid solution with the baking soda. The acid and baking soda react to produce carbon dioxide gas, which inflates the balloon.