



# GOING UP WITH A BANG!

by Jim Wiese

**C**HINESE CHEMISTS ACCIDENTALLY discovered gunpowder in the eighth century while experimenting to find medicines that would prolong life. During the ninth century, the Chinese were using gunpowder to make fireworks for use as military signals and in celebrations such as New Year's. We don't want you to experiment with real gunpowder, but you can still get a bang out of this activity and learn more about chemical reactions.

## What You'll Need:

- safety glasses
- newspaper
- empty plastic film canister with lid
- water
- Alka-Seltzer tablet

## What to Do:

1. Put on the safety glasses. Cover your table or work area with newspaper.
2. Fill the plastic film canister half full of water.
3. Break the tablet of Alka-Seltzer into quarters. Place one quarter of the tablet in the water. Do not put the top on the container. Watch what happens when the tablet touches the water.
4. Empty the canister and refill it with fresh water.
5. Take another quarter tablet of Alka-Seltzer and place the tablet in the water. Quickly and firmly put the top on the canister. Set the "loaded" canister upright at least 3 feet (1 meter) away from you. What happens?

## More Fun Stuff to Do:

Experiment to see if you can make the canister lid fly higher. Try using different amounts of water or Alka-Seltzer tablets.

*Illustrated by Liza Ferneyhough*

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## How This Works:

When you first add the Alka-Seltzer tablet to the water in the canister, it will bubble. When you add the Alka-Seltzer tablet to the water in the canister and replace the lid, after a few moments the lid will fly up into the air.

This is an example of a **chemical reaction** that produces explosive results. In a chemical reaction, a change in matter takes place in which substances break apart to produce one or more new substances. The Alka-Seltzer tablet contains a substance called bicarbonate. When you mix bicarbonate with water, a new substance, carbon dioxide gas, is formed. When you put the top on the container, the carbon dioxide gas is trapped. The pressure of the gas builds up until it is strong enough to pop the top off the container.

Ancient Chinese fireworks used gunpowder for their chemical reaction. Gunpowder is a blackish mixture of sulfur, charcoal dust, and saltpeter. Modern fireworks use different chemicals, and there are actually two chemical reactions that take place. The first chemical reaction that happens at the bottom of the tube causes a fireworks ball to fly up into the air (in a process similar to the flying canister lid). Once the ball is in the air, a second chemical reaction occurs that causes the ball to explode. The different shapes and colors of the exploding fireworks are caused by different shapes of the fireworks ball and by the addition of other chemicals to the exploding mixture.

## Ancient Science in Action

By the tenth century, the Chinese had further improved gunpowder's explosive power and had invented the gun, the rocket, the bomb, and the mine. The Chinese army was the first to use both guns and rockets in battle, against the invading Mongols in the early thirteenth century at the battle of Kai-Keng. Following the battle, the Mongols began to make gunpowder and rockets of their own and eventually conquered China. It is thought that the Mongols were responsible for the spread of gunpowder to Europe.

SALTPETER IS A FORM OF POTASSIUM NITRATE, WHICH OCCURS IN NATURE.

