

# Alka-Seltzer Cannons

## 4<sup>th</sup> Grade

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### References:

- <http://wow.osu.edu/Chemistry/cpchanges.htm>

### Benchmarks:

PS-2 (Benchmark A): Identify characteristics of a simple chemical change. SI-3, 4, 5, 6 (Benchmark C): Develop, design, and safely conduct scientific investigations and communicate the results. SWK-3 (Benchmark B): Explain discrepancies in an investigation using evidence to support findings.

### Objectives:

Not only to demonstrate an example of a chemical change by the formation of a gas, but also to show students that, when doing experiments, scientists must be sure that the experiments are reliable and the results are valid. They must also make sure that when dealing with an unknown liquid or an unknown substance they must take appropriate safety precautions.

You will also want to stress the procedural design of the scientific method: *predict, test, observe, hypothesize.*

### Materials:

- film canisters
- original Alka-Seltzer
- water
- plastic cup

### Initial Demonstration:

Place an Alka-Seltzer tablet in a clear cup of water in front of the class and watch it foam and fizz.

### Target Observations:

- When you place an Alka-Seltzer® tablet in a cup of water you can observe the release of carbon dioxide gas
- After several minutes, the tablet can no longer be seen in the water
- Small residual pieces of the tablet are left floating on the top of the water

### **Target Model:**

- Sometimes when things dissolve in water there is an observable chemical reaction that takes place in which something new, a gas, is made. This experiment is a perfect example of the many observable signs to determine whether a chemical change has taken place.

### **Procedure:**

Place an Alka-Seltzer® tablet in a cup of water. Unlike when we put a sugar cube in water, this material does not dissolve in a calm fashion. It dissolves in a semi-violent chemical reaction. What safety practices must we follow to conduct a safe test with such a reaction?

How much gas is released in the bubbling? One way to see how much gas is produced is to put a lid on the reaction and see if it makes enough gas to pop off the top.

Combine half of a tablet with some water in a film container, cap it tightly, step back at least 5 feet, and wait for the lid to pop off. The carbon dioxide being formed builds up pressure inside the sealed film container until the lid can no longer hold it. It will make a loud noise and the lid will pop off, shooting into the air. Avoid setting the canister directly below light fixtures, because the lid may be able to break light bulbs. Please be careful! Repeat the experiment with a crushed  $\frac{1}{2}$  tablet.

Which scenario popped the top the furthest into the air? Another possible action is to see which tops popped off faster. Why? Draw a comparison between the powdered vs. the whole tablet. Make a graph of how long it took for the top to pop off the canister. Again, make the students explain the process and steps that they took to do the experiment, starting with what was the question. This is also a good time to discuss such terms as *validity* and *reliability* and *repeatability*.

### **Target Observations:**

- The top popped off at different times for the crushed tablet and the uncrushed tablet.
- Once the lid is popped off, it can be placed back on the canister for several more times until all of the tablet has reacted.

### **Summary:**

Students have conducted an experiment where they examined the effect of one variable (physical state of the Alka-Seltzer tablet). They were instructed on appropriate safety features. They should understand that the experiment is also an example of a chemical change.