Demo: Plop & Fizz Investigation

FOR THE TEACHER

Summary
In the demonstration the teacher will perform a reaction between water and Alka-Seltzer in order to generate the release of carbon dioxide. Students will observe the chemical reaction, while timing the release of carbon dioxide and observe 3 states of matter. This will be repeated 3 times, each time increasing the number of tablets used.

Grade Level
Elementary School

Objectives
By the end of this demonstration, students should be able to
- Identify 3 states of matter.
- Explain the meaning of a chemical reaction.
- Collect and organize data.
- Draw conclusions based upon results.

Chemistry Topics
This demonstration supports the students’ understanding of:
- Chemical reactions
- Chemical change
- Kinetics
- Reaction Rate
- States of matter

Time
Teacher Preparation: 10 minutes
Lesson: 30 minutes

Materials
- Small bottle
- Clay
- Aquarium tubing
- Small jar
- Stop watch
- 2 tablets Alka-Seltzer
- ½ cup Water
- Food coloring (optional)

Safety
- Students should wear proper safety gear during chemistry demonstrations. Safety goggles and lab apron are required.
- Students should wash their hands thoroughly before leaving the lab.
- Do not consume lab solutions, even if they’re otherwise edible products.

Submitted by
Barbara Minenko
King Elementary
Katy, TX

Thanks to:
Dow Chemistry Teacher Summit
**Teacher Notes**

- Prior to the demonstration students will have had prior instruction and experience with mixtures and solutions.
- Understanding the reaction: Alka-Seltzer contains a dry acid and baking soda. When they combine with the water carbon dioxide is formed. The gas travels through the tube to form bubbles in the jar of water. When all of the material has reacted the bubbling will stop.
- As a teacher demonstration incorporate the help of the students when able. For example, choose one student use timing tools, and inform them of when to start and stop timing (1st sight of air bubbles to the last).
- Another option is to have students conduct this lab in small groups with the teacher’s direction.
- Students should record data on their student sheet.
- Use of a document camera may assist those to see more closely from a distance.
- Practice quickly securing the clay and tube to the bottle to minimize the amount of has escaping the bottle.
- An increase in tablets increased the amount of carbon dioxide produced resulting in a longer reaction time of producing bubbles.
- Optional: For effect you may use food coloring. I used blue in one container and yellow in the other. As the gas passes through the two colors mixed to form green, shown in the photo below.
- Different angles of the carbon dioxide produced in the tall bottle and passing through the tube into the smaller container where bubbles become visible are shown in the photos below.

**Demonstration Procedure**

1. Pour ½ cup of water into the small bottle (it is optional to add food coloring).
2. Place clay around the tubing about 2 inches from one end.
3. Fill the jar with water.
4. Place the free end of the tube in the jar of water (it is optional to add food coloring).
5. Break 2 Alka-Seltzer tablets and place into the small bottle of water.
6. Quickly insert the tube and secure the opening with clay.
7. Watch and ask students to record observations and the time from the start of bubbling to the end.
8. Repeat steps 1-7 increasing the number of tablets used.
FOR THE STUDENT
Lesson

Plop & Fizz Investigation

Background
Changes in states of matter have been observed by the additional and removal of heat. Today, it will be observed how a solid and liquid produce a gas through a chemical reaction.

Data

<table>
<thead>
<tr>
<th>Alka-Seltzer tablets</th>
<th>Time of Bubbling</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
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<tr>
<td>6</td>
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</tr>
</tbody>
</table>

Analysis
1. What relation was observed between the number of tablets and the amount of time bubbles were produced?

2. List possible reasons for the differences in time:

3. How are the “bubbles” produced in this reaction similar to the bubbles seen in sodas?