

Mentos Super Fountain

Mentos + Pop = Fun. Through a fun experiment with Diet Coke and Mentos, students learn about the scientific method and enjoy a super fountain!!

Grade Level: 2nd

Phenomena:

Can different liquids cause reactions in candy?

Objectives:

- Students will be introduced to the Next Generation Science Standards eight primary practices of science
- Students will experiment with mixing soda and Mentos candy
- Students will draw conclusions based on observations
- Students will create an illustration identifying and justifying their favorite step in the Next Generation Science Standards

Materials:

- 2 liter bottle of Coke (room temperature)
- 2 liter bottle filled with water
- Goggles
- Tube of Mentos (mint and flavored work equally as well)
- Geyser Tube or trigger cap (see preparations for trigger cap instructions)
- Paper towels

Appendixes:

Time Considerations:

Preparations: 5 minutes

Lesson Time: 55 minutes

Introduction: 15 minutes

Activity 1: 30 minutes

Conclusion: 10 minutes

Related Lesson Plans:

Flubber, Yellow/Blue Switcheroo, Eggs-plosion, H₂Olympics, Blood-Typing, Mystery Box



Next Generation Science Standards

2-PS1-2. Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.

Science and Engineering Practices (SEP):

Analyzing and Interpreting Data

Disciplinary Core Ideas:

Structure and Properties of Matter

Crosscutting Concepts:

Cause and Effect

Background

There is considerable debate over why Mentos mixed with soda produces an amazing eruption. While the most probable explanations are described here, other explanations could be possible.

Soda pop is primarily composed of sugar (or diet sweetener), flavoring, water and preservatives. The substance that makes soda bubbly is invisible carbon dioxide gas, which is pumped into bottles using tons of pressure. Until you open the bottle, the gas mostly stays suspended in the liquid and cannot expand to form more bubbles, which gases naturally tend to do.

Water molecules strongly attract each other, linking

together to form a tight mesh around each bubble of carbon dioxide gas in the soda. In order to form a new bubble, or even to expand a bubble that has already formed, water molecules must push away from each other. It takes extra energy to break this surface tension. In other words, water "resists" the expansion of bubbles in the soda.

If you shake a soda bottle and then open it, the gas is released from the protective hold of the water molecules and escapes with a whoosh, taking some of the soda with it.

When you drop Mentos into soda, the gelatin and gum arabic from the dissolving candy break the water's surface tension. This disrupts the water molecules' organization, so that it takes less work to expand and form

new bubbles. As soon as the Mentos hit the soda, bubbles form all over the surface of the candy. When all this gas is released, it literally pushes all of the liquid up and out of the bottle in an incredible blast. Identify a large open space outdoors for conducting the super fountain experiment.

Next Generation Science Standards Steps

To conduct a lesson utilizing the NGSS standards steps, the instructor is going to ensure that students will:

- 1) Ask Questions
- 2) Develop useful models
- 3) Plan and carry out an investigation
- 4) Analyze and interpret data
- 5) Use mathematical and commutative thinking
- 6) Construct explanations
- 7) Engage in an argument or conversation about the evidence
- 8) Obtain, evaluate and communicate the information

These are not to be done in a step-by-step order but should be touched on at least once throughout the lesson. Allow students to have flexibility between the steps!

Preparation

*Fill an empty two liter bottle with water for the second super fountain experiment.

*If you don't have a Geyser Tube create a trigger cap. Take an old two-liter cap and drill a hole in the top large enough for

a piece of wire to go through. Twist a loop in the top of the wire to form a trigger for your finger to pull. Thread the straight end through the cap, so the trigger will be outside of the bottle. Poke holes in the center of five mentos (they shouldn't touch the soda until you're ready) and thread them through the wire, bend the wire a little to hold the Mentos on. When you're ready to experiment, put your trigger cap on the soda, hold the bottle, pull the trigger and run for it (*Kilbane, C.*)!

Introduction

Ask students if they have ever done an experiment before. If so, what did they do? What were they trying to find out? What did they use to carry out the experiment?

Whenever scientists (and we will be scientists today!) do experiments they follow certain steps to ensure they are finding quality results. Does anyone know what this group of steps or process is called?

Put the steps on the board and briefly go over what each one entails.

1. Question: When scientists do experiments, they always begin with a question.
2. Hypothesis/Prediction: After asking the question scientists then try to guess the answer.
3. Research: Randomly combining things from around the house is dangerous so scientists have to do some

research by reading, looking on the internet or asking other scientists.

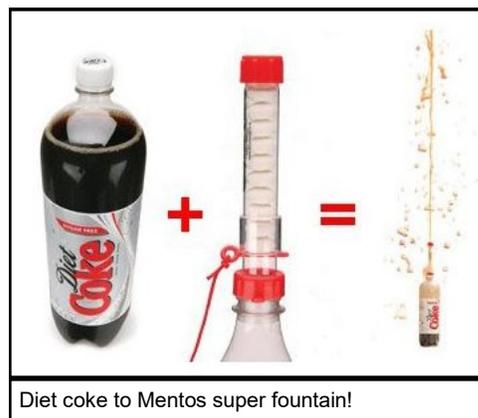
4. Experiment: This is generally the fun part. Scientists do an experiment by following the directions and they have fun! But they are always safe and careful.

5. Results: Scientists keep accurate records of results of their experiment.

6. Conclusion: Examine the meaning of your results.

Why are these steps important to follow (*Science Buddies*)?

Teach students *The Scientific Method* song. After going over



the song, have students sing it with you.

Doing the Activity

Activity 2: Super Fountains

Pose today's experimental question to students: Do you think candy can make soda erupt?

Show students the Mentos and two liter bottle of soda. Ask students what they think will

happen when you put Mentos into a two liter bottle of diet coke? Have the students form a hypothesis (educated guess).

Show students the Mentos and two liter bottle of water. Ask students what they think will happen when you put Mentos into a two liter bottle of water? Have students form a second hypothesis.

Go over all the materials needed for the experiment: 1 package of Mentos, 1 two liter bottle of diet soda, 1 two liter bottle filled with water, Geyser Tube, goggles - scientists are always safe while experimenting!

Experimental Procedure

Begin by tying one end of the string to the trigger pin.

Open the bottle of soda and attach the Geyser Tube. Put the trigger pin into the hole at the base of the Geyser Tube.

Twist off the top cap on the Geyser Tube and drop half a pack of Mentos candies into the tube.

Make sure students are a safe

distance from the super fountain before pulling the trigger pin.

The Mentos will drop and the soda will go flying in the air, creating a geyser!

Pour out the remaining soda and take a look at the Mentos. Compare these Mentos to unused Mentos from the package. You can see where the soda has eaten away at the surface of the candy.

Ask student what they observed—why do you think this happened?

Try the experiment again, using the same procedure but with the two liter bottle filled with water.

Ask students what they observed—why do you think soda caused a super fountain while the water had no reaction? Ask the students if their hypotheses were correct. Remind the students that it does not matter whether their guesses were right, because the reason for conducting experiments is to find out the answer to our question.

Vocabulary

Conclusion: a reasoned judgment

Hypothesis: an educated guess

Materials: the tools and other things needed to perform a particular task

Results: the outcome(s) of a certain task or procedure

Scientific Method: the system of advancing knowledge by formulating a question, collecting data about it through observation and experimentation, and testing a hypothetical answer

Conclusion

Ask the students why they think soda creates a super fountain, but water does not? What does soda have that water doesn't? How can we test this?

Assessment

Have students draw a picture of their favorite part of the experiment and write which step of the scientific method it took place during.

Sources

- Kilbane, C. (2010). *How to Make a Diet Coke & Mentos Bomb*. Retrieved Dec. 8, 2010, from eHow: http://www.ehow.com/video_4950864_make-diet-coke-mentos-bomb.html#ixzz17XhN0d00
- Science Buddies. (2010). *Steps of the Scientific Method*. Retrieved Aug. 26, 2010, from http://www.sciencebuddies.org/science-fair-projects/project_scientific_method.shtml
- Steve Spangler Science. (2010). *Mentos Diet Coke Geyser*. Retrieved Dec. 8, 2010, from <http://www.stevespanglerscience.com/experiment/original-mentos-diet-coke-geyser>

Images:

- Nexus Gadgets. (2005-2011). *Mentos and Coke Geyser Tube*. Retrieved Aug. 31, 2011, from <http://www.nexusgadgets.com/mentos-and-coke-geyser-tube-pr-16565.html>

The Scientific Method

To the tune of: The Wheels on the Bus

There are six cool steps in the scientific method

The scientific method

The scientific method

There are six cool steps in the scientific method

When we do an experiment!

First we need to ask a question

Ask a question

Ask a question

First we need to ask a question

When we do an experiment!

Second we need to predict an outcome

Predict an outcome

Predict an outcome

Second we need to predict an outcome

When we do an experiment!

Third we need to gather materials

Gather materials

Gather materials

Third we need to gather materials

When we do an experiment!

Fourth we need to follow directions

Follow directions

Follow directions

Fourth we need to follow directions

When we do an experiment!

Fifth we need to look at the results

Look at the results

Look at the results

Fifth we need to look at the results

When we do an experiment!

Sixth we need to wrap it all up

Wrap it all up

Wrap it all up

Sixth we need to wrap it all up

When we do an experiment!!!

