

BUBBLE TROUBLE

Extending “Bubble Trouble” In Your Classroom

This study guide is meant to build on the enthusiasm and curiosity of your students about bubbles after watching or participating in the “Bubble Trouble” presentation.

These activities are fun and engaging and can act as an introduction to the scientific principles they demonstrate.

Meets
Next Generation
Science
Standards

**CHOOSE
BUBBLE
MUSIC TO
ACCOMPANY
CLASS AS
THEY BLOW
BUBBLES AND
EXPERIMENT...**



Some suggestions for music:

- Waltzes
- Rock songs such as “Rock the World” by the Bubbles
- Or wistful, slow-moving songs such as: “I’m Forever Blowing Bubbles”



Bubble Trouble

Soda Experiment! What Makes Soda Fizz?

PROCESS:

- 1) Open the very cold soda can quickly. Note the amount of bubbles of carbon dioxide gas or “fizz.”
- 2) Then, open the can that is room temperature and compare the fizz.

Ask: What makes the very cold soda more fizzy than the room temperature soda?

When soda is cold, the carbon dioxide gas molecules are more tightly held in the liquid. When a cold can is opened, the pressure drops and carbon dioxide gas bubbles rush out. In the room temperature can, pressure holding the gas inside the liquid is much less. So there is little or no fizz when you open the can.

3) Ask: Why does shaking a can of soda increase the amount of fizz?

Ask a student to shake the room temperature can rapidly and then note the amount of fizz when the can is opened.

Students form small groups to use the information they have learned in this activity to explain why.

Shaking the can provides carbon dioxide molecules with more “energy” to break free from the liquid.

Opening the can produces more fizz.

Materials

One can of very cold soda

Two cans soda at room temperature



Carbonization:

Soda contains the gas carbon dioxide, which has been mixed under pressure with the liquid during manufacturing. This process is called carbonization. Without carbonization, sodas would taste flat and boring. When you open the can, the pressure is released. Carbon dioxide gas bubbles burst free from the soda and pop out of the can as fizz.

Bubble Trouble

Build A Bubble-Powered Paper Rocket

Adapted from www.nasa.gov "NASA's The Space Place," which contains a pattern and more details.



Blastoff must occur outdoors on a sidewalk or driveway.

Process: Make the Rocket

Work in pairs or small groups and decide how to cut the paper to make a long, thin or short, fat rocket. Make a sharp or blunt nose cone and decide whether or not to add fins to the rocket. (See website for paper patterns, if needed.)

1) Cut out pieces for rocket from sheet of paper.

2) Tape the canister to the edge of an 11inch long piece of paper. Roll paper around edge of canister and tape into place. Be sure to position the lid end of the canister at the bottom of the rocket. The lid will be blown off to make the rocket shoot into the air.

3) Tape fins to the rocket body. Tape a nose cone to the top of the rocket.



Put on eye protectors before BlastOff!

1) Remove lid from bottom of canister. Fill canister onethird with water.

2) Quickly: Drop onehalf of antacid tablet into canister. Snap lid on tight. Put rocket on outdoor flat surface such as sidewalk or driveway.



THEN STAND BACK!

3) The rocket should blast off!

Materials

regular notebook size paper
(8 ½ by 11"),

plastic 35mm film canister
(must have cap that fits
INSIDE rim, not outside)

cellophane tape

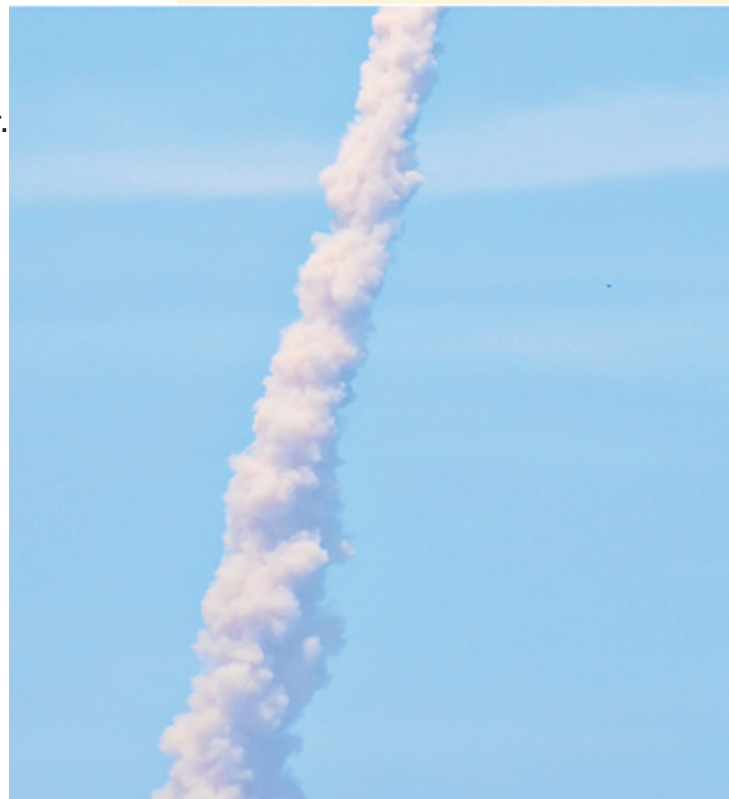
antacid tablet that fizzes

scissors

paper towels

water

**Warning: Everyone involved
must wear eyeglasses,
sunglasses, or safety glasses.**



Bubble Trouble

Ask: What powered the rocket? What did bubbles have to do with it?

The tablet, when placed in water, begins to fizz or allow tiny bubbles of gas to escape. The bubbles move up, not down, because they weigh less than water. At the surface of the water, the bubbles break open. The gas that is released then presses on the sides of the canister and pops the bottom lid open. Water and gas rush out of the bottom of the rocket and blast the rocket into the air.

Bubbles, Colors, And Light

Review: Light is made up of different colors. Different wavelengths create different colors to the human eye.

PROCESS: Create the largest bubble you can. Keep blowing on bubble until it breaks up and fades.

Ask: What colors do you see on bubbles and where? What happens to the colors of the bubble over time? Which colors last longest and why?

Discuss these questions with other students and share these principles:

Why do bubbles have color? Bubbles reflect the light waves in their surroundings. The light waves hit the outer surface of the bubble and then, in a split second, the inner surface. The two light waves reflect back to our eyes as color.

Why does the color of the bubble fade? Light waves create color, but they can also make the bubble lose color. A bubble wall can get thinner over time because the bubble solution is weak or the chemicals have fallen to the bottom of the bubble. The walls of the bubble keep getting thinner and closer together. The two reflected waves of light get closer until they meet. Then, they cancel each

Materials

strong bubble solution
sufficient to create large
bubbles

large bubble wand



Bubble Trouble

other out and the bubble loses its color.

Why are there different colors on different parts of the bubble?

Different parts of the bubble wall have different thicknesses. The thicker the section of wall, the more intense color is created by the light waves.

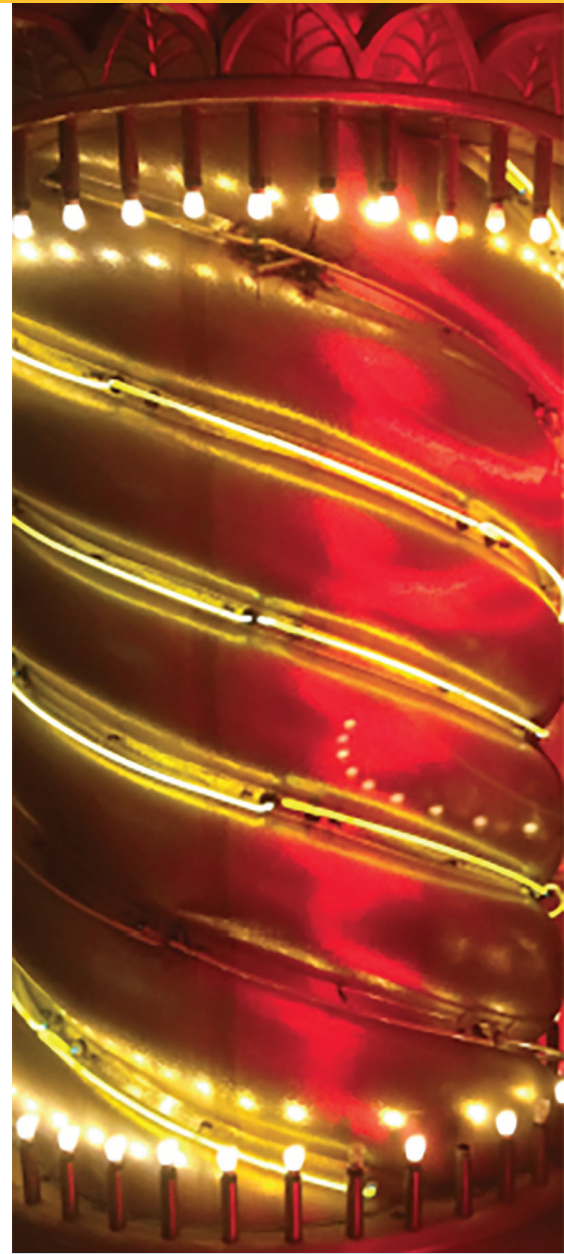
Research Projects

Work in pairs or small groups to research the scientific principles of chemistry and physics that answer the following questions and report back to class.

- What are the physical and chemical forces that create and maintain a bubble?
- How do light waves reinforce or cancel out each other?
- Research constructive and destructive interference. How do the colors of a bubble change over time? Which colors last the longest? the shortest? Why are some colors more intense than others?

Creative Arts Projects

- Take still photos or videos of bubbles and bubble experiments
- Create bubble demonstrations for students in lower grades
- Create a colored fog show using light gels
- Demonstrate how to create a rainbow by breaking white light into its spectrum of colors
- Use the computer to create bubble art
- Start a class blog about science experiments and discoveries
- Encourage students to use their creative imaginations to create a project



Activities support the following standards for New York schools:

- Arts Standards for New York Schools
- Middle School Standard 1: Creating, Performing, and Participating in the Arts
- Next Generation Science Core Ideas
- PS1: Matter and Its Interactions;
- PS1.A Structure and Properties of Matter
- PS1.B Chemical Reactions
- PS2: Motion and Stability: Forces and Interactions
- PS2.A: Forces and Motion;
- PS2.B: Types of Interactions