

STEM in the lab

.....● Inspiring Idaho's future STEM workforce

LAUNCHING FIREWORKS



GRADE LEVELS

This activity is appropriate for grades K-5.



MISSION

Learn about the elements used to create the spectacular colors seen in firework celebrations. Color your own firecracker, then use paper and a straw to design a system to launch your firework.



VOCABULARY

ELEMENT: a pure substance made from a single type of atom.

FIRECRACKER: a device containing gunpowder and other combustible chemicals that causes a spectacular explosion when ignited.

PERIODIC TABLE: the system for arranging the elements.



MATERIALS

- » Bendable straw
- » Construction paper
- » Firework cutout
- » Yardstick/ruler
- » Markers/crayons/colored pencils
- » Scissors
- » Tape

ABOUT THIS ACTIVITY

In 1869, scientist Demitry Mendeleev grouped 92 elements that make up every substance into a table called the periodic table. At Idaho National Laboratory, scientists use elements from the periodic table to improve our way of life. A few examples of those elements uranium for nuclear energy, plutonium to power space exploration, and hydrogen to effectively store excess electricity to be used at a later date.

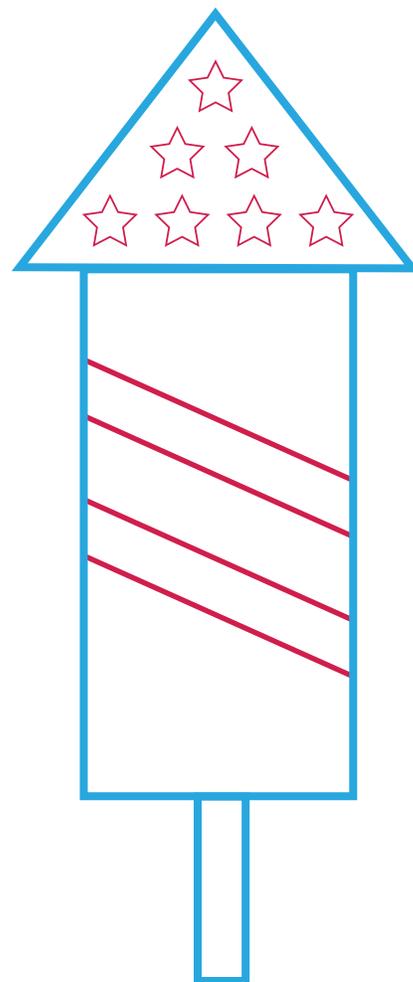
Scientists are not the only ones who use the periodic table. We use elements from the periodic table every day, including oxygen, hydrogen, fluorine and chlorine to name a few. One of the most exciting ways to use elements is fireworks, which are always a big bang at many celebrations. Did you know that different elements make up the different colors we see from fireworks? Aluminum is a component of sparklers. It produces silver and white flames and sparks. Carbon, antimony, barium, chlorine, copper, iron, lithium, magnesium, phosphorus, potassium, sodium, sulfur, strontium, titanium, zinc and oxygen are other elements that provide for a spectacular show.



Even though we can't make our own real fireworks, we can still add to fun this Fourth of July with paper firecrackers. In this activity you will color your own firecracker, and then then use paper and a straw to design a system to launch your firework.

INSTRUCTIONS

- 1 There are several videos and nonfiction books on how fireworks get their colors and shapes. If time permits, these are fun ways to introduce this activity. Older students can also research the colors each element makes in fireworks.
- 2 Once students know which elements make which colors, choose one to three elements and color the firecracker image based on what colors those elements produce. List the elements on the places you draw with the color associated with each element. There is a paper providing examples of what the colors produced by each included in the supplies.
- 3 Next, students will make a pocket. Cut a strip of paper a few inches shorter than twice the length of the straw. The width of the paper should be able to fold over the straw and have about an inch on each side of the straw. Fold the paper to make a pocket the straw can fit into.
- 4 Tape the pocket to the firecracker, making sure to tape the pocket closed on both sides and the top so no air can escape.
- 5 Insert the straw into the pocket, making sure the straw is not up against the top of the pocket.
- 6 Blow into the straw.
What happens to the air when you blow into the straw?
How can you increase air pressure in order to make your firework fly higher?
- 7 With a ruler or yardstick, try to measure how high the rocket went. Make a table and record your results. Adjust your construction paper pocket as needed.



THE SCIENCE BEHIND IT

The key to launching your paper rocket high into the sky is make sure the top of the construction paper pocket is sealed with tape. Sealing the paper closed will allow air pressure to build up inside the pocket, and when enough pressure builds up, the paper firework will launch.

EXTENSIONS

- » Learn more about the periodic table at INL's interactive Periodic Table. It offers pop-up information on every known element. <https://inl.gov/periodic-table/>
- » Tape multiple pockets/straws to the back of your firecracker. What difference does that make?

RESOURCES

- » **Chemical Elements in Fireworks**
<https://www.thoughtco.com/elements-in-fireworks-607342>
- » **INL Interactive Periodic Table**
<https://inl.gov/periodic-table/>
- » **Chemical Element**
<https://kids.britannica.com/kids/article/chemical-element/352942>
- » **Oxford English Dictionary**
<https://languages.oup.com/google-dictionary-en/>
- » **Idaho Laboratory Joins National Research Programs For Making 'Green' Hydrogen**
<https://inl.gov/article/inl-joins-hydrogen-research-programs/>

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