

Western Engineering Outreach

Candy Lightning

Grade 3-5

Meet Today's ENG HERO!



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Dr. Berruti is an internationally recognized researcher with expertise in chemical reactor technologies, thermal cracking, conversion of heavy oils and biomass residues and organic wastes into value-added fuels and chemicals. His research, often carried out in collaboration with many national and international industrial organizations, has led to significant academic and industrial contributions. His publication record includes over 250 articles in many prestigious journals, books and conference proceedings, and several patents. To find out more about Dr. Berruti: https://www.eng.uwo.ca/chemical/faculty/berruti_f/index.html

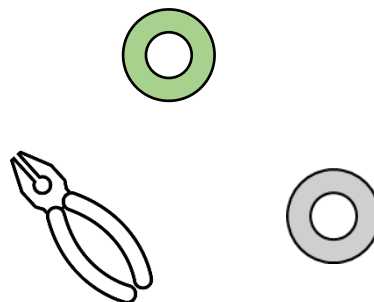
Learning Goal:

Students will explore static electricity as they try to create their own charge!

Curriculum Connections: Grade 4 -Light and Sound; Grade 5 -Properties of and Changes in Matter

Materials Needed:

- Life Savers Mints- Wint O Green
- Sugar Free Life Savers Mints- Wint O Green
- Life Savers Mints- Spear O Mint® and/or Pep O Mint®
- Other hard candy (optional)
- Pliers
- Dark room



Engineering and Science Connections:

Today we will be becoming chemical engineers! Chemical engineers help create and research all different kinds of things that have chemicals in them. They create synthetic flavors such as blue raspberry and ice cream flavors.

Today we will be learning about static electricity, so what is static electricity?

Static electricity is the result of an imbalance between negative and positive charges in an object. These charges can build up on the surface of an object until they find a way to be released or discharged.

Lightning is a massive release of static electricity. It starts when icy raindrops rub against the air. This rubbing gives rise to static electricity, and sometimes the electricity can jump across an air gap. This is called a discharge, or spark. Within clouds or between the clouds and Earth, the discharge is huge; it heats the air to the extent that it glows with white light. That glowing white light is the lightning you see.

Miniature buildups of static electricity occur often. Maybe you remember your hair standing up after brushing it, or clothes clinging together when they come out of the dryer. In both examples, rubbing created static electricity. Crushing crystalline structures like hard sugar or salt also gives rise to static electricity.

Whenever there is static electricity, a release might happen. You might have felt or seen a discharge when touching a metal doorknob after walking across a carpeted floor. Although releases occur often, we hardly ever see a light flash. These miniature releases excite the air around it, which then typically releases ultraviolet (UV) light, a type of light humans cannot see. Note that many animals, like insects and birds, would observe this UV light flash because their eyes are sensitive to UV light-but human eyes are not.

It is only when there is a fluorescent substance around, which can absorb the UV light and reemit it as visible light, that we see a tiny light flash.

Video Recommendation: Static Electricity / How it is Produced / Video for Kids

<https://www.youtube.com/watch?v=ZF3-mwLq6Q8>

Activity:

Hovering Plates

Magnets are not the only things that repel each other.

What you will need:

- A piece of cloth
- 2 Styrofoam plates

Steps:

- Rub the base of a plate with the cloth
- Place the plate on a flat surface
- Try to place the other plate (base-down) on the other plate and watch as they repel.

How it works:

This trick works due to static electricity, which happens when you rub things together. The plate gains electrons from the cloth and becomes negatively charged. These electrons repel the electrons in the other plate.

Time to begin

In today's main activity we will be creating bright light flashes using the Life Saver candy!

1. **Note:** The electrical discharges created in this activity are tiny and harmless. Although it is the same phenomenon, lightning in storms is created by huge discharges and is dangerous.
2. Place one Life Savers mint between a pair of pliers and turn off the light. Wait a minute or two to let your eyes adjust to the dark, then watch the candy as you crush it.



3. Repeat with all other types of mints



4. To confirm your findings, repeat the activity a few times.
5. You probably detected it for only one of the types of Life Savers you crushed. Can you find which combination of ingredients is responsible for the phenomenon? You will need some detective skills to find out!
6. Investigate what exactly creates the flash. Take another Life Savers mint, the type that exhibited the phenomenon, and start exploring. We know the flash happens when we crush the candy with pliers.

Debrief

Did you see a light flash when crushing the sugar-containing Life Savers Wint O Green mints, but not when crushing the other types of Life Savers mints? This is expected. You need hard crystalline sugar as well as the artificial flavoring substance in the Wint O Green type to create the flash.

Crushing hard crystalline sugar creates static electricity, which can lead to a mini discharge—a kind of miniature lightning. The discharge is usually accompanied by ultraviolet (UV) light, which is a type of light humans cannot see. A fluorescent substance—a substance that absorbs UV light and release it again as light humans can see—can make the light flash visible, and that is exactly what the artificial flavoring substance in the Wint O Green mint does.

Although lots of hard crystalline structures emit UV light when crushed, the crystals in the sugar substitute do not. Therefore, there was no UV flash to see when crushing the sugar free Wint O Green mints.

What Did You Learn?



- What is Chemical Engineering?
- What is static electricity?
- Common static electricity phenomena

Future Learning



- Research how to roll a can with static electricity
- Research how to bend water using static electricity

Share your creations!

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Thanks for discovering with us!