

Western Engineering Outreach

Exploring Static Electricity

Grade K-2

Meet Today's ENG HERO!



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Firouz is currently supervising the Power System Protection Laboratory at Western University. His research interests include the protection and control of power systems, with a focus on renewable power. He completed his BSc and MSc in Electrical Engineering in Iran and his PhD at the University of Toronto.

To learn more about Dr. Ajaei visit:

https://www.eng.uwo.ca/electrical/faculty/ajaei_f/index.html

Learning Goal:

- Students will explore the energy we use every day and will consider how things around them can be affected by static electricity.
- Curriculum Connections: Grade 1 - Energy in Our Lives

Materials Needed:

- 1 Balloon
- Measuring Cup: $\frac{1}{4}$ cup
- $\frac{1}{4}$ Cup of Cornstarch
- $\frac{1}{4}$ Cup of Vegetable Oil
- Spoon
- Bowl
- Construction paper
- Tissue paper
- White paper
- Kleenex
- Aluminum Foil
- Wool



Engineering and Science Connections:

What is electricity?

Electricity is a form of energy that can be used to power electrical items, like computers, cell phones, refrigerators, kettles, and sometimes cars!

What are some other things in your life that use electricity?

Have you ever taken a sweater off and your hair stands up on end? Or shocked someone after walking with socks on a carpet? That kind of electricity is called static electricity.

Static Electricity

Static is another word for “not moving.” Static electricity is an electrical charge that builds up on the surface of something and it stays in one place. It does not flow or move to a different area.

Atoms are made up of neutrons, protons, and electrons. The electrons spin around on the outside. A static charge happens when two surfaces touch each other and the electrons move from one object to another. One of the objects will have a positive charge and the other a negative charge. Items with different charges (positive and negative) will attract each other, while items with similar charges (positive and positive) will push away from each other. It's kind of like a magnet!

So you've gone flying down a slide and your hair stands straight up. This is because of the friction of sliding. It has caused a positive charge on each piece of hair. As each hair has the same charge, they all try and push away from each other, causing that funny straight hair to stand right up on end!

The same happens with your skin. If it's charged with static electricity, and you touch something metal, your skin will get rid of the static electricity and give it to the metal.

How is static electricity used?

Static electricity has quite a few uses. For example, it is used in printers and photocopiers where static electric charges attract the ink, or toner, to the paper. Other uses include paint sprayers, air filters, and dust removal.

Video Recommendation: Static Electricity - How It Is Produced

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

Activity:

Before beginning, think about the following questions:

- Why do we need electricity?
- What is static electricity?
- How long do you think you can go without using any electricity?

Part 1: Exploring Static Electricity

Blow up a balloon and secure it. Then rub the balloon on your hair.

What happens? Does your hair stand up? Does it stick to the balloon?

Try rubbing the balloon on your shirt next.

What happens now?

Do you think the balloon is attracted or not attracted?

Attraction is when two objects have a pull towards each other. If the two objects want to push each other away, it is called repulsion.

Now we will explore the other materials. Rub several other materials together and see what happens. Is there any attraction? After a few tries, start to guess what materials will be attracted to each other. Make sure to test with the balloon as well. What does it attract? What does it not attract? Make a list of all the things that stick to the balloon when you rub them together. Go around your house and try other things to see if they will stick to the balloon.

Part 2: Jumping Goop

Use your measuring cup to measure out $\frac{1}{4}$ cup of cornstarch. Pour it into a bowl.

Add $\frac{1}{4}$ cup of vegetable oil. Stir it up until it makes a slimy liquid.

Rub the balloon on your hair, then hold the balloon very close to the spoonful of cornstarch goop. It will start to move! If the balloon gets close enough the goop will jump from spoon to balloon.

Why do you think the goop is attracted to the balloon? When you rub the balloon on your hair, electrons from the molecules in your hair rub off onto the balloon. This gives the balloon a negative charge, and it is attracted to the positive charges within the goop, specifically within the cornstarch. Experiment with different materials. Will the goop still jump?



What Did You Learn?



- What is electricity?
- What is static electricity?
- How do we use electricity every day?

Future Learning



- If you try the experiment with just plain cornstarch, the cornstarch will be attracted to the balloon. Try it with just cornstarch and see what happens! Turn the activity into an experiment by adjusting the amounts of cornstarch and oil. Make notes on what you change in the recipe and notes about how it reacts.
- Start a discussion about electricity in your lives. Take children on a drive to see power lines and substations that you might pass every day without even realizing.

Share your creations!

We would love to see what you made. Email us at discover@uwo.ca or tag us on social media.

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Thanks for discovering with us!