Static Electricity

INTRODUCTION

Have you ever rubbed a balloon on your hair? If so, what happened? Your hair stood straight up, and the balloon tried to stick to it! As children we used to love that "hair-raising" experience, but what we didn't realize was that what we thought was "magic" actually was science.

WHERE'S THE SCIENCE?

Remember back to some of your science classes when your teachers were talking about ***atoms, nuclei, protons, electrons, and neutrons?*** Well these play a role in what happened with the balloon and hair.

Just as a refresher – everything is made up of atoms. An atom has a **nucleus**. The nucleus contains protons and neutrons and orbiting around the nucleus are electrons. ***Electrons*** have a negative charge ***(-)***.***Protons*** have a positive charge ***(+)*** and ***neutrons*** have no charge. Under normal conditions there is an equal number of ***protons (+)*** and ***electrons (-)*** giving the atom a neutral net charge. So let's revisit the balloon and hair and see what's happening. When you rub the balloon on your hair, some of the ***electrons (-)*** from your hair are transferred to the balloon. This causes the balloon to have more ***electrons (-)*** than ***protons (+)*** resulting in a negative charge. The hair now has more ***protons (+)*** than ***electrons (-)*** so it becomes positively charged. Thus your hair stands on end as if it is trying to stick to or is ***attracted*** to the balloon. The build-up of an electrical charge on an object is static electricity. It is

considered static since there is no current flowing as in AC/DC electricity.
Now think about your hair. What causes that to stand straight up? Well, things with the same net charge ***repel***. For example, two negatively charged objects will **repel** just as two positively charged objects will ***repel.*** Since your strands of hair are positively charged, they repel each other, thus causing them to "stand straight up". **NOTE**: Students who have had experiences with magnets may make connections to attract and repel.

MATERIALS

- Balloons
- Paper
- Styrofoam pieces
- Water source

PROCEDURE

1. Introduce the lesson by asking students what they think they know about electricity. Chart students' ideas and post in a visible place in the classroom.
2. Tell the students that today they are going to investigate electricity. They will work with partners and record the results of their investigation in their science notebooks. Instruct them to follow the next series of directions with their partner. Give them only one direction at a time, and then bring them back as a group to discuss their observations. Guide them to the next direction by asking what they think will happen. Posting these directions in the front of the room will avoid confusion or missing steps.

    1. Rub the balloon in your hair and see what happens when it is placed near a wall.
    2. Rub the balloon in your hair and see what happens when it is put near water flowing from the faucet.
    3. Rub the balloon in your hair and then see what happens when it is put near pieces of paper or Styrofoam pieces.

4. Rub two balloons in your hair and see what happens when they are put next to one another.

3. Instruct the students to return to the carpet or group area with their science notebooks when the investigation is complete. Discuss what they did and their results. Ask the students what they observed about each part of the investigation. Did the balloons behave differently when you changed the object it touched? Introduce the term **static electricity**. Relate static electricity to what they already know about electricity. Return back to the chart paper and record their ideas and further questions.

Additional Resources

KLVX Video streaming
National Science Teachers Association – *SciLinks*
www.mos.org/sln/toe/staticmenu.html
Site devoted to exploring static electricity.
www.sciencemadesimple.com/static.html
Informational site about static electricity.
Electrical Circuits ISBN (will input on Monday) Delta Science Readers
www.deltaeducation.com

Nevada State Science Standards

P5B4 Students know electrically charged particles can attract or repel other electrically charged material (e.g., static electricity). E/S
N5A1 Students know scientific progress is made by conducting careful investigations, recording data, and communicating the results in an accurate method. E/S
N5B3 Students know the benefits of working with a team and sharing findings. E/L