Static Electricity

Summary

Students work in cooperative groups and learn about static electricity through two experiments.

Time Frame

1 class periods of 45 minutes each

Group Size

Small Groups

Materials

For Each Group of 4 Students:

- 1 paper towel
- 1 piece of plastic wrap about 12 inches square
- different objects from the classroom such as: pins, glitter, erasers, paper clips, etc.
- paper to record observations

Background for Teachers

Static electricity exists when an object has lost or gained electrons. All matter is made of atoms. The nucleus of an atom contains protons, having a positive charge, and neutrons having no charge. Electrons, which have a negative charge, spin around the nucleus. Usually the protons and electrons are in balance; however, when an object loses some of its electrons, it is positively charged, and an object with extra electrons is negatively charged. Both objects now have static electricity. The electricity is at rest; it does not flow through the object as in current electricity.

Examples of static electricity can be found in our environment. In cold, dry areas, static electricity is more evident. If the area is humid, it is more difficult to observe or create static electricity. Some examples of static electricity are walking across a carpet and touching a doorknob, brushing hair so that it crackles or follows the brush, rubbing a hard rubber rod with fur, rubbing a glass rod with silk, rubbing a balloon on clothing, or static cling created by clothes tumbling in a dryer.

There is a science misconception that lightning is an example of static electricity. This is not true. Particles in clouds rub together and create static electricity in the clouds. Particles build up both positive and negative charges. When the charges jump to the ground or to another cloud, the energy is neutralized. The flash of lightning seen is an example of current electricity.

Intended Learning Outcomes

- Observe simple objects, patterns, and events and report their observations.
- Predict results of investigations based on prior data.
- Demonstrate a sense of curiosity about nature.
- Seek and weigh evidence before drawing conclusions.

Instructional Procedures

Experiment #1:

- Give each group a piece of plastic wrap, a paper towel, and a sheet to record observations.
- Lay the plastic wrap on a desk.
- Charge it by smoothing it flat and rubbing it with the paper towel.
- Lift the plastic wrap off the desk by one corner.
- What happens? What can you say about that? (It's attracted to the desk, then your arm. When

you rubbed the wrap with the paper towel, electrons were transferred leaving the plastic wrap with a charge. It was attracted to the desk and then your arm.)
Lay it back down on the desk and charge it again by rubbing it with the paper towel.
This time pick it up in the center, on opposite sides.
What happens? What an you say about this? (It looks like a tent or an upside down V. Since the surface has the same charge, and like charges repel, it is pushing away from itself.)

Experiment #2:

Now let's see how statically charged objects affect other objects.
Choose 4-5 small objects from your classroom such as pins, glitter, erasers, paper clips. Let students add a few more items if they would like.
Have each group make a record sheet, like a table, to record the name of the object, prediction of what will happen, actual observation, and make a space at the bottom for group conclusions and class conclusions.
Select which item will be tested first.
Discussing as a small group, students should decide on and record their predictions of what will happen when the charged plastic wrap is brought near the selected item.
Experiment to test their predictions by charging the plastic wrap again. Have two students take the plastic wrap on opposite ends, turn it over so the charged side is above the object, and hold it over the object. Lower it slowly until it's about 2-3 inches above the object.
What happens? Record it.
Select the next item to be tested and repeat the process. (This will allow use of prior knowledge to help with predictions.)
Once all objects have been tested, discuss observations as a small group and write some conclusions.
Why were some objects picked up and others weren't? Are there any other objects you'd like to try to test your theory?
Gather class attention back to whole group. Discuss what happened by having groups share their predictions, observations, and what generalizations and conclusions they made about the properties of static electricity.

Assessment Plan

Assess group record sheets in terms of the following questions.
Did they make and record observations?
Did they use prior knowledge to refine their predictions?
Did they draw appropriate conclusions and refine them?

Bibliography

Original lesson plan by Stevane Godina.

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