

TAKE CHARGE!

ALL ABOUT STATIC ELECTRICITY

Introduction:

Have a volunteer rub a balloon on a sweater or terry cloth towel and then hold the balloon close to his/her hair. Observe that his/her hair.

Why is this happening? (Answer: Electrons move from your hair to the balloon, causing each of the hairs to have the same positive charge. Since objects with the same charge repel each other, the hairs try to get as far from each other as possible. The farthest they can get is by standing up and away from the others.)

ELECTRIC CHARGE BASICS

Every atom is made of negatively-charged electrons surrounding a positively-charged nucleus. The nucleus contains protons, which are positively charged, and neutrons, which are neutral (they have no net electric charge). Electrons can move from one atom, molecule or material, to another. Most objects do not have an electric charge because there is a balance of electrons and protons in the material that makes up the object. In certain circumstances, there can be an imbalance of protons and electrons. An object with a greater number of electrons than protons is negatively charged. An object with more protons than electrons is positively charged.

Charging by Friction

When two materials are rubbed together, some electrons may be transferred from one material to the other, leaving them both with a net electric charge. The material that lost electrons becomes positively charged, while the material that gained electrons becomes negatively charged. Both insulators and conductors can gain a net charge in this way. This is how clothing gets charged in the clothes dryer, or our bodies get charged when we walk across a carpeted floor.





HANDS ON ACTIVITY: MAKE A LEVITATION DEVICE

- TARGET GRADES: 3 - 5
- OBSERVE: the interaction between a balloon and plastic bag and recognize an unseen force that exists between the two objects.
- STEPS: Cut a strip from the open end of the plastic bag. Set to one side. Inflate and tie off the balloon. Lay a strip of plastic on the table and rub it with the towel. Hold on to the balloon with one hand and rub the surface of the balloon with the towel. With the balloon still in one hand, pick up the strip of plastic and “float” it about one foot above the balloon. What it levitate
- EXPLAIN THE MAGIC: When two different materials rub against each other, they become electrically charged. One becomes positive, and the other becomes negative. Opposite charges attract and like charges repel. This happened between the balloon and the towel and also between the plastic and the towel, leaving the balloon and the plastic with the same charge and causing them to repel each other.



HANDS ON ACTIVITY: A VAN DE GRAAF GENERATOR

- A Van de Graaff generator produces a static electric charge by rubbing two materials together (for example, a rubber belt and felt or metal). This is the same concept as shoes on a carpet, but the charge produced can be much greater.
- See what happens when you place your hand on the dome before it is turned on, and you are standing on a rubber pad. The rubber pad provides insulation so that the charge from the generator does not travel through your body into the ground.
- When the Van de Graaff generator starts charging, it transfers the charge to the person who is touching it. Since the person's hair follicles are getting charged to the same potential, they try to repel each other. This is why the hair actually stands up.