

Dangers of Static Electricity

Static charge can be more than just a nuisance. Sometimes static charge can be dangerous to both people and equipment. Trucks that deliver fuel to your local gas station or that refuel airplanes must get rid of all static charge before they begin pumping the fuel (Figure 7.7). A spark caused by a build-up of static charge could cause an explosion. To prevent this, a cable is attached to the objects before any fuel is pumped. The cable is a conductor, and it transfers any excess static charge to the ground. Allowing charge to flow into Earth's surface is called **grounding**. Earth is so large it can accept charges without becoming charged itself.

To protect a building from lightning, a lightning rod is placed on top of the building (Figure 7.8). If lightning occurs near the building, the large amount of charge will pass through the lightning rod to the ground rather than onto the building.

Figure 7.7 As a fuel truck drives down the highway or an airplane lands on a runway, it can become charged. The excess charge has no way of escaping because it cannot move through the rubber tires. A small spark near the fuel could cause a huge explosion. Therefore, the fuel hose includes a grounding cable to prevent sparking.



Figure 7.8 A lightning rod carries the electric charge from a lightning bolt safely to the ground.

Reading Check

1. In terms of the motion of electrons, what is the difference between an insulator and a conductor?
2. Explain how an object that is made up of millions of electrons and protons can still be neutral.
3. What is the purpose of the Van de Graaff generator?
4. What are four uses of static electricity?
5. What is grounding?
6. Why do fuel trucks and airplanes need to be grounded before pumping fuel?

Explore More

Air is normally an insulator. Under certain conditions, it will become a conductor. This type of conductor is called plasma. To learn more about plasma, go to www.bcsience9.ca.

7-1C Charging Insulators and Conductors

Find out ACTIVITY

If a static charge is created on an insulator, that charge tends to remain held very nearly in one place and cannot move very far. When there are extra electrons in one location on a conductor, the charge travels throughout the conductor. In this activity, you will investigate how to produce static charge using various materials.

Safety

- Never eat anything in the science room.

Materials

- puffed rice cereal
- various solid materials such as plastic straw, comb, plastic ruler, acetate strip, vinyl strip, glass rod, aluminum strip, iron strip, brass strip
- various soft materials such as wool, paper towel, plastic wrap, fur

What to Do

1. Create a table like the sample table below to record your observations. Substitute the names of the materials your teacher has supplied for the examples shown here.

Solid Material	Soft Material	Number of Puffed Rice Grains Attracted
Plastic straw	Paper towel Wool Nylon cloth	
Glass rod	Paper towel Wool Nylon cloth	
Aluminum strip	Paper towel Wool Nylon cloth	

2. Place a handful of puffed rice cereal in a pile on your desk.
3. Select one of your solid materials. Use one of your soft materials to rub one end of the solid object 10 times. Bring the end that you rubbed in contact with the puffed rice cereal. Slowly lift the object and count how many pieces of cereal stuck to the object. Record this value in your data table.
4. Remove the cereal from the object and return this cereal to your original pile of cereal.
5. Before rubbing this same object with the next soft material, wipe the surface of the object with your bare hand.
6. Repeat steps 3 to 5 until you have completed your data table. Be sure to rub each material in a similar way.
7. Clean up and put away the equipment you have used.

What Did You Find Out?

1. Which combination of objects attracted the most puffed rice?
2. Why do you think it is important to rub each material in a similar way?
3. What was the purpose of wiping the object with your bare hand before performing the next test?
4. List the solid materials that you think are conductors. What observations did you use in your decision?
5. List the solid materials that you think are insulators. What observations did you use in your decision?