



Static Electricity: Snap, Crackle, Jump

Background Reading

Atoms are the tiny particles that make up all matter. Atoms that contain the same number of positively charged protons in their nucleus as negatively charged electrons surrounding their nucleus are said to be electrically neutral. The atoms in some substances tend to give off electrons more readily, while atoms in other substances tend to hold on to what they have and accept even more. When two substances with differing tendencies rub against each other, one loses electrons (and becomes positively charged), while the other gains surplus electrons (and becomes negatively charged). The build-up of charges on the surface of an object is called static electricity.

Objects with the same charge repel one another, while objects with opposite charges attract one another. Charged objects can also attract neutral objects through a process called polarization. When a negatively charged object, for example, is brought near a neutral one, protons in the neutral object move closer to the negatively charged object, and electrons move as far away as possible. This doesn't change the neutrality of the object since no electrons actually leave the object, but it does create a situation in which attractive forces between the two objects are, for the time being at least, stronger than repelling ones.

When rubbed with a wool scarf, the surface of a vinyl record picks up extra electrons from the scarf. If the charged record is placed over puffy rice cereal, the electrically neutral cereal pieces become polarized. Because opposite charges attract, the negatively charged record lifts the positively charged ends of the cereal pieces.

You can neutralize a charged object by touching it with an oppositely charged object or a neutral one. A spark commonly flies on contact upon the discharge of static electricity. Alternately, the charge will eventually wear off on its own. As electrons pass from one object to the other, both objects will take on the same charge, and we know what happens when similarly charged objects meet: They repel one another.

There is nothing special about the vinyl record and wool scarf used in this example. Rub a glass rod with silk or cotton, or pull a plastic comb through your hair: The glass and the comb will collect extra electrons and become negatively charged, while the fabric pieces and the hair will lose electrons and become positively charged. Regular balloons also have a very strong tendency to gain electrons and become negatively charged and are useful for demonstrating the phenomenon.

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