

PhyzGuide: Conductoro y Insulatora

THE FUNDAMENTALS OF ELECTRIC CHARGE

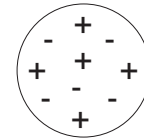
Electric charge is a basic characteristic of several subatomic particles. The most common charged particles are positively charged protons and negatively charged electrons.

Although atoms are made up of these charged particles, they are usually electrically neutral because they contain as many electrons as protons.

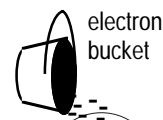
Objects are usually neutral because they are made up of molecules (which are electrically neutral). An object becomes charged if it gains or loses electrons. If it gains electrons, it has a net negative charge. If it loses electrons, it has a net positive charge. *Remember, only electrons move in the charging process*—protons are very massive and are fixed in the nuclei of atoms.

A common way of getting a net charge on an object is by surface to surface contact. Glass rubbed with silk gains a positive charge. Rubber rubbed with wool gains a negative charge. *An important point about electric charge is that under normal circumstances, it cannot be created or destroyed.* So when glass is rubbed with silk, the silk gains as much negative charge as the glass gains positive charge.

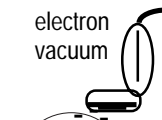
Electrons move when certain objects are rubbed because certain atoms and molecules bind electrons more tightly than others. For instance, electrons are bound more tightly in the molecules of silk than those of glass.



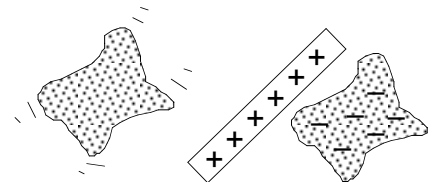
Objects are made of charged particles, but are usually electrically neutral



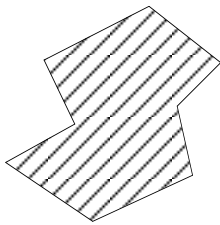
Adding electrons results in a negative charge



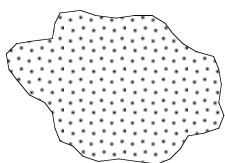
Removing electrons results in a positive charge



Electrons jump from the glass to the silk.
NOTE: Only electrons (negative charge) move—protons do not move



Conductors are represented by diagonal lines



Insulators are represented by random dots

CONDUCTORS AND INSULATORS

Substances that allow electric charge to move freely about within them are **conductors**. Metals are good conductors because the outer (valence) electrons of metal atoms are not anchored to their corresponding nuclei. The electrons are free to roam throughout the substance. When excess charge is placed on a conductor, it rapidly spreads out over the surface of the object. A charged conductor is easily discharged by contact with another conducting object.

Insulators do not allow the rapid movement of charges. Most electrons are bound to specific nuclei in insulators; they are not free to move about. When charge is added to an insulator, it “seeps” into the insulator. A charged insulator holds onto its excess charge, and is not easily discharged by contact with other objects.