

## Section 1 Electric Charge

- A. Protons have positive electric charge; electrons have negative electric charge.
1. In most atoms, the charges of the protons and electrons cancel each other out and the atom has no net charge.
  2. Atoms become charged by gaining or losing electrons.
  3. **Static electricity**—the accumulation of excess electric charges on an object
- B. Electrically charged objects obey the following rules:
1. **Law of conservation of charge**—charge may be transferred from object to object, but it cannot be created or destroyed
  2. Opposite charges attract, and like charges repel.
  3. Charges can act on each other even at a distance, because any charge that is placed in an **electric field** will be pushed or pulled by the field.
  4. Electrons move more easily through **conductors**, like metals.
  5. Electrons do not move easily through **insulators**, such as plastic, wood, rubber, and glass.
- C. Transferring electric charge
1. Charging by contact
    - a. The process of transferring charge by touching or rubbing
    - b. Example: static electricity from your feet rubbing the carpet



2. Charging by induction

- a. The rearrangement of electrons on a neutral object caused by a nearby charged object
- b. Example: a negatively charged balloon near your sleeve causes an area of your sleeve to become positively charged

3. Static discharge

- a. A transfer of charge through the air between two objects because of a buildup of static electricity
- b. Example: lightning

4. **Grounding**—using a conductor to direct an electric charge into the ground

D. The presence of electric charges can be detected by an electroscope.

**Discussion Question**

**What do you think happens when you get static electricity in your hair?**

Usually this happens after your hair rubs against something like a sweater or a hairbrush. Some electrons from your hair move to the sweater or hairbrush, causing the sweater or hairbrush to have a negative charge, and your hair to have a positive charge. Your hair will be attracted to the sweater or hairbrush. Strands of hair that are positively charged also might repel one another and lift straight up in the air.