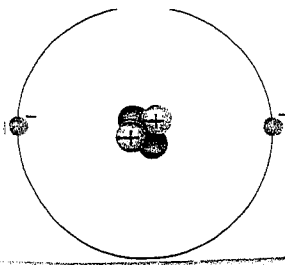


Figure 32.2 ▲

Model of a helium atom. The helium nucleus is composed of two protons and two neutrons. The positively charged protons attract two negative electrons.



Name: _____

Electrostatics Guided Notes

Electrostatics: the study of electricity or electric charges at _____. Electrostatics involve 3 aspects: 1. Electric charges, 2. _____, 3. The charge's behavior in different materials.

Electrical force: a force that one electrical charge _____ on another.

Like charges: _____

Opposite charges: _____

This is a fundamental rule of all electrical phenomena!!!

A charge is attributed to attraction and repulsion. Protons are _____ charged and _____ are negatively charged particles in an atom.

Atomic info:

Every atom has a positively charged center called a nucleus surrounded by negatively charged particles called electrons. All electrons are the same; same mass and charge. The nucleus has protons and neutrons which are 2,000 times more _____ than electrons.

Neutrons have _____! In an atom, the number of _____ equals the number of _____. This is known as the conservation of charge. Now atoms can gain or lose e^- and when this happens, they are known as _____. Under normal circumstances, sodium has 11 protons and 11 electrons. A positive Na^+ ion has _____ protons and _____ electrons. A nitrogen atom has 7 protons and 7 electrons. A negative N^{3-} ion has _____ protons and _____ electrons. These atoms can become electrically charged because the valence electrons (outermost electrons) are easier to displace.

Coulomb's Law: the force of attraction or repulsion acting along a straight line between two electric charges is directly proportional to the product of the charges and inversely to the square of the distance between them.

More simply put:

-As distance increases between charges, there is a decrease in electrical force. (Inverse relationship)

-Increase the quantity of charge, increase electrical force between charges. (Direct relationship)
Think, Newton's Law of Universal Gravitation; as mass increases between two objects there is a stronger attraction between them. As distance between two objects increases, the gravitational force is weaker.

How will the force of an electron attracted to another charge change if it is moved twice as far away?

Conductors and Insulators: Electrons have the ability to _____ and move differently in different materials. Conductors allow electrons to move and are typically _____. Insulators like to hold onto their electrons so current doesn't flow through them. Glass and _____ are some examples of insulators.

Semiconductors: conduct electric current under some conditions but not others. They are commonly used in _____ with _____ being the most notable semiconductor. Fluctuations in temperature or crystal impurities mean that semiconductors have a conductivity level between insulators and conductors. When several layers of semiconductors are compacted together, a _____ is created.

Superconductor: A material that has almost no resistance to electron flow at very low temperatures.

3 ways to electrically charge an object:

1. Friction: Electrons are transferred by friction from one object to another. Example: Scuffing feet on carpet and touching a _____ object. Running a comb through your hair.
2. Contact: Electrons are transferred from one object to another by making _____ contact. (touch, but not rubbing) Example: A charged rod making contact with a _____ piece of metal.
3. Induction: Electrons are forced to either gather or disperse due to the presence of a nearby charge. NO _____ is made between objects! Example: A charged rod being held close to a _____ object. Think Ben Franklin flying a kite in a thunderstorm. This is also why we have lightning rods on buildings.

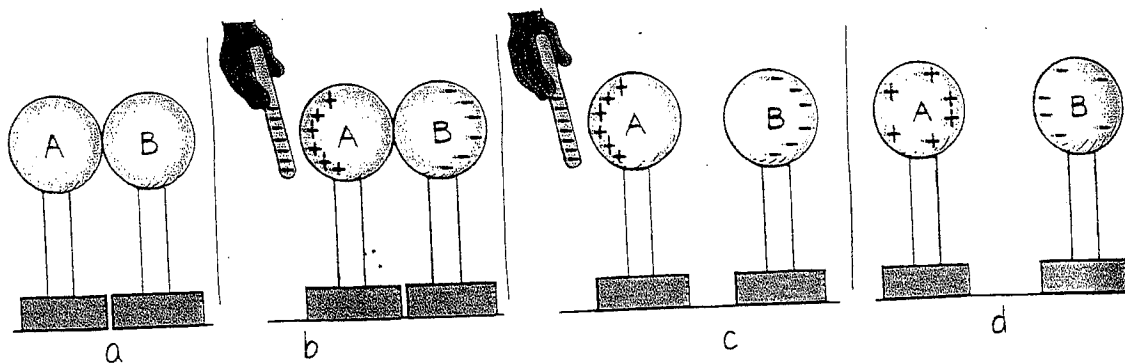


Figure 32.8 ▲
Charging by induction.

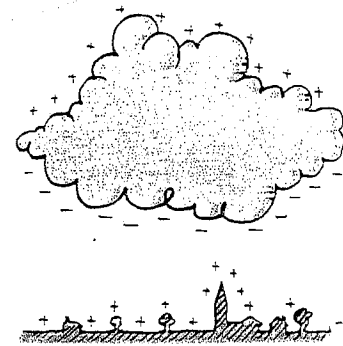


Figure 32.10 ▲
The bottom of the negatively charged cloud induces a positive charge at the surface of the ground below.

Charge Polarization: Alignment of charges between objects. Remember opposites _____ and like charges _____.

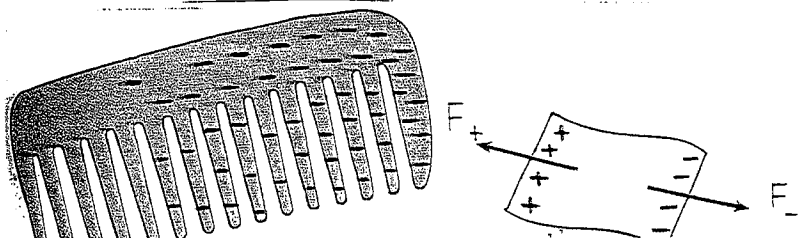


Figure 32.13 ▲
The negatively charged balloon polarizes molecules in the wooden wall and creates a positively charged surface, so the balloon sticks to the wall.

