

PROPERTIES OF ELECTRIC CHARGE

Observation: Like charges Repel & Unlike Charges Attract

Ben Franklin set convention that glass rod contains positive charge, \therefore plastic rod contains negative charge.

Electric Charge is an intrinsic property of protons and electrons, like mass. **SI Unit:** Coulomb (C)

$e = 1.60 \times 10^{-19} \text{ C} =$ magnitude of the charge on a proton or an electron (smallest amount of free charge yet discovered)

	Charge	Mass
Electron	$-1.60 \times 10^{-19} \text{ C}$	$9.11 \times 10^{-31} \text{ kg}$
Proton	$+1.60 \times 10^{-19} \text{ C}$	$1.673 \times 10^{-27} \text{ kg}$
Neutron	0 C	$1.675 \times 10^{-27} \text{ kg}$

Electrical Charge, q , is **Quantized**: $q = Ne$, where N is an integer.

Conservation of Electrical Charge

During any process, the net electric charge of an isolated system remains constant (is conserved).

Insulators: Materials in which electric charges do not move freely.

Conductors: Materials in which electric charges move freely.

Induction in an Insulator

Electric force causes *slight separation of positive and negative charges in the molecules of the insulating material* (No charge transfer occurs and no net charge produced by induction of an insulator.) (e.g. Static cling)

METHODS OF CHARGING

Charging by Rubbing / Contact

When two unlike materials are rubbed together and a separation of charge occurs. (e.g. Rubbing black plastic rod against animal fur, results in electrons from atoms of the fur being transferred to the rod, leaving *plastic rod negatively* charged and *fur positively* charged.)

Charging by Induction

The process of giving one object a net electric charge without touching the object to a second charged object (CONDUCTORS ONLY!).