

There are 2 types of charge : positive + , negative -

Opposite charges attract , like charges repel , charged and neutral attract
 + / - + / + - / -

Atom - electrons : $m = 9.1 \times 10^{-31} \text{ kg}$, negative charge

- protons : $m = 1.67 \times 10^{-27} \text{ kg}$, positive charge

- neutron : $m = 1.67 \times 10^{-27} \text{ kg}$, neutral

- All electric charges are a result of an excess or deficit of electrons. (gained or lost electrons)

Conductor: electrons can move freely : copper, silver, gold

Insulator : electrons don't move easily : rubber, wood

- Millikan discovered that the charge on an electron is:

$$e = 1.6 \times 10^{-19} \text{ C}$$

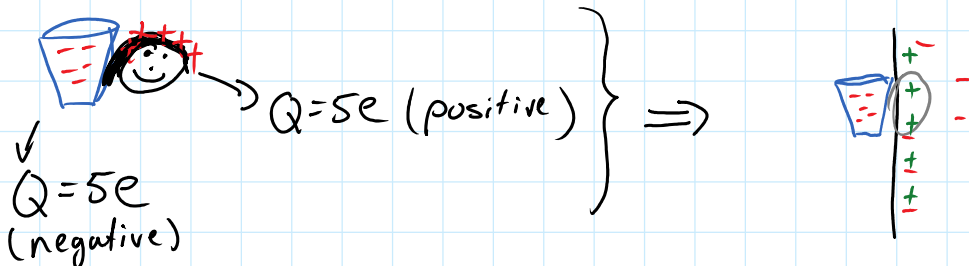
↑ Coulomb (a unit of charge)

} elementary charge

this is also the charge on a proton

The total charge on an object is $Q = ne$

total charge ↑ # of extra / lost electrons



$$Q = ne$$

ex: Calculate the charge on a styrofoam cup that has 5×10^{10} excess electrons.

$$Q = (5 \times 10^{10})(1.6 \times 10^{-19} \text{ C}) = 8.0 \times 10^{-9} \text{ C}$$

ex: How many electrons have been transferred if an object has a positive charge of $7.5 \times 10^{-6} \text{ C}$

$$Q = ne$$

$$\frac{7.5 \times 10^{-6} \text{ C}}{1.6 \times 10^{-19}} = n \left(\frac{1.6 \times 10^{-19} \text{ C}}{1.6 \times 10^{-19} \text{ C}} \right)$$

$$n = 4.69 \times 10^{13} \text{ electrons}$$