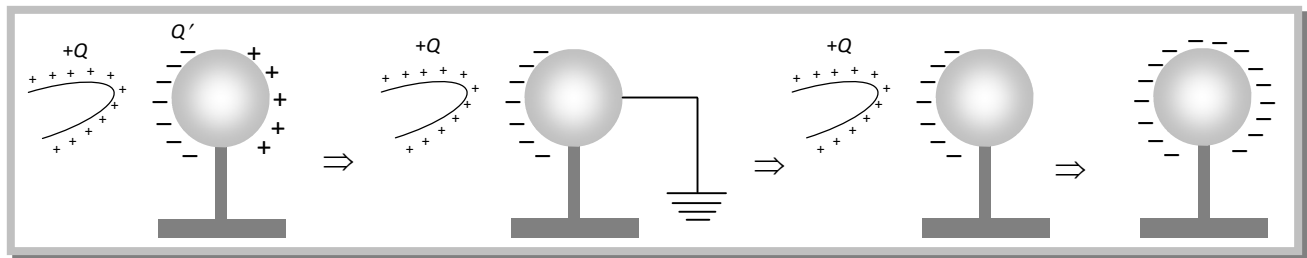


Methods of Charging.

A body can be charged by following methods:

(1) **By friction:** In friction when two bodies are rubbed together, electrons are transferred from one body to the other. As a result of this one body becomes positively charged while the other negatively charged, e.g., when a glass rod is rubbed with silk, the rod becomes positively charged while the silk negatively. However, ebonite on rubbing with wool becomes negatively charged making the wool positively charged. Clouds also become charged by friction. In charging by friction in accordance with conservation of charge, both positive and negative charges in equal amounts appear simultaneously due to transfer of electrons from one body to the other.

(2) **By electrostatic induction:** If a charged body is brought near an uncharged body, the charged body will attract opposite charge and repel similar charge present in the uncharged body. As a result of this one side of neutral body (closer to charged body) becomes oppositely charged while the other is similarly charged. This process is called electrostatic induction.



Note: Inducing body neither gains nor loses charge.

Induced charge can be lesser or equal to inducing charge (but never greater) and its maximum value is

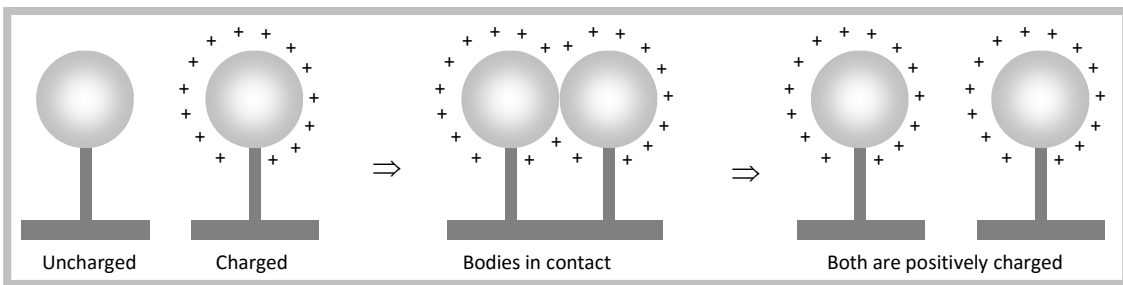
given by $Q' = -Q \left[1 - \frac{1}{K} \right]$ where Q is the inducing charge and K is the dielectric constant of the material of the uncharged body. Dielectric constant of different media are shown below

Medium	K
Vacuum / air	1
Water	80
Mica	6
Glass	5-10
Metal	∞

Dielectric constant of an insulator cannot be ∞

For metals in electrostatics $K = \infty$ and so $Q' = -Q$; i.e. in metals induced charge is equal and opposite to inducing charge.

(3) **Charging by conduction:** Take two conductors, one charged and other uncharged. Bring the conductors in contact with each other. The charge (whether $-ve$ or $+ve$) under its own repulsion will spread over both the conductors. Thus the conductors will be charged with the same sign. This is called as charging by conduction (through contact).



Note: A truck carrying explosives has a metal chain touching the ground, to conduct away the charge produced by friction.