Electric Dipole and Continuous Charge Distribution

Saturday, June 10, 2023 10:18 AM

Continous charge distribution :-

(1). Linear charge density (λ) :- The linear charge density is defined as the amount of charge present over a unit length of the conductor.

Symbol : λ

unit : C/m

Formula : $\lambda = \frac{Q}{l}$

(2). Surface charge density (σ) :- The surface charge density is defined as the amount of charge present over a unit area of the conductor.

Symbol : σ

unit : C/m^2

Formula : $\sigma = \frac{Q}{A}$

(3). Volume charge density (ρ) :- The volume charge density is defined as the amount of charge present over a unit volume of the conductor.

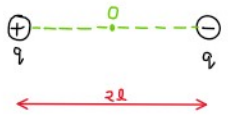
Symbol : ρ

unit : C/m^3

Formula : $\rho = \frac{Q}{V}$

Electric Dipole :-

Two point charges of equal magnitude and opposite in sign seperated by small distance ($2l$) form an electric dipole.



e.g. HCl , H_2O , N_2O etc. molecules.

> Note :-
> The total charge of electric dipole is zero . That does not mean electric field at any point is zero.

Electric Dipole Moment :-

The strength of an electric dipole is measured by its dipole moment and it is equal to the

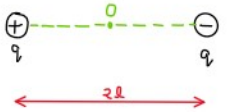
Electric Dipole Moment :

The strength of an electric dipole is measured by its dipole moment and it is equal to the product of the magnitude of either charges and the distance between them.

It is a vector quantity denoted by $\vec{p}$.

Mathematically : $|\vec{P}| =$ Magnitude of either charges $\times$ distance between them

$$|\vec{P}| = q(2l)$$



S.I. unit : C-m (Vector quantity)

Direction : Direction is from negative charge (-q) to positive charge (+q).