

D II Physics Notes (Paper II)

D. S. Sanjeet Kumar, Asst. Prof., Dept. of Physics,
H.O. J.C., V.V.S.U., Anaparthi, India.

Electrostatics

Clausius Mossotti Equation: Clausius and Mossotti tried to correlate the macroscopic properties of a dielectric with its microscopic character. They established a relation between the dielectric constant (a macroscopic parameter) and the molecular polarisability (a microscopic parameter) of a non-polar dielectric. This relation is known as 'Clausius-Mossotti Equation'.

The polarisability α of a molecule is the dipole moment p induced in the molecule per unit polarising (local) field. That is

$$p = \alpha E_{\text{local}}$$

If there are n molecules per unit volume of the dielectric,

then the polarisation P is given by

$$P = n p = n \alpha E_{\text{local}}$$

As we know that

$$E_{\text{local}} = E + \frac{P}{3\epsilon_0}, \text{ where}$$

E is the macroscopic field within the dielectric

$$\therefore P = n \alpha \left(E + \frac{P}{3\epsilon_0} \right)$$

Now, the polarisation P is related to the dielectric constant K by the equation,

$$P = (K-1) \epsilon_0 E. \text{ Then we have}$$