DILECTRIC POLARISATION

When a dielectric substance is placed in an electric field , the centres of positive and negative charges of each atom or molecule are displaced from their mean positions in opposite directions Thus an electrical doublet or dipole is produced and the dielectric molecules is said to be polarised .

Polarisation (P) : Dipole moment per unit volume is called

Dielectric polarisation Polarisation : $P = \mu / V$

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Dipole moment : $\mu = qr$

Polarizability (α) : Induced dipole moment per unit electric field .

$$\alpha = \mu_{ind} / E$$

Total polarizability is given by

$$\alpha = \alpha_e + \alpha_a + \alpha_d$$

α_e = Electronic polarizability

α_a = Atomic polarizability

α_d = Dipolar polarizability

CLAUSIUS – MOSOTTI RELATION

A relation between dielectric constant (macroscopic parameter) of a non dielectric was given by Clausius and Mosotti and was named as ‘ Clausius – Mosotti relation ‘ .

The dielectric polarisation P is given by

$$P = P_e + P_a + P_d \qquad (1)$$

Where the subscripts e , a and d refer , respectively , to electronic , atomic and dipolar polarisation .

On the basis we can classify the dielectrics into three ways :

The eq(1) may be written as

$$P = N (\alpha_e + \alpha_a + \alpha_d)E$$

Where $\alpha_d = \mu^2 / 3KT$

N = Number of atoms per unit volume

μ = Permanent dipole moment