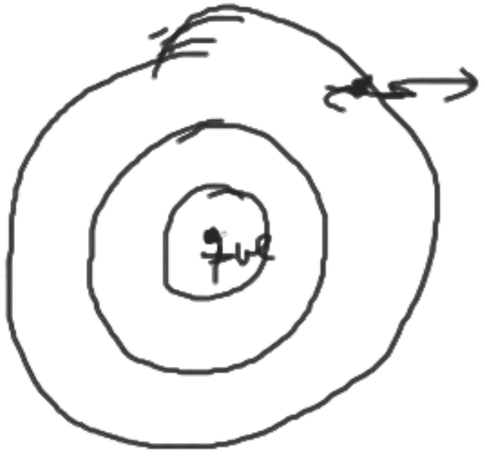
BPT-401

Date - 16/03/2021

Dielectrics material :



Dipole moment ⇒

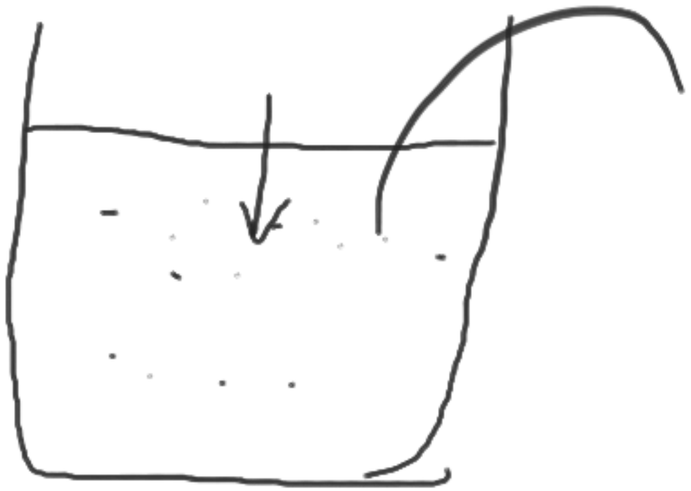
$\vec{H}\,\vec{Cl}_{+\delta}$

$= H - Cl - \delta$ ⇒ Permanent dipole moment

10^{-9} m

d ~ nm

+q −q



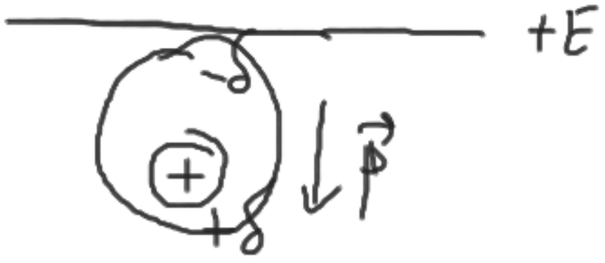
Polar dielectrics ✓

non-polar dielectrics ✓

Non. polar molecule

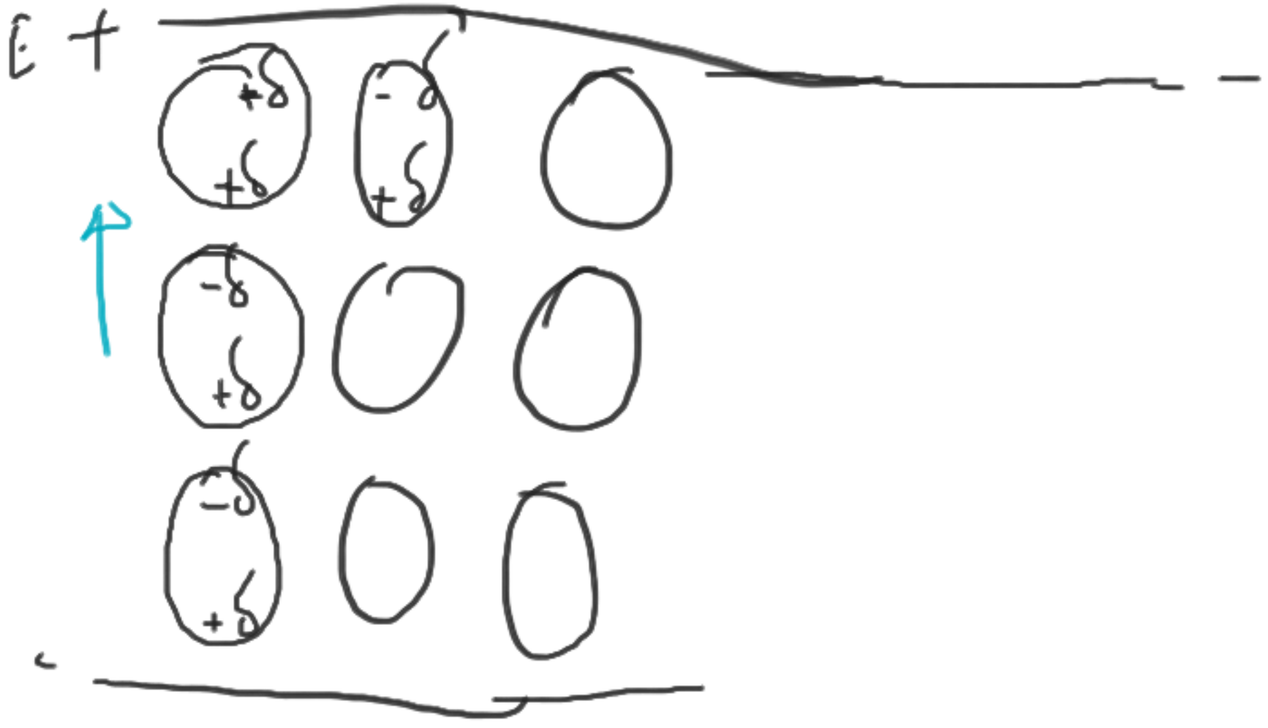
e^-

⇒



Induced dipole moment

$\vec{P}$



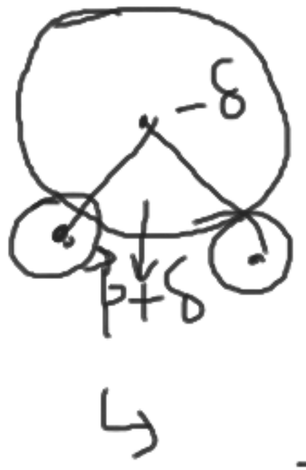
Polar molecule

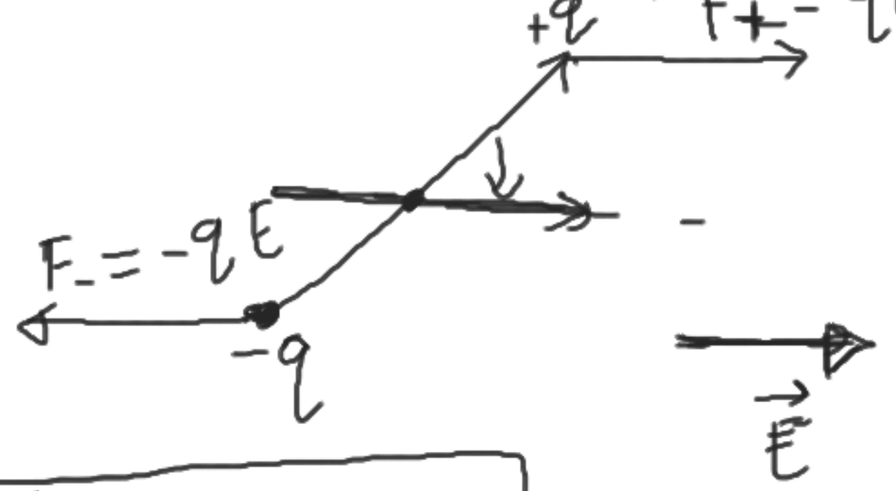
HCl, H_2O permanent dipole moment exists

Uniform, non-uniform

$\vec{E} = \frac{\vec{F}}{q}$

$\vec{F} = q\vec{E}$

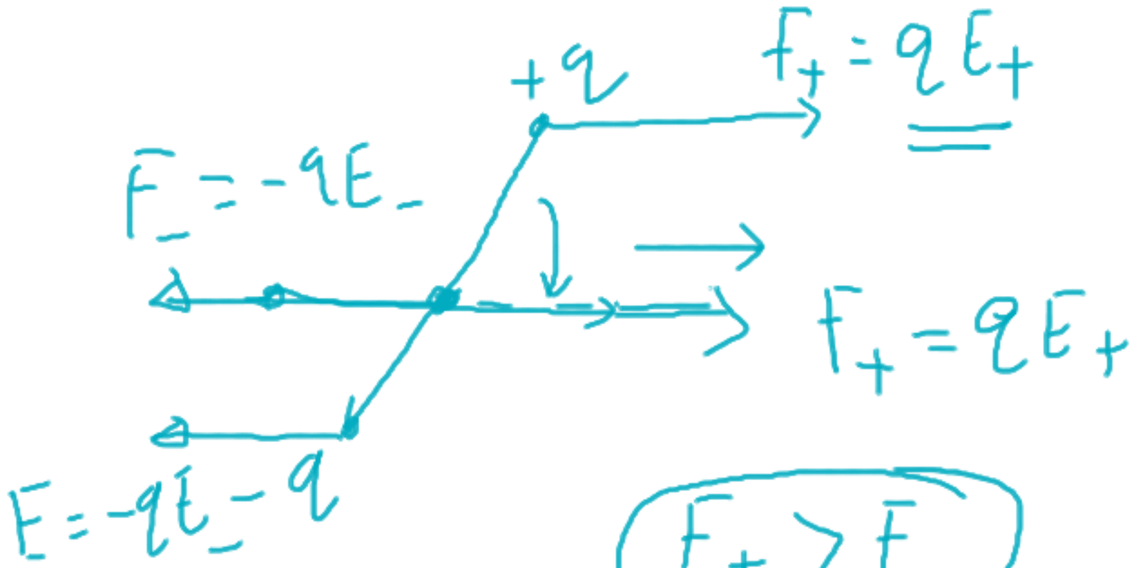




$\vec{N} = \vec{P} \times \vec{E}$

Case non-uniform electric field :

$E_+ > E_-$



$F_+ > F_-$

✓ Dielectrophoresis

✓ Net force on the dipole

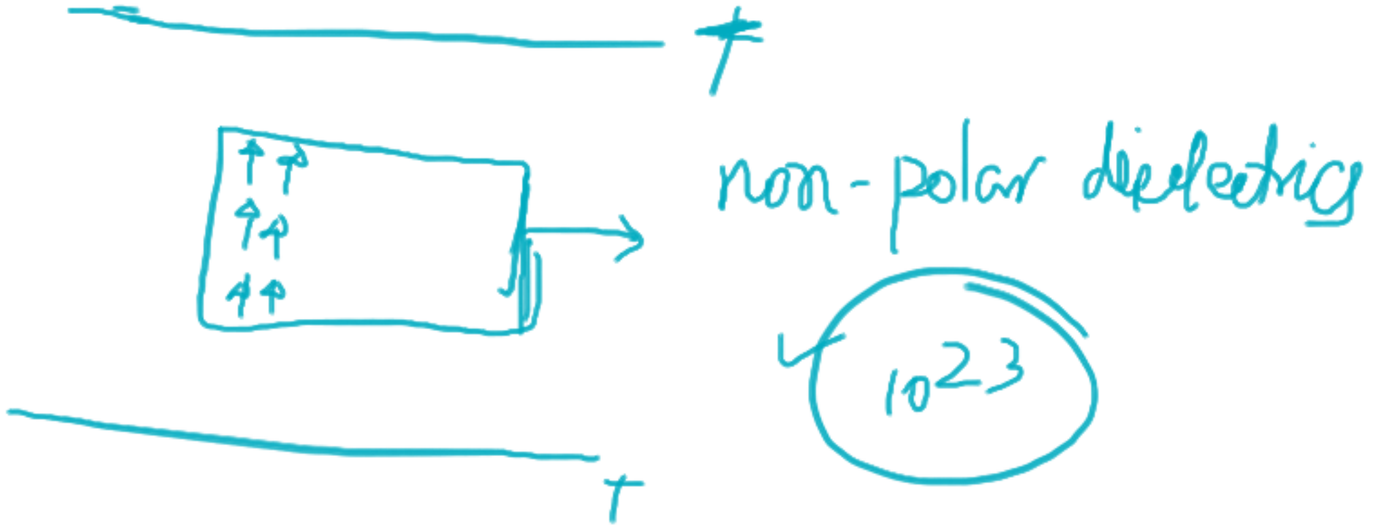
$$\vec{F} = \vec{F}_+ - \vec{F}_- = q(E_+ - E_-) = q\Delta\vec{E}$$

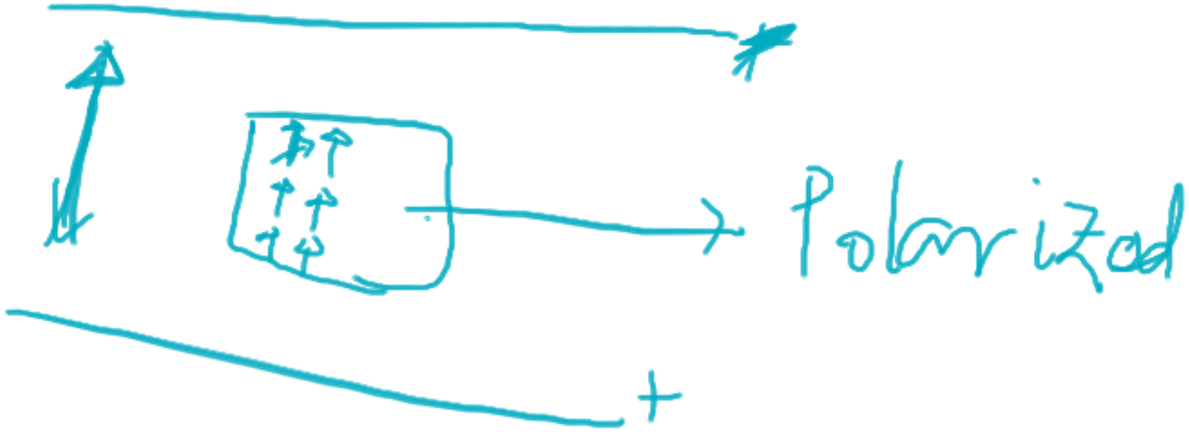
$\Delta E_x = \bar{\nabla} E_x \cdot d$, E_y & E_z

$$\Delta \bar{E} = (\bar{d} \cdot \bar{\nabla}) \bar{E}$$

$$\vec{F} = (\vec{P} \cdot \vec{\nabla}) \vec{E}$$

Polarization :





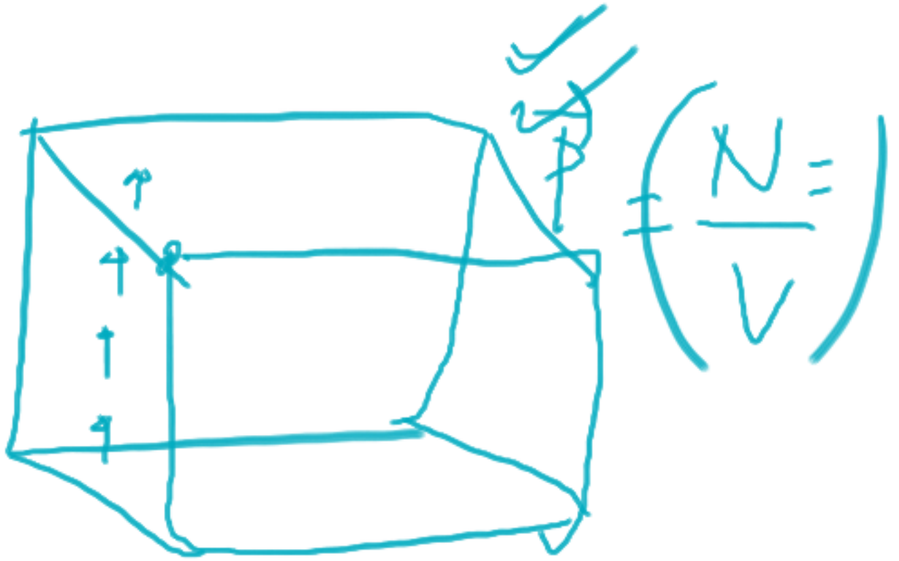
dipole moment $\vec{p}$

10^{23}

Polarisation

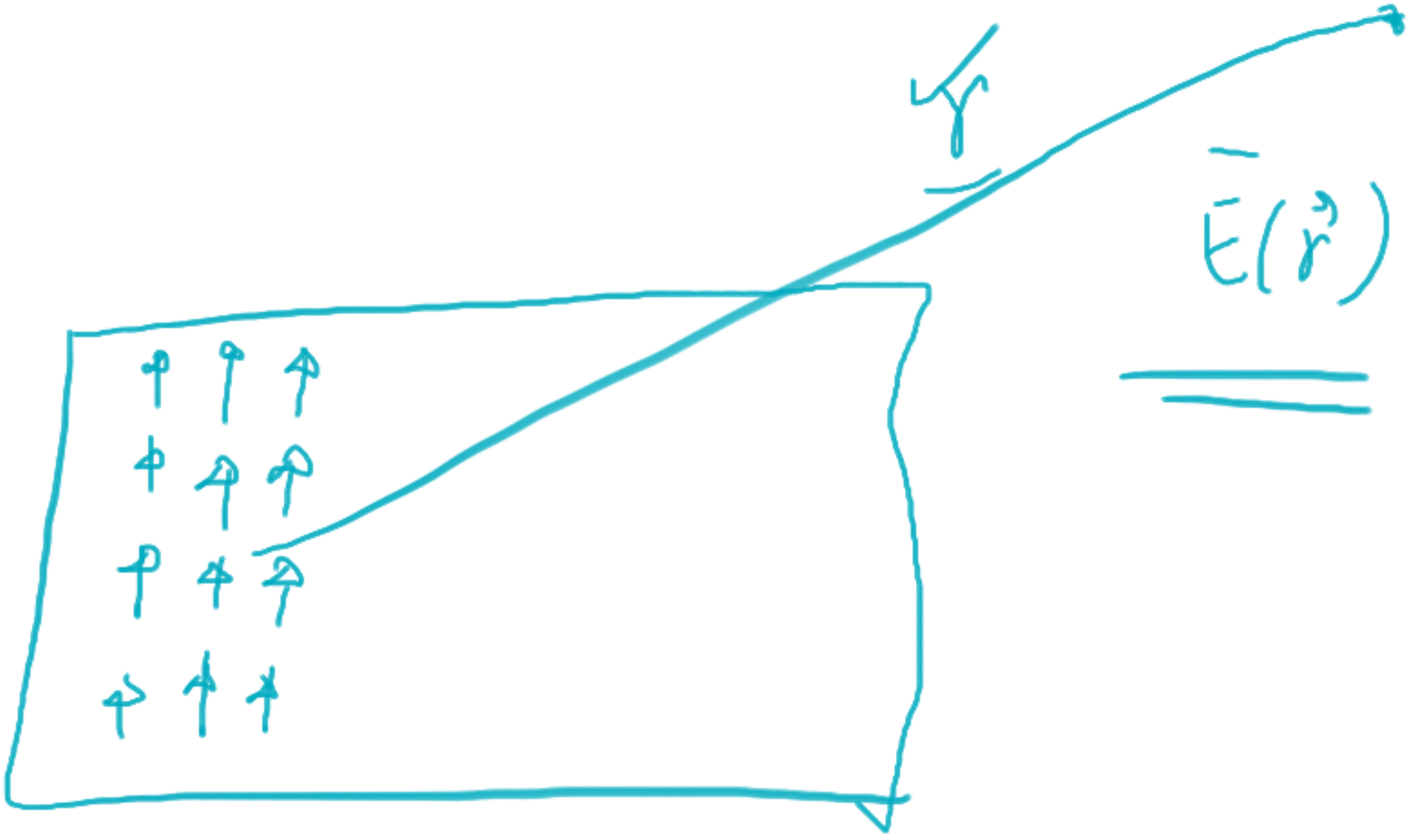
$\vec{P}$ = number of dipole moment per unit volume

V



$\left(\frac{N}{V}\right)$

$V(\vec{r})$, $\vec{E}(\vec{r})$



$\vec{E}(\vec{r})$