Types of polarization

Some of the important polarizations are as under–

(i) **Electronic polarization**

Here when the external field is applied, the electron clouds of atom are displaced with respect to the heavy nuclei within the dimensions of atom. This is called electronic polarization. It does not depend upon temperature.

\[ \vec{P}_e = N \alpha_e \vec{E} \]

(ii) **Ionic polarization**

It occurs only in some ionic crystals. In the presence of external electric field the positive and negative ions are displaced up to the point where ionic bonding force stop this displacement. Hence dipoles gets induced. There also do not depend upon temperature.

(iii) **Orientational polarization**

It applies only in polar dielectric materials. Generally, in absence of external electric field electric dipoles are so oriented randomly that their net effect becomes zero but in presence of electric field, these dipole try to rotate and align in the direction of electric field. This is known as orientation polarization which is dependent over temperature also.

The total polarization in the sum of all there effects as

\[ \vec{P} = \vec{P}_e + \vec{P}_s + \vec{P}_0 \]