What is permittivity? | Relative permittivity

It is the property of any material that measures the opposition provided to the formation of an electric field. It is denoted by the Greek letter ϵ. It indicates the amount of charge required to produce a unit of electrical flux in a given medium.

Formula of permittivity

Mathematically

$$\text{Permittivity} = \frac{Electric\ Displacement}{Electric\ Field\ Intensity}$$

Permittivity equation

It can depend on the frequency, magnitude, and direction of the applied field. The SI unit for permittivity is farad per meter (F/m).

Types of permittivity

There are two types of permittivity.

1: Vacuum Permittivity

The vacuum characterizes the smallest possible value of the allowable degree. It also appears in the Coulomb force constant. Permittivity is taken from the word permeation. It means how much permeation is given by the medium to force to pass through it. But actually, permittivity means

> **How much does medium allow its own field to reduce the coulomb's forces**

If the medium has more permittivity it will less allow the coulomb's force to pass through it.

The permittivity of free space is minimum so the maximum coulomb's force will pass through it.

This is often referred to as the free space permittivity or the electrical constant. The symbol is ϵ_0 and has a value of 8.85 10^{-12} Farads/meter. Opposition to the formation of electric field lines is also evident in the dielectric.

2: Relative Permittivity

The linear permittivity factor of homogeneous material is often given relative to the free space permittivity, as a relative permitting factor r (also known as the dielectric constant, although this term is obsolete, and sometimes only refers to a relatively static permittivity at zero frequency).

The real allowable yield is then calculated by multiplying the relative allowable by ε_0.

The ratio between the permittivity of medium and space is called relative permittivity.

$$\varepsilon_r = \frac{\varepsilon m}{\varepsilon o}$$

The permittivity of free space is minimum as compared to any medium