Coulombs law in C.G.S. system

In C.G.S. system $K = \frac{1}{K}$ where K is dielectric constant of a medium.

Hence, Coulombs law in a medium C.G.S. system

$$f = K \frac{q_1 q_2}{r^2}$$

$$f_m = \frac{1}{K} \frac{q_1 q_2}{r^2} \quad \text{---} (7)$$

For air (i.e free space) $K = 1$

$$f_a = \frac{q_1 q_2}{r^2} \quad \text{---} (8)$$

Dividing eqn (8) by eqn (7) we get,

$$\boxed{\frac{f_a}{f_m} = K} \quad \text{---} (9)$$

Thus dielectric constant of a medium is defined as the ratio of electrostatics force between two point charge separated by a certain distance in air to the electrostatics force between the same two charge separated by the same distance in the medium.

* Relative permitivity of a medium is equal
the dielectric constant of the medium i.e
$\epsilon_R = K$ $\epsilon = \epsilon_0 \epsilon_R$
$= \epsilon_0 K$

Q) Two point charge each of 1C seperated b
1m distance experience a force 9×10^9 N. How
much force is experienced by them if the
immersed in water keeping the distance o
seperation between them, dielectric consta
of water is 80.

Sol- $K = \frac{f_a}{f_m}$

$f_m = \frac{f}{K}$

$= \frac{9 \times 10^9}{80}$

$= 1.125 \times 10^9$ N Ans

Q) What is the force between two small charg
sphere having charge of 2×10^{-7} C and 3×1
placed 30 cm in air.

Sol- $q_1 = 2 \times 10^{-7}$ C

$q_2 = 3 \times 10^{-7}$ C

$r = 30$ cm $= 0.3$ m