

**Answer on Question #69568 – Physics – Field Theory**

Calculate the magnitude of the polarization for a dielectric material in an electric field of  $10^6$  V/m, given that the susceptibility of the material is 4.38.

**Solution:**

Electric susceptibility is defined as the constant of proportionality relating an electric field  $E$  to the induced dielectric polarization density  $P$  such that [1]:

$$P = \epsilon_0 \chi_e E,$$

where  $P$  is the magnitude of the polarization for a dielectric material (or polarization density), so

$$P = \epsilon_0 \chi_e E \approx 8.85 \times 10^{-12} \text{ F} \cdot \text{m}^{-1} \times 4.38 \times 10^6 \text{ V} \cdot \text{m}^{-1} \approx 3.88 \times 10^{-5} \text{ C} \cdot \text{m}^{-2},$$

**Answer:**  $3.88 \times 10^{-5} \text{ C} \cdot \text{m}^{-2}$ .

[1] [https://en.wikipedia.org/wiki/Electric\\_susceptibility](https://en.wikipedia.org/wiki/Electric_susceptibility)

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