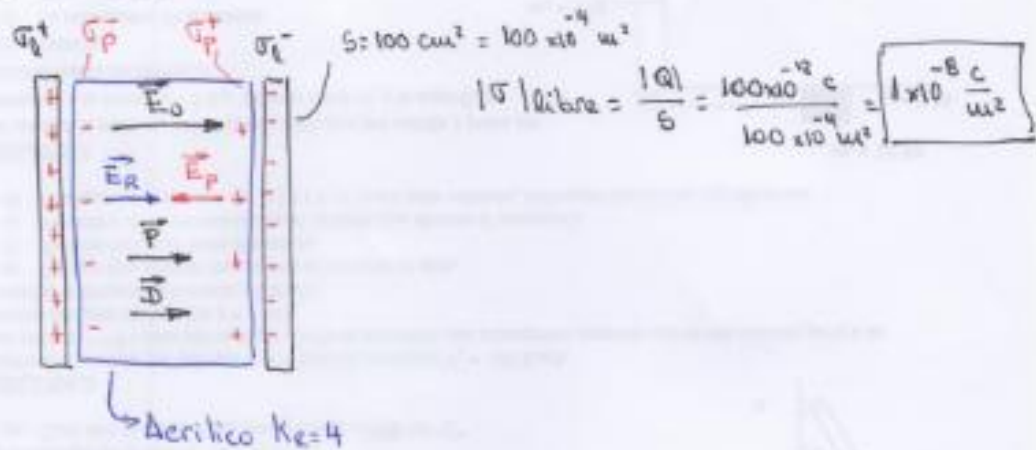


UNIDAD TEMÁTICA III  
CAMPO ELÉCTRICO EN MEDIOS MATERIALES

①

problema 9.3



$$\|\vec{E}_0\| = \frac{|\sigma_{\text{libre}}|}{\epsilon_0} = \frac{1 \times 10^{-8} \frac{\text{C}}{\text{m}^2}}{8.85 \times 10^{-12} \frac{\text{C}^2}{\text{Nm}^2}} = 1130 \frac{\text{N}}{\text{C}}$$

$$|\sigma_{\text{libre}}| = 1 \times 10^{-8} \frac{\text{C}}{\text{m}^2}$$

$$|\sigma_{\text{polarizada}}| = \left( \frac{k_e - 1}{k_e} \right) |\sigma_{\text{libre}}| = \left( \frac{4 - 1}{4} \right) \cdot 1 \times 10^{-8} \frac{\text{C}}{\text{m}^2} = 0.75 \times 10^{-8} \frac{\text{C}}{\text{m}^2}$$

$$\|\vec{E}_P\| = \frac{|\sigma_P|}{\epsilon_0} = \frac{0.75 \times 10^{-8} \frac{\text{C}}{\text{m}^2}}{8.85 \times 10^{-12} \frac{\text{C}^2}{\text{Nm}^2}} = 847 \frac{\text{N}}{\text{C}}$$

$$\|\vec{E}_R\| = \|\vec{E}_0\| - \|\vec{E}_P\| = 1130 \frac{\text{N}}{\text{C}} - 847 \frac{\text{N}}{\text{C}} = 283 \frac{\text{N}}{\text{C}}$$

$$\|\vec{E}_R\| = \frac{\|\vec{E}_0\|}{k_e} = \frac{1130 \frac{\text{N}}{\text{C}}}{4} = 283 \frac{\text{N}}{\text{C}}$$

(2)

- Susceptibilidad Relativa (Adimensional)

$$\chi_e = K_e - 1 = 4 - 1 = \boxed{3}$$

- Susceptibilidad Absoluta (Dimensionada)

$$\chi = \chi_e \epsilon_0 = 3 \times 8,85 \times 10^{-12} \frac{\text{C}^2}{\text{Nm}^2} = \boxed{2,65 \times 10^{-11} \frac{\text{C}^2}{\text{Nm}^2}}$$

$$\|\vec{P}\| = |\vec{D}_{\text{polarizada}}| = \boxed{0,75 \times 10^{-8} \frac{\text{C}}{\text{m}^2}}$$

$$\|\vec{D}\| = |\vec{D}_{\text{libre}}| = \boxed{1 \times 10^{-8} \frac{\text{C}}{\text{m}^2}}$$

$$\vec{D} = \epsilon_0 \vec{E}_R + \vec{P}$$

$$\boxed{1 \times 10^{-8} \frac{\text{C}}{\text{m}^2}} = 8,85 \times 10^{-12} \frac{\text{C}^2}{\text{Nm}^2} \cdot 283 \frac{\text{N}}{\text{C}} + 0,75 \times 10^{-8} \frac{\text{C}}{\text{m}^2} = \boxed{1 \times 10^{-8} \frac{\text{C}}{\text{m}^2}}$$

Verifica