

62. (a) Let $E = \sigma/2\varepsilon_0 = 3 \times 10^6 \text{ N/C}$. With $\sigma = |q|/A$, this leads to

$$|q| = \pi R^2 \sigma = 2\pi\varepsilon_0 R^2 E = \frac{R^2 E}{2k} = \frac{(2.5 \times 10^{-2} \text{ m})^2 (3.0 \times 10^6 \text{ N/C})}{2 (8.99 \times 10^9 \frac{\text{N}\cdot\text{m}^2}{\text{C}^2})} = 1.0 \times 10^{-7} \text{ C} .$$

(b) Setting up a simple proportionality (with the areas), the number of atoms is estimated to be

$$N = \frac{\pi(2.5 \times 10^{-2} \text{ m})^2}{0.015 \times 10^{-18} \text{ m}^2} = 1.3 \times 10^{17} .$$

(c) Therefore, the fraction is

$$\frac{q}{Ne} = \frac{1.0 \times 10^{-7} \text{ C}}{(1.3 \times 10^{17})(1.6 \times 10^{-19} \text{ C})} \approx 5 \times 10^{-6} .$$