

46. The charge dq within a thin shell of thickness dr is $\rho A dr$ where $A = 4\pi r^2$. Thus, with $\rho = b/r$, we have

$$q = \int dq = 4\pi b \int_{r_1}^{r_2} r dr = 2\pi b (r_2^2 - r_1^2) .$$

With $b = 3.0 \mu\text{C}/\text{m}^2$, $r_2 = 0.06 \text{ m}$ and $r_1 = 0.04 \text{ m}$, we obtain $q = 0.038 \mu\text{C}$.