

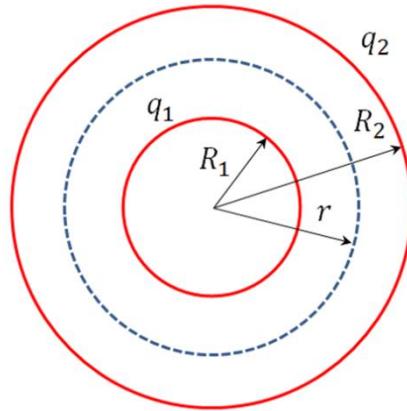
Answer on Question #73800, Physics / Electromagnetism

Question. Two concentric thin metallic spheres having radii 30 cm and 20 cm carry $10\text{ }\mu\text{C}$ and $5\text{ }\mu\text{C}$, charges respectively. Calculate the electric potential at a distance of 25 cm from the centre of the spheres.

Given. $R_1 = 20\text{ cm} = 0.2\text{ m}$; $R_2 = 30\text{ cm} = 0.3\text{ m}$; $r = 25\text{ cm} = 0.25\text{ m}$; $q_1 = 5\text{ }\mu\text{C} = 5 \cdot 10^{-6}\text{ C}$; $q_2 = 10\text{ }\mu\text{C} = 10 \cdot 10^{-6}\text{ C}$.

Find. $\varphi - ?$

Solution.



The electric potential at a distance of $r = 25\text{ cm}$ from the centre of the spheres

$$\begin{aligned}\varphi = \varphi_1 + \varphi_2 &= \frac{1}{4\pi\epsilon_0} \frac{q_1}{r} + \frac{1}{4\pi\epsilon_0} \frac{q_2}{R_2} = \frac{1}{4\pi\epsilon_0} \left(\frac{q_1}{r} + \frac{q_2}{R_2} \right) = \\ &= \frac{1}{4 \cdot 3.14 \cdot 8.85 \cdot 10^{-12}} \left(\frac{5 \cdot 10^{-6}}{0.25} + \frac{10 \cdot 10^{-6}}{0.3} \right) = 480 \cdot 10^3 \text{ V} = 480 \text{ kV}.\end{aligned}$$

Answer. $\varphi = 480 \text{ kV}$.

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