

Answer on Question #73213, Chemistry / General Chemistry |

When an object with an electric charge of $-7.0\mu\text{C}$ is 5.0cm from an object with an electric charge of $4.0\mu\text{C}$, the force between them has a strength of 100.7N . Calculate the strength of the force between the two objects if they are 1.7cm apart. Round your answer to 2 significant digits.

Solution:

The objects interact due to **Coulomb's law** (https://en.wikipedia.org/wiki/Coulomb%27s_law)

$$F_1 = k \frac{q_1 q_2}{r_1^2} \quad (1)$$

The force between the two objects if they are 1.7cm apart is

$$F_2 = k \frac{q_1 q_2}{r_2^2} \quad (2)$$

Comparing (1) and (2) we obtain

$$F_2 = F_1 \frac{r_1^2}{r_2^2} = 100.7 \text{ N} \frac{(5 \text{ cm})^2}{(1.7 \text{ cm})^2} = 8.7 \cdot 10^2 \text{ N}$$

Answer: $F_2 = 8.7 \cdot 10^2 \text{ N}$