



QUESTION OF THE DAY

Problem: A capacitor stores $5.9 \times 10^{-5} \text{ C}$ of charge when connected to a 6.0 V battery. How much charge does the capacitor store when connected to a 21.0 V battery?

Solution: The key concept is to remember that the capacitance of a capacitor is constant (presuming the capacitor is not physically altered).

The definition of capacitance is $C = \frac{Q}{V}$

With the given information, we can conclude that $C = \frac{5.9 \times 10^{-5} \text{ C}}{6.0 \text{ V}} = 9.833 \times 10^{-6} \text{ F}$

Now that we know the capacitance, we can determine either Q or V, depending on which we have. In this case, we know that the new voltage is 21.0 V

Therefore, rearranging the definition of capacitance gives $CV=Q$.

Thus, $CV = (9.833 \times 10^{-6} \text{ F})(21.0 \cdot \text{V}) = Q = 2.065 \times 10^{-4} \text{ C}$

At 21 volts, the capacitor contains $2.065 \times 10^{-4} \text{ C}$ of charge