

Problem 26.31

This simply uses the relationship for the energy wrapped up in a charged capacitor. The only twist is that you aren't given the capacitance but, rather, the voltage across the cap and the charge on the cap. Using that information, we can write:

$$\begin{aligned} E &= \frac{1}{2} C V_c^2 \\ &= \frac{1}{2} \left(\frac{Q}{V_c} \right) V_c^2 \\ &= \frac{1}{2} Q V_c \\ &= \frac{1}{2} (54.0 \times 10^{-6} \text{ C})(12.0 \text{ V}) \\ &= 3.24 \times 10^{-4} \text{ J} \end{aligned}$$

$$Q = 54 \times 10^{-6} \text{ C}$$

