

Answer on question #65349, Physics / Electric Circuits

Question Did you dare touch the Van de Graaff? The maximum charge that our classroom Van de Graaff generator could hold on its dome was about $5\ \mu\text{C}$. Assume that when you get shocked by the generator, all of this charge passes through you in just one-hundredth of a second ($1.00 \times 10^{-2}\ \text{s}$). (a) Calculate the associated average current for getting shocked by the Van de Graaff generator, and express your answer in units of mA (milli-amperes). Now, lets say you are feeling bold and opt to lick a 9 V battery. The resistance for wet skin is about $2000\ \Omega$. (b) Calculate the associated current through your tongue when you place it across the terminals of a 9 V battery, and express your answer in the same units of mA.

Solution (a) Average current is

$$I = \frac{Q}{t} = \frac{5 \cdot 10^{-6}}{1 \cdot 10^{-2}} = 5 \cdot 10^{-4}\ \text{A} = 0.5\ \text{mA}$$

(b) Current is

$$I = \frac{U}{R} = \frac{9}{2000} = 4.5\ \text{mA}$$