Answer on Question#59063 — Physics / Electric Circuits

A capacitor of 2.0μF is connected to a battery of 2.0V through a resistance of 10kΩ. What is the initial current in the circuit and the current after 0.02s?

0.5μA and 0.074mA

7.4A and 5.0mA

0.2μA and 0.074mA

6.2μA and 7.04mA

Solution:

Voltage on the capacitor is described by the next formula:

$$U_C = E * (1 - e^{-\frac{t}{rc}})$$

Where *E* is the battery voltage, *t* is time, *c* is capacity, *r* is resistance.

Current across the capacitor equals:

$$i = c\frac{dU_C}{dt}$$

So,

$$i = \frac{c * E * e^{-\frac{t}{rc}}}{rc} = \frac{E * e^{-\frac{t}{rc}}}{r}$$

So the initial current in the circuit is 0.2mA and the current after 0.02s is 0.074mA.

Answer:

0.2mA and 0.074mA