1. how many electrons are there in 10 C of charge?

2. find current through a wire if 10^15 electrons pass through a wire in 0.01 seconds.

Solution

1. Charge of one electron is $e = 1.60217733 \times 10^{-19} C$

$$1 \ coulumb = \frac{1}{1.60217733 * 10^{-19}} \ e = 6.2415 * 10^{18} \ e$$

$$10 \ coulumbs = 6.2415 * 10^{19} \ e$$

The number of electrons N:

$$N = \frac{Q}{e} = 6.2415 * 10^{19}$$

where Q – is total charge (in our case - $10 \ coulumbs$), e – is charge of one electron $(1.60217733 \times 10^{-19} C)$.

2. The current through a wire is

$$I = \frac{\Delta q}{\Delta t} = \frac{Ne}{\Delta t} = \frac{10^{15} * 1.6 * 10^{-19}}{0.01} = 1.6 * 10^{-2} A = 16 \ mA$$

where Δq - is charge that passed through a wire, Δt - is time interval, N - the number of electrons, e – is charge of one electron.

Answer: 1) $6.2415 * 10^{19}$; 2) $16 \ mA$.