**Answer on Question 59074, Physics, Electric Circuits**

**Question:**

For how long must a steady current of $2\ A$ flow through a copper voltameter to deposit $10^{-3}\ kg$ of copper? The electrochemical equivalent, $Z$, for copper is $0.000329\ g/C$.

a) $42.1\ min$

b) $22.6\ min$

c) $30.2\ min$

d) $25.3\ min$

**Solution:**

Let's recall the famous Faraday's First Law of Electrolysis. It states, that the chemical deposition due to flow of current through electrolyte is directly proportional to the total quantity of electric charge passed through it:

$$m = Z \cdot Q,$$

here, $m$ is the mass of copper deposited in this process, $Q$ is the total quantity of electric charge passed through electrolyte, $Z = 0.000329\ g/C$ is the electrochemical equivalent of the copper.

We can find the total quantity of electric charge passed through electrolyte from the formula:

$$Q = It,$$

here, $I$ is the current, $t$ is the time.

Finally, our formula becomes:

$$m = Z \cdot I \cdot t.$$

From this formula we can find the time required to deposit $10^{-3}\ kg$ of copper:

$$t = \frac{m}{Z \cdot I} = \frac{1\ \text{g}}{0.000329\ \frac{g}{C} \cdot 2\ \frac{C}{s}} = 1520\ s = 25.3\ min.$$

**Answer:**

d) $25.3\ min$