

Question #63709, Chemistry / Other

A constant current was passed through a solution of AuCl_4^- ions between gold electrodes. After a period of 10.00 minutes the cathode increased in weight by 1.314 grams. how much charge was passed and what was the current I?

Solution:

Faraday's laws can be summarized by

$$m = \frac{Q M}{F z}$$
$$Q = It$$

m is the mass of the substance liberated at an electrode in grams

Q is the total electric charge passed through the substance in coulombs

F = 96485 C mol⁻¹ is the Faraday constant

M is the molar mass of the substance in grams per mol

z is the valency number of ions of the substance (electrons transferred per ion).

$$Q = \frac{mFz}{M}$$

AuCl_4^- ions – Au^{+3} reduces to Au^0 . *z*=3.

M(Au) = 196.967 g/mol

$$Q = \frac{1.314 \text{ g} \times 96485 \text{ C/mol} \times 3}{196.967 \text{ g/mol}} = \mathbf{1931.0 \text{ C}}$$

$$Q = It$$
$$I = \frac{Q}{t} = \frac{1931.0}{600 \text{ s}} = \mathbf{3.22 \text{ A}}$$

<https://www.AssignmentExpert.com>