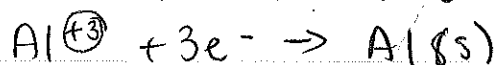


4/23/13

Quiz How many moles of Al(s) can be produced if 5 mol of e^- are supplied. Al_2O_3 ?



$$\frac{5 \text{ mole } e^-}{3e^-} \times \frac{Al^{3+}}{Al^{3+}} = \boxed{1.7Al}$$

Quiz

1 mole $e^- = 96485$ Coulombs & 1 Amp = 1 Coulomb/sec.

How many hours are required to plate 350 g of Copper Metal from 0.5M $CuSO_4(aq)$ by using a current of 3.0A?

Molar mass Cu = 63.5g/mol

Given: 35g Cu

Wanted: How long it takes to plate out Cu.

g Cu $\xrightarrow{\text{molar mass}}$ mol Cu $\xrightarrow{\text{stoichiometry}}$ mole e^- $\xrightarrow{\text{Faraday}}$ Coulomb $\xrightarrow{\text{Amp.}}$ time

$$\frac{35g \text{ Cu}}{63.5g} \times \frac{\text{mol Cu}}{\text{mol Cu}} \times \frac{\text{mol Cu}^{2+}}{\text{mol Cu}} \times \frac{2 \text{ mole } e^-}{1 \text{ mol } e^-} \times \frac{96485 \text{ C}}{1 \text{ mole } e^-} \times \frac{1 \text{ s}}{3600 \text{ sec}} \times \frac{1 \text{ hr}}{60 \text{ min}}$$

$$\frac{1 \text{ hr}}{60 \text{ min.}} = \boxed{10 \text{ hours}}$$

Non-Standard Conditions

Derive Nernst equation

$$\Delta G = \Delta G^\circ + RT \ln Q$$

at equilibrium $\Delta G^\circ = -RT \ln Q$.

$$E = E^\circ - \frac{RT}{nF} \ln Q \quad \leftarrow \text{nonstandard conditions.}$$

$$E = E^\circ - \frac{0.0591}{n} \log Q$$