- How many minutes would be required to obtain 10.0 g of liquid mercury by passing a constant current of 0.17 A through a solution containing $Hg_2(NO_3)_2(aq)$?

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The number of moles of Hg in 10.0 g is:

amount of mercury = mass / molar mass = (10.0 g) / (200.59 g mol^{-1})
= 0.0499 mol

The redox reaction is the 2 electron process below:

$Hg_2^{2+}(aq) + 2e^- \rightarrow 2Hg$

Hence, for each mole of Hg, 1 mol of electrons is required so 0.0499 mol of electrons are required.

The number of moles of electrons passed by a current *I* in a time *t* is given by:

number of moles of electrons = *It* / *F*

The time required to pass 0.0499 mol of electrons using *I* = 0.17 A is therefore:

***t* = (0.0499 mol) × (96485 C mol^{-1}) / (0.17 A) = 28000 s = 470 mins**

Answer: **470 mins**