24 Electrolysis calculations – Part 2

Name: _____ Class: _____ Date: _____

Vocabulary

Write each word three times.

English	**Write it 3 times** (English)
Faraday constant	
Avogadro constant	

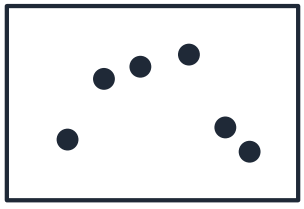
Recall

You can calculate how much product an electrolysis makes, from the charge passed.

New ideas

Read these first, then do the Practice.

1 The Faraday constant

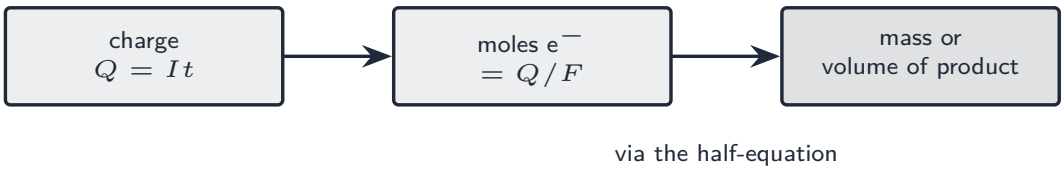


1 mole of electrons

$$F = 96\,500 \text{ C mol}^{-1}$$

The **Faraday constant** is the charge on one mole of electrons, $F = 96\,500$ C mol^{-1}. (It equals the **Avogadro constant** times the electron charge.)

2 The calculation steps



Find the charge $Q = It$, then moles of electrons $= Q/F$, then use the half-equation to find the product.

Worked example. A current of 5.0 A flows for 1930 s: $Q = It = 5.0 \times 1930 = 9650$ C; moles of electrons $= Q/F = 9650/96\,500 = 0.10$ mol.

Watch out: in $Q = It$ the time must be in *seconds* (convert minutes first). Then moles of electrons $= Q/F$, and the *half-equation* tells you how many electrons make one unit of product.

Practice

Try these in order.

24.6 What is the *Faraday constant*? [1]

24.7 Write the formula for the charge passed. [1]

24.8 How do you find the moles of electrons from the charge? [1]

24.9 A current of 2 A flows for 100 s. What charge passes? [1]

24.10 What do you use to turn moles of electrons into moles of product? [1]

24.11 Challenge. In the electrolysis of molten sodium chloride ($Na^+ + e^- \rightarrow Na$), how many moles of sodium form when 0.20 mol of electrons pass? [2]