

## Electrolysis worksheet 5

1) An electrolytic cell attempts to produce chlorine gas by electrolysis of aqueous 0.01M KCl solution using inert electrodes. Gas is produced at both electrodes.

a) Give the likely equation to the reaction occurring at the anode.

b) Give the likely equation to the reaction occurring at the cathode.

c) What happens to the pH of the solution surrounding the anode? Explain

2) What mass (in grams) of nickel could be electroplated from a solution of nickel(II) chloride by a current of 0.450 amperes flowing for 5.50 hours?

3) Pure aluminium is to be extracted from a large sample of *molten*  $\text{AlCl}_3$ . An electrolytic cell is set up to run for 4.50 hours with a current of 0.490 amperes using inert electrodes. At this concentration the  $\text{Cl}^-$  are at concentration of 3.0M.

a) One student suggested setting up an electrolytic cell using (1.00 M)  $\text{AlCl}_3$  solution. What are the products formed at the:

i. cathode -----

ii. anode -----

b) Another student suggested molten  $\text{AlCl}_3$  with the exclusion of water. What are the products formed at the:

i. cathode -----

ii. anode -----

iii. How many litres of the gas produced at the anode, when measured at  $0^\circ\text{C}$  and 101.3 kPa pressure, are produced when the electrode efficiency is only 65%?

4) A fine layer of platinum is to be plated onto an iron rod from a solution of  $[\text{PtCl}_6]^{2-}$ , using an average current of 10.0 amperes at an electrode efficiency of 70.0%?

a) The electrolytic cell shown on the right is used.

i. What material should the positive electrode be made from?

ii. What is the reaction occurring at the cathode?

b) How long, in hours, would be required for the electroplating of 88.0 g of platinum

