ELECTROLYSIS OF COPPER SULFATE

5.5.1

Copper has the structure of a typical metal. It has a lattice of positive ions and a "sea" of mobile electrons. The lattice can accommodate ions of a different metal.

(a) Aqueous copper(II) sulphate solution can be electrolysed using carbon electrodes. The ions present in the solution are as follows.

$Cu^{2+}(aq)$, $SO_4^{2-}(aq)$, $H^+(aq)$, $OH^-(aq)$

(i) Write an ionic equation for the reaction at the negative electrode (cathode).

.....[1]

(ii) A colourless gas was given off at the positive electrode (anode) and the solution changes from blue to colourless.

Explain these observations.

.....

.....[2]

(b) Aqueous copper(II) sulphate can be electrolysed using copper electrodes. The reaction at the negative electrode is the same but the positive electrode becomes smaller and the solution remains blue.

(i) Write a word equation for the reaction at the positive electrode.

.....[1]

(ii) Explain why the colour of the solution does not change.

.....

.....[2]

(iii) What is the large scale use of this electrolysis?

.....[1]

(a)	(i)	$Cu^{2+} + 2e = Cu$	[1]
	(ii)	gas is oxygen	[1]
		(copper(II) sulphate) changes to sulphuric acid **or** copper ions removed from solution	[1]
(b)	(i)	copper atoms - electrons = copper ions accept correct symbol equation	[1]
	(ii)	concentration of copper ions does not change **or** amount **or** number of copper ions does not change	[1]
		copper ions are removed and then replaced **or** copper is transferred from anode to cathode	[1]
	(iii)	refining copper **or** plating (core) **or** extraction of boulder copper	[1]