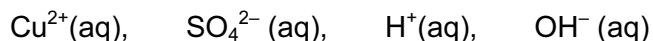


ELECTROLYSIS OF COPPER SULFATE

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.



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