

Electrolysing aqueous copper sulfate using inert electrodes such as carbon, platinum or rhodium

1. List of ions present in the solution: Cu^{2+} , H^+ , OH^- , SO_4^{2-}
2. Electrodes are inert so they do not take part in electrolysis.
3. Ions attracted to the anode are OH^- , SO_4^{2-}
4. Ions attracted to the cathode are Cu^{2+} , H^+
5. Ions lower down the series are:
Anode: OH^-
Cathode: Cu^{2+}

• Half equations at the anode: $4\text{OH}^- - 4\text{e}^- \rightarrow 2\text{H}_2\text{O} + \text{O}_2$
Observation at the anode: Colourless gas given off.

• Half equations at the cathode: $\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}$.

• Observation at the cathode: brown colour copper settles at the cathode.

• Ions left behind in the solution : H^+ and SO_4^{2-} . These react to form H_2SO_4 which is sulfuric acid. Hence the electrolyte becomes acidic in nature. As the copper ions are lost from the solution, the colour of the electrolyte goes from blue to colourless.