

# Edexcel Chemistry GCSE

## CP 4 - Electrolysis of Copper Sulfate Solution

### Flashcards

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What colour is  $\text{CuSO}_4(\text{aq})$ ?



What colour is  $\text{CuSO}_4(\text{aq})$ ?

Blue



# What is an electrolyte?



# What is an electrolyte?

An ionic compound which is molten or dissolved in water



# What is electrolysis?



# What is electrolysis?

## The splitting up of electrolytes using electrical energy



Write the half equation for the reaction occurring at the cathode when  $\text{CuSO}_4$  is electrolysed  
(Higher only)





Write the half equation for the reaction occurring at the cathode when  $\text{CuSO}_4$  is electrolysed  
(Higher only)



Write a half equation for the formation of  
oxygen from  $\text{OH}^-$  ions  
(Higher only)



Write a half equation for the formation of oxygen  
from  $\text{OH}^-$  ions  
(Higher only)



At which electrode does oxidation?  
(Higher only)



At which electrode does oxidation?

(Higher only)

Positive electrode



To which electrode do positive ions move towards?



To which electrode do positive ions move towards?

Negative electrode (cathode)



What forms at the cathode and the anode in electrolysis?





What forms at the cathode and the anode in electrolysis?

Cathode - metals or hydrogen

Anode - non-metals



What are the products of electrolysis of copper sulfate when using inert electrodes?



What are the products of electrolysis of copper sulfate when using inert electrodes?

Copper at negative electrode

Oxygen at positive electrode



# How do you set up an electrochemical cell?



How do you set up an electrochemical cell?

Place positive and negative electrodes in a beaker containing a molten or dissolved ionic compound. Connect both electrodes to a power supply with wires.



When carrying out the electrolysis of  $\text{CuSO}_4$ , what safety precautions should be taken?



When carrying out the electrolysis of  $\text{CuSO}_4$ , what safety precautions should be taken?

Wear gloves and safety goggles (copper sulfate causes skin and eye irritation)

Keep propanone (for drying the electrodes) away from flames and use in fume cupboard



What observations could you make when  $\text{CuSO}_4$  is electrolysed using inert electrodes?





What observations could you make when  $\text{CuSO}_4$  is electrolysed using inert electrodes?

Cathode - copper deposit (brown/pink solid)

Anode - bubbles of  $\text{O}_2$  gas

Solution - blue colour fades



# What does inert mean?



# What does inert mean?

## Unreactive



How would you test the gas produced at the anode for electrolysis of  $\text{CuSO}_4$ ?



How would you test the gas produced at the anode for electrolysis of  $\text{CuSO}_4$ ?

If the gas is oxygen, it will relight a glowing splint



You are using copper electrodes for the electrolysis of  $\text{CuSO}_4$ . Over time, what happens to the anode? Why?



You are using copper electrodes for the electrolysis of  $\text{CuSO}_4$ . Over time, what happens to the anode? Why?

Mass will decrease.  $\text{Cu(s)}$  in the electrode are oxidised to  $\text{Cu}^{2+}(\text{aq})$



You are using copper electrodes for the electrolysis of  $\text{CuSO}_4$ . How are the change in masses of the electrodes linked?





You are using copper electrodes for the electrolysis of  $\text{CuSO}_4$ . How are the change in masses of the electrodes linked?

The mass lost from the anode should be the same as the mass gained by the cathode



You are using copper electrodes for the electrolysis of  $\text{CuSO}_4$ . What is the relationship between the mass gained by the cathode and the current used?



You are using copper electrodes for the electrolysis of  $\text{CuSO}_4$ . What is the relationship between the mass gained by the cathode and the current used?

The mass gained by the cathode is directly proportional to the current used (for a given time)



Why must you clean the copper electrodes with emery paper before use?



Why must you clean the copper electrodes with emery paper before use?

To remove any copper oxide which may have formed



Why should you dry the copper electrodes at the end of the electrolysis of  $\text{CuSO}_4$ ?



Why should you dry the copper electrodes at the end of the electrolysis of  $\text{CuSO}_4$ ?

So the change in mass is only caused by the gain/ loss of copper atoms

