

# WJEC (Eduqas) Chemistry

# GCSE

## 6 - Reactivity Series and Extraction of Metals

### Flashcards

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What is the word equation for the reaction between metals and acids?



What is the word equation for the reaction between metals and acids?

Metal + acid  $\rightarrow$  salt + hydrogen



What is the word equation for the reaction between metals and oxygen?



What is the word equation for the reaction between metals and oxygen?

Metal + oxygen → metal oxide



What is the word equation for the reaction between metals and water?



What is the word equation for the reaction between metals and water?

Metal + water → metal hydroxide + hydrogen



Explain how one metal can displace a salt of another metal in a solution





# Explain how one metal can displace a salt of another metal in a solution

This is describing a displacement reaction using the reactivity series, where a more reactive metal forms a solution and the less reactive metal coats the surface of the more reactive metal



# List the properties of aluminium



# List the properties of aluminium

Low density

Lightweight for its size

Very thin layer of oxides on surface that resist corrosion



List the uses of aluminium



# List the uses of aluminium

Used for aircrafts, trains, overhead power cables, saucepans and cooking foils



# List the properties of copper



# List the properties of copper

Good heat and electrical conductors

Malleable - soft, easily bent and shaped

Unreactive - resistant to corrosion



# List the uses of copper





# List the uses of copper

Electrical wiring, gas pipes and water pipes, plumbing in houses



List the properties of iron



# List the properties of iron

Malleable

Can form alloy with carbon to create steel which is harder and stronger than iron and less likely to rust



# List the uses of iron



# List the uses of iron

Used to build cars

Steel used in construction industry



# List the properties of titanium



# List the properties of titanium

Low density

Lightweight for size

Very thin layer of oxides on surface that resist corrosion



# List the uses of titanium





# List the uses of titanium

Fighter aircraft

Artificial hip joints

Pipes in nuclear power stations



# What is oxidation?



# What is oxidation?

The gain of oxygen

The loss of electrons (OIL of OILRIG)



# What is reduction?



# What is reduction?

The loss of oxygen

The gain of electrons (RIG of OILRIG)



Explain how iron can be extracted from  
its core



# Explain how iron can be extracted from its core

Iron oxide + carbon dioxide  $\rightarrow$  iron + carbon dioxide

Iron oxide (iron core) loses oxygen and so is reduced, whilst the carbon gains oxygen as so is oxidised



How can acidic impurities from the iron extraction reaction be removed?





# How can acidic impurities from the iron extraction reaction be removed?

Limestone or calcium carbonate reacts with the acidic impurities to form molten slag which can be removed



Explain why iron can be extracted from its oxides by reduction with carbon



# Explain why iron can be extracted from its oxides by reduction with carbon

Iron is less reactive than carbon and so can be extracted.



# Explain the process of electrolysis



# Explain the process of electrolysis

When ionic substance is melted/dissolved the ions are free to move and is now called the electrolyte.

Passing a current through this allows the solution to be broken down into electrons (electrolysis)

Positively charged ions move to the negative electrode (cathode) and negatively charged ions move to the positive electrode (anode)



# What is the cathode?



# What is the cathode?

Negative electrode



# What is the anode?





# What is the anode?

Positive electrode



Which elements are produced at each electrode during the electrolysis of molten lead bromide?



Which elements are produced at each electrode during the electrolysis of molten lead bromide?

Pb (s) is produced at cathode

Br<sub>2</sub> (l) is produced at anode



Which process is used to extract aluminium from a molten compound?



# Which process is used to extract aluminium from a molten compound?

Electrolysis can be used for metals that are more reactive than carbon



Explain the process of extraction of aluminium from aluminium oxide



# Explain the process of extraction of aluminium from aluminium oxide

Aluminium oxide is dissolved in molten cryolite

Electrode are made of graphite (form of carbon)

Aluminium forms at negative electrode and sinks to bottom of tank where it can be tapped off

Oxygen forms at positive electrode, reacts with the graphite electrode to form carbon dioxide



Why is aluminium oxide dissolved in molten cryolite during the extraction process?





# Why is aluminium oxide dissolved in molten cryolite during the extraction process?

Aluminium oxide has a very high melting point so would be very expensive to melt

When dissolved in molten cryolite, the compound has a lower melting point and so saves energy costs



During the extraction of aluminium from aluminium oxide, why does the positive electrode have to be replaced often?



During the extraction of aluminium from aluminium oxide, why does the positive electrode have to be replaced often?

When oxygen forms at the positive electrode it reacts with the carbon (graphite) that the electrode is made from.

This produces carbon dioxide and the electrode gradually burns away

Therefore for electrolysis to continue the positive electrode must be replaced often



What products are created during the electrolysis of sodium chloride solution?



# What products are created during the electrolysis of sodium chloride solution?

$\text{H}^+$  ions go to cathode and  $\text{H}_2$  (g) is produced - Na is more reactive than H

$\text{Cl}^-$  ions go to anode,  $\text{Cl}_2$  (g) is produced -  $\text{Cl}^-$  are halide ions



What products are created during the electrolysis of sodium sulfate solution?



# What products are created during the electrolysis of sodium sulfate solution?

$\text{Cu}^+$  ions go to cathode and  $\text{Cu (s)}$  is produced -  $\text{Cu}$  is less reactive than  $\text{H}$

$\text{Cl}^-$  ions go to anode,  $\text{Cl}_2 \text{ (g)}$  is produced -  $\text{Cl}^-$  are halide ions



# Explain the process of phytoextraction





# Explain the process of phytoextraction

Some plants absorb metal compounds through their roots

They concentrate these compounds as a result of this

The plants can be burned to produce an ash that contains the metal



# Explain the process of bacterial metal extraction



# Explain the process of bacterial metal extraction

Some bacteria absorb metal compounds

Produce solutions called leachates which contain the metal



# What is the test for copper (II)?



# What is the test for copper (II)?

Produces a blue precipitate when NaOH added



What colour precipitate is formed when iron (II) reacts with NaOH?



What colour precipitate is formed when iron (II) reacts with NaOH?

Green precipitate



What colour precipitate is formed when iron (III) reacts with NaOH?





What colour precipitate is formed when iron (III) reacts with NaOH?

Brown precipitate

