

AQA Chemistry GCSE

Topic 4: Chemical Change

Flashcards

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What is oxidation/reduction?



What is oxidation/reduction?

Oxidation - When a substance gains oxygen

Reduction - When a substance loses oxygen



What is the reactivity series of metals? What are the trends in reactivities of metals in reactions with acids/water?



What is the reactivity series of metals? What are the trends in reactivities of metals in reactions with acids/water?

The series shows the metals in order of their reactivity.

Metals above H_2 in reactivity series react with acid to produce H_2 . The more reactive the metal is, the quicker and more violent reaction with acid occurs.

Metals below H_2 don't react with acids.

Not all metals above H_2 react with water - mostly Group I and II metals. Aluminium is the borderline case.



What is a displacement reaction?



What is a displacement reaction?

A reaction where a more reactive metal displaces a less reactive metal from a compound



How are unreactive metals found in Earth?



How are unreactive metals found in Earth?

In their natural state (well, they are unreactive...)



How can metals less
reactive than carbon be
extracted?



How can metals less reactive than carbon be extracted?

Reduction with carbon. Carbon displaces the metal in a metal oxide - gets oxidised to carbon oxides. Metal from the metal oxide gets reduced to the pure metal.



How are metals more reactive than carbon extracted?



How are metals more reactive than carbon extracted?

By electrolysis



How are oxidation and reduction defined in terms of electron transfer ?

Higher Tier Only



How are oxidation and reduction defined in terms of electron transfer?

Oxidation – loss of electrons

Reduction – gain of electrons

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What is the general equation for a reaction between metals and acids? What type of reaction is this?



What is the general equation for a reaction between metals and acids? What type of reaction is this?

Metal + acid \rightarrow salt + hydrogen

Redox reaction, also a displacement reaction



Which metals in the reactivity series will react with acid?



Which metals in the reactivity series will react with acid?

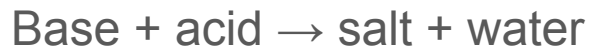
Those above hydrogen



What is the general equation for a neutralisation reaction?



What is the general equation for a neutralisation reaction?



What is the general equation for the reaction between metal carbonate and acid?



What is the general equation for the reaction between metal carbonate and acid?

Metal carbonate + acid \rightarrow salt + water + carbon dioxide



What is the general equation for the reaction between metal oxides and acids?



What is the general equation for the reaction between metal oxides and acids?

Metal oxide + acid \rightarrow a salt + water



What is a redox reaction?

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What is a redox reaction?

A reaction where both oxidation and reduction occurs

Higher Tier Only



Explain in terms of gain or loss of electrons which species has been oxidised and which species has been reduced when magnesium reacts with hydrochloric acid



Explain in terms of gain or loss of electrons which species has been oxidised and which species has been reduced when magnesium reacts with hydrochloric acid

Magnesium has lost electrons and thus has been oxidised (Mg to Mg^{2+})

The hydrogen in HCl has gained electrons and thus has been reduced (H^+ to H_2)

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How is a soluble salt formed?



How is a soluble salt formed?

- a) React the excess acid with some insoluble chemical (e.g. metal oxide)
- b) Filter off the leftovers
- c) Crystallise the product



What do acids and alkalis produce in aqueous solutions?



What do acids and alkalis produce in aqueous solutions?

Acids produce hydrogen ions, alkalis produce hydroxide ions



What are bases, acids and alkalis?



What are bases, acids and alkalis?

Bases are compounds that neutralise acids, acids produce hydrogen ions in aqueous solutions, alkalis are soluble bases - produce hydroxide ions in aqueous solutions



What is the pH scale and what does a pH of 7 show?



What is the pH scale and what does a pH of 7 show?

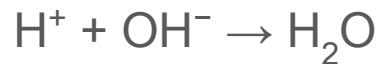
The measure of acidity/alkalinity of a solution; neutral solution



State the general equation for a neutralisation reaction in a short, ionic form.



State the general equation for a neutralisation reaction in a short, ionic form.



What is a strong acid? What is a weak acid?

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What is a strong acid and weak acid?

Strong acid is completely ionised in aqueous solution; weak acid is only partially ionised in aqueous solution

Higher tier only



What happens to pH as concentration of H^+ increases?

Higher tier only



What happens to pH as concentration of H^+ increases?

The pH decreases

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What is a concentrated acid and what is a dilute acid? Is this the same as a strong and weak acid?

Higher tier only



What is a concentrated acid and what is a diluted acid? Is this the same as a strong and weak acid?

- Concentrated acid has more moles of acid per unit volume than dilute (dilute refers to solutions of low concentrations)
- It is not the same - concentration is not the same thing as strength of an acid.
- Strength refers to whether the acid is completely ionised in water (strong) or only partially (weak).

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As the pH is decreased by one unit, what change is seen in the hydrogen ion concentration?

Higher tier only



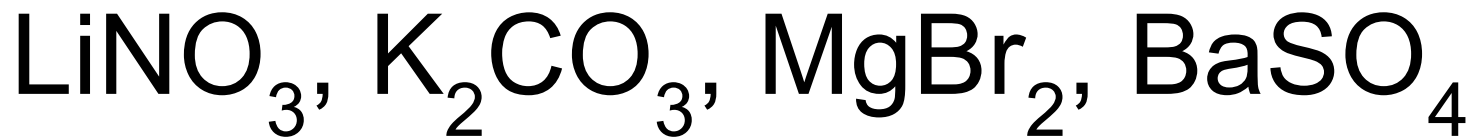
As the pH is decreased by one unit, what change is seen in the hydrogen ion concentration?

Increases by a factor of 10

Higher tier only



Name the following salts:



Name the following salts: LiNO_3 , K_2CO_3 , MgBr_2 ,
 BaSO_4

Lithium nitrate

Potassium carbonate

Magnesium bromide

Barium sulfate



What is electrolysis?



What is electrolysis?

The passing of an electric current through ionic substances that are molten or in solution to break them down into elements; ions are discharged (they lose/gain electrons) at electrodes to produce these



What is an electrolyte?



What is an electrolyte?

The liquid/solution which conducts electricity



What is a cathode and what is an anode?



What is a cathode and what is an anode?

Cathode is the negative electrode, anode is the positive electrode



What occurs at the cathode
and what occurs at the anode
during electrolysis?



What occurs at the cathode and what occurs at the anode during electrolysis?

Reduction occurs at the cathode

Oxidation occurs at the anode



In aqueous electrolysis, which element is discharged at the cathode? Oxygen is produced at the anode unless what?



In aqueous electrolysis, which element is discharged at the cathode? Oxygen is produced at the anode unless what?

The less reactive element discharges at the cathode. Hydrogen is produced unless there is a less reactive metal, in which case the said metal is produced. Oxygen is produced at the anode unless the solution contains halide ions, in which case halogen molecules are produced.



How is aluminium manufactured?

Why is it expensive?



How is aluminium manufactured? Why is it expensive?

Aluminium is made through the electrolysis of aluminium oxide and cryolite.

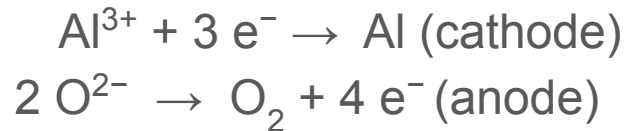
Lots of energy is needed to produce the current in electrolysis which makes this process expensive.



What are the half equations in the extraction of aluminium?



What are the half equations in the extraction of aluminium?



Oxygen reacts with C of the anode producing CO_2 .



Why is cryolite used in this process?



Why is cryolite used in manufacturing of aluminium?

It lowers the melting point of aluminium oxide, reducing energy costs



What are the half equations in
electrolysis of the aqueous
 Na_2SO_4 ?

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What are the half equations in electrolysis of the aqueous Na_2SO_4 ?



Higher tier only

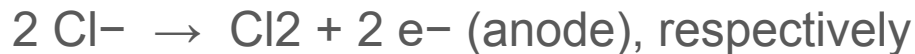
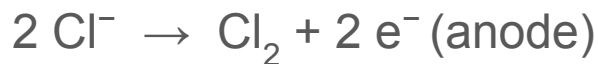


What are the half equations in electrolysis of the molten and aqueous KCl?

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What are the half equations in electrolysis of the molten and aqueous KCl?



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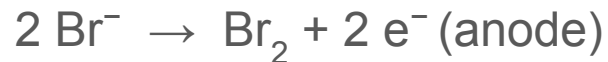


What are the half equations in
electrolysis of the aqueous
 CuBr_2 ?

Higher tier only



What are the half equations in electrolysis of the aqueous CuBr_2 ?



Higher tier only

