Edexcel Chemistry GCSE

Topic 3 - Chemical Changes

Flashcards

Which ions make aqueous solutions acidic?

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Hydrogen ions (H^+)

Which ions make aqueous solutions alkaline?

Which ions make aqueous solutions alkaline?

Hydroxide ions (OH^-)

What is the pH scale?

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The pH scale ranges from pH 0 to pH 14 and measures the acidity or alkalinity of a solution.

What are pH ranges for acids and alkalis? What the pH of a neutral solution?

What are pH ranges for acids and alkalis? What the pH of a neutral solution?

Acid - Less than pH 7 (pH 1 is strongest).

Neutral - pH 7.

Alkali - Greater than pH 7 (pH 14 is strongest).

What can be used to measure pH?

What can be used to measure pH?

Universal indicator

pH probe

What colour is phenolphthalein in acid and alkali?

What colour is phenolphthalein in acid and alkali?

Acid - Colourless

Alkali - Pink

What colour is methyl orange in an acid and an alkali?

What colour is methyl orange in an acid and an alkali?

Acid - Red

Alkali - Yellow

What colour is blue litmus paper in an acid and an alkali?

What colour is blue litmus paper in an acid and an alkali?

Acid - Turns red

Alkali - Stays blue

What colour is red litmus paper in an acid and an alkali?

What colour is blue litmus paper in an acid and an alkali?

Acid - Stays red

Alkali - Turns blue

Suggest a problem with using universal indicator to test the pH of a solution

Suggest a problem with using universal indicator to test the pH of a solution

The colour of the solution is matched to a pH colour chart. This is quite subjective as people may disagree with which colour the solution matches.

It doesn't provide an exact pH value.

Acid X has a pH of 1. What can you say about the concentration of hydrogen ions in acid X?

(higher only)

Acid X has a pH of 1. What can you say about the concentration of hydrogen ions in acid X?

(higher only)

There is a high concentration of hydrogen ions in the acid, making it a strong acid.

The lower the pH of the acid, the higher the concentration of H^+ ions.

Alkali Y has a pH of 8.5. What can you say about the concentration of hydroxide ions in alkali Y?

(higher only)

Alkali Y has a pH of 8.5. What can you say about the concentration of hydroxide ions in alkali Y?
(higher only)

There is a low concentration of hydroxide ions in the alkali, making it a weak alkali.

The lower the pH of the alkali, the lower the concentration of OH^- ions.

If pH decreases by one unit, what happens to the concentration hydrogen ions?

(higher only)

If pH decreases by one unit, what happens to the concentration hydrogen ions?

(higher only)

The hydrogen ion concentration increases by a factor of 10.

What is a neutralisation reaction? During an acid-alkali neutralisation reaction, what happens?

What is a neutralisation reaction? During an acid-alkali neutralisation reaction, what happens?

A neutralisation reaction is a reaction between an acid and a base.

In an acid-alkali neutralisation reaction, H^+ ions from the acid react with OH^- ions from the alkali to form water.

What is the ionic equation for a neutralisation reaction?

What is the ionic equation for a neutralisation reaction?

$$H^+(aq) + OH^-(aq) \rightarrow H_2O(l)$$

What do the terms concentrated and dilute mean when talking about acid? Is this the same as strong/weak acids? (higher only)

What do the terms concentrated and dilute mean when talking about acid? Is this the same as strong/ weak acids? (higher only)

Concentrated acids have more moles of acid per unit volume of water than dilute acids.

The concentration of an acid is not the same as strength. Strength refers to whether the acid has completely dissociates in water or not.

An acid only partially dissociates in water. What can be said about the strength of the acid?

(higher only)

An acid only partially dissociates in water. What can be said about the strength of the acid? (higher only)

Weak acid

What is a base?

What is a base?

Any substance that reacts with an acid to form salt and water only.

True or false?
‘Alkalis are insoluble bases’

True or false?
‘Alkalis are insoluble bases’

FALSE

Alkalis are soluble bases.

What are the products when an acid reacts with a metal?

What are the products when an acid reacts with a metal?

Salt and hydrogen

$$\text{acid} + \text{metal} \rightarrow \text{salt} + \text{hydrogen}$$

What are the products when an acid reacts with a metal oxide?

What are the products when an acid reacts with a metal oxide?

Salt and water

$$\text{acid} + \text{metal oxide} \rightarrow \text{salt} + \text{water}$$

What are the products when an acid reacts with a metal hydroxide?

What are the products when an acid reacts with a metal hydroxide?

Salt and water

$$\text{acid} + \text{metal hydroxide} \rightarrow \text{salt} + \text{water}$$

What are the products when an acid reacts with a metal carbonate?

What are the products when an acid reacts with a metal carbonate?

Salt, water and carbon dioxide

Acid + metal carbonate → salt + water + carbon dioxide

Why are metal oxides normally bases rather than alkalis?

Why are metal oxides normally bases rather than alkalis?

Metal oxides are normally insoluble.

Alkalis are soluble.

What is the name of the salt formed from magnesium and sulfuric acid?

What is the name of the salt formed from magnesium and sulfuric acid?

Magnesium sulfate

What is the name of the salt formed from zinc oxide and nitric acid?

What is the name of the salt formed from zinc oxide and nitric acid?

Zinc nitrate

What is the name of the salt formed from calcium carbonate and hydrochloric acid?

What is the name of the salt formed from calcium carbonate and hydrochloric acid?

Calcium chloride

Describe the chemical test for hydrogen

Describe the chemical test for hydrogen

Insert a lit splint into a test tube of gas.

A ‘squeaky pop’ will be heard if hydrogen is present.

Describe the chemical test for carbon dioxide

Describe the chemical test for carbon dioxide

Bubble the gas through limewater (calcium hydroxide).

Limewater turns cloudy if carbon dioxide is present.

When a soluble salt is prepared from an acid and an insoluble reactant, why is excess of the insoluble reactant added?

When a soluble salt is prepared from an acid and an insoluble reactant, why is excess of the insoluble reactant added?

To ensure all the acid reacts.

When a soluble salt is prepared from an acid and an insoluble reactant, how and why is the excess reactant removed?

When a soluble salt is prepared from an acid and an insoluble reactant, how and why is the excess reactant removed?

By filtration.

It is removed to leave a pure solution of the salt.

What method must be used to prepare a salt from an acid and a soluble reactant?

What method must be used to prepare a salt from an acid and a soluble reactant? Why?

Titration.

Since both the reactants are soluble, a titration allows you to combine the reactants exactly and avoid adding an excess of either reactant as this would be hard to remove.

Name the method that could be used to prepare a sample of soluble copper sulfate from insoluble copper oxide and sulfuric acid?

Name the method that could be used to prepare a sample of soluble copper sulfate from insoluble copper oxide and sulfuric acid?

Filtration

What 3 steps are required when producing a pure dry salt from an acid and alkali?

What 3 steps are required when producing a pure dry salt from an acid and alkali?

Complete a titration to find the volume of acid that reacts exactly with a set volume of alkali.

Use the results from the titration to mix the acid and alkali in the correct proportions.

Evaporate the water from the solution, leaving pure dry salt crystals.

Describe how to carry out an acid-alkali titration

Describe how to carry out an acid-alkali titration

1. Use a pipette to add a measured volume of acid to the conical flask then add a few drops of indicator. Place on a white tile.
2. Fill the burette with the alkali, noting the initial volume.
3. Add the alkali to the conical flask. First complete a rough trial to find the end point (the point at which the indicator first changes colour).
4. Repeat, adding the alkali drop by drop near the end point and swirling the flask constantly to mix.
5. Record the final volume in the burette. Repeat until you have concordant results.

Most common chlorides are soluble. What are the two exceptions?

Most common chlorides are soluble. What are the two exceptions?

Silver chloride and lead chloride are insoluble.

True or false?
‘All nitrates are soluble’

True or false?
‘All nitrates are soluble’

TRUE

Fill in the gap:

‘All common sodium, potassium and ammonium salts are _____’

Fill in the gap: ‘All common sodium, potassium and ammonium salts are _____’

Soluble

Most common sulfates are soluble. What are the three exceptions?

Most common sulfates are soluble. What are the three exceptions?

Lead sulfate, calcium sulfate and barium sulfate are insoluble.

Most common carbonates and hydroxides are insoluble. What are the three exceptions?

Most common carbonates and hydroxides are insoluble. What are the three exceptions?

The carbonate / hydroxides of sodium potassium and ammonium are soluble.

What salt is produced when lead reacts with sulfuric acid? Will a precipitate form?

What salt is produced when lead reacts with sulfuric acid? Will a precipitate form?

Lead sulfate.

A precipitate will form because lead sulfate is insoluble.

How could you prepare a pure, dry sample of an insoluble salt?

How could you prepare a pure, dry sample of an insoluble salt?

1. Mix the two solutions required to form the salt.
2. Filter the mixture using filter paper.
3. The residue on the filter paper is the insoluble salt.
4. Wash the salt with distilled water and leave to dry.

What is an electrolyte?

What is an electrolyte?

An ionic compound in its molten or aqueous state.

Aqueous - dissolved in water.

Why can an electrolyte carry charge?

Why can an electrolyte carry charge?

An ionic compound in is molten or aqueous state has mobile ions which can carry charge.

What is electrolysis?

What is electrolysis?

A process which uses electrical energy (from a direct current supply) to decompose electrolytes.

What is the cathode and anode?

What is the cathode and anode?

Cathode - negative electrode

Anode - positive electrode

Where do charged ions in the electrolyte move to during electrolysis?

Where do charged ions in the electrolyte move to during electrolysis?

Cations (positive ions) move towards the cathode (negative electrode).

Anions (negative ions) move towards the anode (positive electrode).

What happens at the anode during electrolysis?

What happens at the anode during electrolysis?

The anions (negatively charged ions) lose electrons to form their elements.

What happens at the cathode during electrolysis?

What happens at the cathode during electrolysis?

Cations (positively charged ions) gain electrons to form their elements.

Name the processes that occur at each electrode during electrolysis (higher only)

Name the processes that occur at each electrode during electrolysis
(higher only)

Anode (positive) - oxidation.

Cathode (negative) - reduction.

What is formed at each electrode in electrolysis?

What is formed at each electrode in electrolysis?

Positive electrode: Non metal.

Negative electrode: Metal or hydrogen.

How can you predict whether a metal or hydrogen will form at the negative electrode?

How can you predict whether a metal or hydrogen will form at the negative electrode?

If hydrogen is above the metal in the reactivity series then the metal will form.

If the metal is more reactive than hydrogen then hydrogen will form.

What is formed at each electrode during the electrolysis of copper chloride solution?

What is formed at each electrode during the electrolysis of copper chloride solution?

Positive electrode: Chlorine

Negative electrode: Copper

What is formed at each electrode during the electrolysis of sodium sulfate solution?

What is formed at each electrode during the electrolysis of sodium sulfate solution?

Positive electrode: Oxygen

Negative electrode: Hydrogen

What is formed at each electrode during the electrolysis of molten lead bromide?

What is formed at each electrode during the electrolysis of molten lead bromide?

Positive electrode: Bromine

Negative electrode: Hydrogen

Predict what will be formed at each electrode during the electrolysis of molten zinc chloride

Predict what will be formed at each electrode during the electrolysis of molten zinc chloride

Positive electrode: Chlorine

Negative electrode: Zinc

What is formed at each electrode during the electrolysis of sodium chloride solution?

What is formed at each electrode during the electrolysis of sodium chloride solution?

Positive electrode: Chlorine

Negative electrode: Hydrogen

What is formed at each electrode during the electrolysis of water acidified with sulfuric acid?

What is formed at each electrode during the electrolysis of water acidified with sulfuric acid?

Positive electrode: Oxygen

Negative electrode: Hydrogen

What are the half equations for the reactions occuring at the cathode and anode during the electrolysis of copper chloride?

(higher only)

What are the half equations for the reactions occuring at the cathode and anode during the electrolysis of copper chloride? (higher only)

Anode: $2Cl^- \rightarrow Cl_2 + 2e^-$

Cathode: $Cu^{2+} + 2e^- \rightarrow Cu$

What does oxidation mean in terms of electrons?

(higher only)

What does oxidation mean in terms of electrons? (higher only)

Loss of electrons

What does reduction mean in terms of electrons?

(higher only)

What does reduction mean in terms of electrons? (higher only)

Gain of electrons

Describe how electrolysis of copper sulfate can be used to purify copper

Describe how electrolysis of copper sulfate can be used to purify copper

Place 2 copper electrodes into copper sulfate solution. The anode should be impure copper and cathode should be pure copper. Connect to a power supply.

The copper in the impure anode is pulled towards the cathode to form pure copper. Impurities form as sludge below the anode. Cu^{2+} ions from copper sulfate remain in solution.