

CIE Chemistry IGCSE

Topic 8 - Acids, Bases and Salts

Flashcards

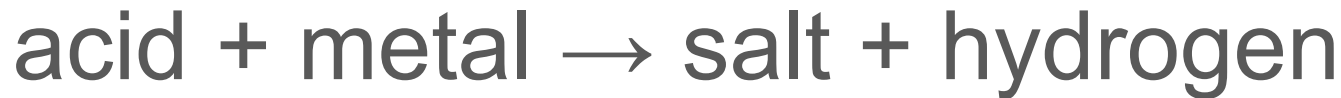


What are the products when an acid reacts with a metal?



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

Salt and hydrogen



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

acid + metal oxide \rightarrow salt + 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

acid + metal hydroxide \rightarrow salt + 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 bases.



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



What colour is methyl orange in acid and alkali?



What colour is methyl orange in acid and alkali?

Acid - Red

Alkali - Yellow



What colour is blue litmus paper in acid
and alkali?



What colour is blue litmus paper in acid and alkali?

Acid - Turns red

Alkali - Stays blue



What colour is red litmus paper in acid
and alkali?



What colour is red litmus paper in acid and alkali?

Acid - Stays red

Alkali - Turns blue



What do acids produce in an aqueous solution?



What do acids produce in an aqueous solution?

H^+ ions



What do bases produce in an aqueous solution?



What do bases produce in an aqueous solutions?

OH^- ions



Define acids and bases in terms of
proton transfer
(extended only)



Define acids and bases in terms of proton transfer
(extended only)

Protons are H^+ ions.

Acids are proton donors.

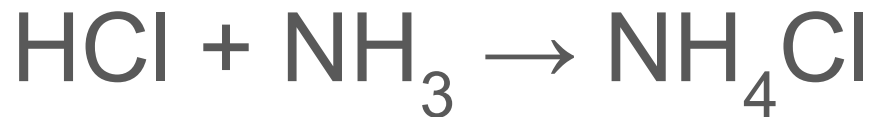
Bases are proton acceptors.



What is the chemical equation for the reaction between hydrochloric acid and ammonia?



What is the chemical equation for the reaction between hydrochloric acid and ammonia?



What is the chemical equation for the reaction between sulfuric acid and sodium hydroxide?



What is the chemical equation for the reaction between sulfuric acid and sodium hydroxide?



What is the difference between a strong
and weak acid?
(extended only)



What is the difference between a strong and weak acid? (extended only)

The strength of the acid refers to the degree of ionisation (or dissociation).

Strong acids are completely ionised in aqueous solutions (lots of H^+ ions are released).

Weak acids are only partially ionised in aqueous solutions (fewer H^+ ions released).



What is the difference between a strong
and weak base?
(extended only)



What is the difference between a strong and weak base? (extended only)

Strong bases are completely ionised in aqueous solutions (lots of OH^- ions are released).

Weak bases are only partially ionised in aqueous solutions (fewer OH^- ions released).



How is the relative acidity and alkalinity of a solution quantified?



How is the relative acidity and alkalinity of a solution quantified?

Using the pH scale



How can pH be measured?



How can pH be measured?

Universal indicator

pH probe



Which pH values describe an acid, alkali and neutral solution?



Which pH values describe an acid, alkali and neutral solution?

Acid: $\text{pH} < 7$

Neutral: $\text{pH} = 7$

Alkali: $\text{pH} > 7$



Why is it important to control acidity in soil?



Why is it important to control acidity in soil?

If the soil is too acidic, crops will be unable to grow.



How is an acidic oxide formed?



How is an acidic oxide formed?

An acidic oxide is generally formed when a non-metal reacts with oxygen.

E.g. SO_2



How is a basic oxide formed?



How is a basic oxide formed?

A basic oxide is generally formed when a metal reacts with oxygen.

E.g. CaO



What is a neutral oxide? (extended only)



What is a neutral oxide? (extended only)

Some non-metallic oxides are neutral.
They can't neutralise acids or bases.

E.g. H_2O



What is an amphoteric oxide?
(extended only)



What is an amphoteric oxide? (extended only)

Some metal oxides are amphoteric meaning they can neutralise both acids and bases to form a salt and water.

E.g. Al_2O_3



An insoluble base reacts with an acid to form a soluble salt. How can the salt be removed from the solution?



An insoluble base reacts with an acid to form a soluble salt. How can the salt be removed from the solution?

- Add excess base to the acid.
- Use filter paper and a funnel to remove any unreacted base.
- Keep in a warm place to evaporate the water.
The salt crystals will be left behind.



How can a soluble salt be prepared from an acid and soluble base?



How can a soluble salt be prepared from an acid and soluble base?

- Use an acid/base titration to find the exact volume of base required for neutralisation of the acid.
- React the exact quantities of acid and base together without any indicator and collect the solution formed.
- Leave to dry in a warm place to evaporate the water. The salt crystals can be collected from the evaporating dish.



How can an insoluble salt be collected
from a reaction mixture?
(extended only)



How can an insoluble salt be collected from a reaction mixture? (extended only)

The insoluble salt is a precipitate so can be collected by filtration:

- Put filter paper in a funnel then place in a conical flask.
- Pour the reaction mixture into the funnel. Wash the salt with distilled water to wash away any solution.
- The salt crystals will be collected on the filter paper. Leave this to dry in a warm place before collecting the crystals.



What reactants can be used to form the
salt magnesium nitrate?
(extended only)



What reactants can be used to form the salt magnesium nitrate? (extended only)

Magnesium

Nitric acid



Suggest a method that could be used to produce sodium sulfate from sodium hydroxide and hydrochloric acid
(extended only)



Suggest a method that could be used to produce sodium sulfate from sodium hydroxide and hydrochloric acid (**extended only**)

Titration



What colour precipitate forms when sodium hydroxide reacts with calcium ions?



What colour precipitate forms when sodium hydroxide reacts with calcium ions?

White



What colour precipitate forms when sodium hydroxide reacts with chromium(III) ions?



What colour precipitate forms when sodium hydroxide reacts with chromium(III) ions?

Green



What colour precipitate forms when sodium hydroxide reacts with aluminium ions?



What colour precipitate forms when sodium hydroxide reacts with aluminium ions?

White precipitate at first.

Re-dissolves with excess NaOH to form a colourless solution.



What colour precipitate forms when sodium hydroxide reacts with copper(II) ions?



What colour precipitate forms when sodium hydroxide reacts with copper(II) ions?

Blue



What colour precipitate forms when sodium hydroxide reacts with iron(II) ions?



What colour precipitate forms when sodium hydroxide reacts with iron(II) ions?

Green



What colour precipitate forms when sodium hydroxide reacts with iron(III) ions?



What colour precipitate forms when sodium hydroxide reacts with iron(III) ions?

Brown



What colour precipitate forms when sodium hydroxide reacts with zinc ions?



What colour precipitate forms when sodium hydroxide reacts with zinc ions?

White precipitate at first.

Re-dissolves with excess NaOH to form a colourless solution.



What is observed when ammonia reacts with aluminium ions?



What is observed when ammonia reacts with aluminium ions?

White precipitate forms.



What is observed when ammonia reacts with calcium ions?



What is observed when ammonia reacts with calcium ions?

No observations.



What is observed when ammonia reacts with zinc ions?



What is observed when ammonia reacts with zinc ions?

White precipitate forms at first.

Re-dissolves in excess ammonia.



Describe how to carry out a flame test



Describe how to carry out a flame test

- Clean a nichrome wire using hydrochloric acid.
- Turn the Bunsen burner onto the blue flame.
- Dip the wire in the solid substance that you want to test.
- Place the wire in the flame. Record the colour of the flame.



What is the result of the flame test on lithium ions?



What is the result of the flame test on lithium ions?

Crimson flame



What is the result of the flame test on sodium ions?



What is the result of the flame test on sodium ions?

Yellow flame



What is the result of the flame test on potassium ions?



What is the result of the flame test on potassium ions?

Lilac flame



What is the result of the flame test on copper ions?



What is the result of the flame test on copper ions?

Blue-green flame



Describe the test for carbonate ions



Describe the test for carbonate ions

- Add a few drops of HCl to the sample in a test tube.
- Connect this test tube to a test tube of limewater.
- If carbonate ions are present, carbon dioxide will be produced. Limewater will turn cloudy when CO_2 is bubbled through.



Describe the test for halide ions



Describe the test for halide ions

- Add a couple of drops of nitric acid to react with any carbonate ions which would obscure the results.
- Add a couple of drops of silver nitrate and observe the colour of the precipitate.



What colour precipitate is formed when silver nitrate is added to a chloride solution?



What colour precipitate is formed when silver nitrate is added to a chloride solution?

White precipitate



What colour precipitate is formed when silver nitrate is added to a bromide solution?



What colour precipitate is formed when silver nitrate is added to a bromide solution?

Cream precipitate



What colour precipitate is formed when silver nitrate is added to an iodide solution?



What colour precipitate is formed when silver nitrate is added to an iodide solution?

Yellow precipitate



Describe the test for nitrate ions



Describe the test for nitrate ions

- Add aluminium and sodium hydroxide to the sample.
- Test for ammonia gas. Damp red litmus paper will turn blue if ammonia present.



Describe the test for sulfate ions



Describe the test for sulfate ions

- Add HCl to remove any CO_3^{2-} ions which would obscure the results.
- Add a couple of drops of barium chloride.
- If sulfate ions are present, a white precipitate of barium sulfate will form.



Describe the test for sulfite ions



Describe the test for sulfite ions

- Add dilute acid.
- Sulfur dioxide gas is given off.
- Test for sulfur dioxide using aqueous potassium manganate(VII). Colour should change from purple to colourless.



Describe the test for oxygen gas



Describe the test for oxygen gas

Insert a glowing splint into a test tube of gas. If oxygen is present, the splint will relight.



Describe the test for hydrogen gas



Describe the test for hydrogen gas

Insert a burning splint into a test tube of gas. If hydrogen is present, a squeaky pop will be heard.



Describe the test for carbon dioxide gas



Describe the test for carbon dioxide gas

Bubble the gas through limewater.

The limewater will turn cloudy if carbon dioxide is present.



Describe the test for chlorine gas



Describe the test for chlorine gas

Insert damp blue litmus paper into a test tube of gas. If chlorine is present, the litmus paper will turn red before being bleached white.



Describe the test for ammonia gas



Describe the test for ammonia gas

Ammonia gas will turn damp red litmus paper blue.



Describe the test for sulfur dioxide



Describe the test for sulfur dioxide

Add potassium manganate(VII).

Colour will change from purple to colourless.

