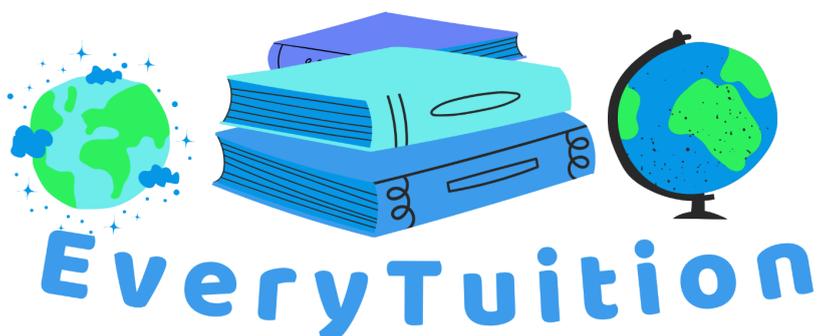


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Chemistry Topic 4 AQA Exam Questions: Chemical Changes

Exam Questions/Mock Exam Questions



Questions For Foundation, Higher, and Triple Science ([scroll down for questions for higher and triple science only](#)):

(It would still be recommended to answer the foundation tier questions for triple science and higher tier to ensure you have good understanding).

Q1.

Jack is investigating acids and metals.

(a) What gas is produced when magnesium reacts with hydrochloric acid?

[2]

(b) Write a word equation for the reaction of magnesium with hydrochloric acid.

[2]

[Total: 4 marks]

Q2.

Tom tests different metals with sulfuric acid.

(a) Which metal reacts fastest with dilute acid: magnesium, copper, or zinc?

[1]

(b) Explain why copper does not react with dilute acid.

[2]

[Total: 3 marks]

Q3.

Harry investigates the reactivity series.

(a) State what is meant by the reactivity series.

[2]

(b) Explain why potassium reacts more vigorously with water than sodium.

[2]

[Total: 4 marks]

Q4.

Ben observes displacement reactions.

(a) Write the word equation for the reaction of iron with copper(II) sulfate solution.

[2]

(b) Explain why iron can displace copper from copper(II) sulfate.

[2]

[Total: 4 marks]

Q5.

Daniel tests acids with indicators.

(a) Name an indicator that turns red in acids.

[1]

(b) Describe the colour change of universal indicator from acid to alkali.

[2]

[Total: 3 marks]

Q6.

Oliver investigates neutralisation reactions.

(a) Write the word equation for the reaction between hydrochloric acid and sodium hydroxide.

[2]

(b) Explain what happens to the hydrogen ions (H^+) during neutralisation.

[2]

[Total: 4 marks]

Q7.

Ethan studies the pH scale.

(a) What is the pH of a neutral solution?

[1]

(b) State whether a solution of hydrochloric acid with pH 2 is strong or weak.

[1]

(c) Explain what happens to the concentration of H^+ ions as the pH decreases.

[2]

[Total: 4 marks]

Q8.

Sam investigates metal oxides.

(a) Which type of metal oxides are soluble in acids: basic or acidic?

[1]

(b) Explain why magnesium oxide reacts with hydrochloric acid.

[2]

[Total: 3 marks]

Q9.

Charlie studies reactions of acids with carbonates.

(a) What gas is produced when hydrochloric acid reacts with calcium carbonate?

[1]

(b) Write a word equation for the reaction of hydrochloric acid with calcium carbonate.

[2]

[Total: 3 marks]

Q10.

Noah investigates the reactivity of metals.

(a) Which is more reactive: zinc or iron?

[1]

(b) Explain why a more reactive metal displaces a less reactive metal from its compound.

[2]

[Total: 3 marks]

Q11.

William tests acids with different indicators.

(a) State the pH range of an acidic solution.

[1]

(b) Name one indicator that can be used to measure pH.

[1]

(c) Describe the colour change of methyl orange in acids and alkalis.

[2]

[Total: 4 marks]

Q12.

Alex observes neutralisation.

(a) Explain what is meant by neutralisation.

[2]

(b) Give the general ionic equation for the reaction of an acid with a metal hydroxide.

[2]

[Total: 4 marks]

Q13.

Jacob investigates displacement reactions.

(a) Write a word equation for the reaction of zinc with copper(II) sulfate solution.

[2]

(b) Explain why zinc displaces copper from copper(II) sulfate.

[2]

[Total: 4 marks]

Q14.

James studies acids and alkalis.

(a) Name a soluble base.

[1]

(b) Explain what happens when an acid reacts with a soluble base.

[2]

(c) Give one example of a neutralisation reaction.

[1]

[Total: 4 marks]

Q15.

Luke investigates acids and metals.

(a) Magnesium reacts with hydrochloric acid to produce hydrogen. Write the symbol equation.

[2]

(b) Explain why the reaction rate increases if the magnesium is powdered.

[2]

(c) State one safety precaution Luke should take when handling hydrochloric acid.

[1]

[Total: 5 marks]

Higher Tier

Q16.

Jack investigates reactions between metals and acids.

(a) What is produced when zinc reacts with hydrochloric acid?

[2]

(b) Write a word equation for the reaction of zinc with hydrochloric acid.

[2]

[Total: 4 marks]

Q17.

Tom is studying the reactivity of metals.

(a) Which metal is more reactive: iron or magnesium?

[1]

(b) Explain why magnesium reacts faster than iron with dilute acids.

[2]

[Total: 3 marks]

Q18.

Harry is investigating displacement reactions.

(a) Write a word equation for the reaction of copper(II) sulfate solution with iron.

[2]

(b) Explain why iron displaces copper from copper(II) sulfate solution.

[2]

[Total: 4 marks]

Q19.

Ben tests acids using indicators.

(a) Name an indicator that turns red in acids.

[1]

(b) Describe what colour universal indicator shows in alkali.

[2]

[Total: 3 marks]

Q20.

Daniel investigates neutralisation.

(a) Write a word equation for the reaction between hydrochloric acid and sodium hydroxide.

[2]

(b) Explain what happens to H^+ ions during neutralisation.

[2]

[Total: 4 marks]

Q21.

Oliver is learning about the pH scale.

(a) What is the pH of a neutral solution?

[1]

(b) State whether a solution with pH 12 is acidic, neutral, or alkaline.

[1]

(c) Explain what happens to the concentration of H^+ ions as pH increases.

[2]

[Total: 4 marks]

Q22.

Ethan is testing metal oxides.

(a) Which type of metal oxides are soluble in acids: basic or acidic?

[1]

(b) Explain why calcium oxide reacts with hydrochloric acid.

[2]

[Total: 3 marks]

Q23.

Sam studies reactions of acids with carbonates.

(a) What gas is produced when hydrochloric acid reacts with calcium carbonate?

[1]

(b) Write a word equation for this reaction.

[2]

[Total: 3 marks]

Q24.

Charlie is learning about the reactivity series.

(a) Which is more reactive: zinc or copper?

[1]

(b) Explain why a more reactive metal displaces a less reactive metal from its compound.

[2]

[Total: 3 marks]

Q25.

Noah investigates acids with indicators.

(a) Name an indicator that can be used to measure pH.

[1]

(b) Describe the colour change of methyl orange in acid and alkali.

[2]

[Total: 3 marks]

Q26.

William observes neutralisation.

(a) Explain what is meant by neutralisation.

[2]

(b) Give the general ionic equation for the reaction of an acid with a metal hydroxide.

[2]

[Total: 4 marks]

Q27.

Alex investigates displacement reactions.

(a) Write a word equation for the reaction of zinc with copper(II) sulfate solution.

[2]

(b) Explain why zinc displaces copper from copper(II) sulfate.

[2]

[Total: 4 marks]

Q28.

Jacob is testing acids and bases.

(a) Name a soluble base.

[1]

(b) Explain what happens when an acid reacts with a soluble base.

[2]

(c) Give one example of a neutralisation reaction.

[1]

[Total: 4 marks]

Q29.

James investigates magnesium and hydrochloric acid.

(a) Write the symbol equation for the reaction.

[2]

(b) Explain why powdered magnesium reacts faster than a solid strip.

[2]

(c) State one safety precaution when handling hydrochloric acid.

[1]

[Total: 5 marks]

Q30.

Luke tests acids with metal carbonates.

(a) What gas is produced when calcium carbonate reacts with nitric acid?

[1]

(b) Write a word equation for the reaction.

[2]

(c) Explain why bubbles of gas appear during the reaction.

[2]

[Total: 5 marks]

Q31.

Jack investigates the reactivity of metals with water.

(a) Which metal reacts faster with water: potassium or sodium?

[1]

(b) Explain why potassium reacts more vigorously than sodium.

[2]

[Total: 3 marks]

Q32.

Tom studies acids and hydrogen ions.

(a) What ion is responsible for the acidity of all acids?

[1]

(b) Explain why strong acids have a low pH.

[2]

[Total: 3 marks]

Q33.

Harry is observing neutralisation reactions.

(a) What is the general word equation for a neutralisation reaction?

[1]

(b) Explain what is meant by an alkali.

[2]

[Total: 3 marks]

Q34.

Ben is testing indicators.

(a) Which indicator turns blue in alkali?

[1]

(b) Describe the colour change of universal indicator from pH 3 to pH 10.

[2]

[Total: 3 marks]

Q35.

Daniel investigates metal oxides.

(a) Which metal oxides react with acids: basic or acidic?

[1]

(b) Explain why magnesium oxide reacts with hydrochloric acid.

[2]

[Total: 3 marks]

Q36.

Oliver tests metals with acid.

(a) Write the symbol equation for the reaction of magnesium with hydrochloric acid.

[2]

(b) Explain why hydrogen gas is produced in this reaction.

[2]

(c) Suggest a safety precaution when handling magnesium and acid.

[1]

[Total: 5 marks]

Q37.

Ethan observes displacement reactions.

(a) Write the word equation for the reaction of iron with copper(II) sulfate solution.

[2]

(b) Explain why iron displaces copper.

[2]

[Total: 4 marks]

Q38.

Sam investigates acids and alkalis.

(a) Give one example of a strong acid.

[1]

(b) Explain why strong acids have a lower pH than weak acids.

[2]

(c) Name a weak acid found in vinegar.

[1]

[Total: 4 marks]

Q39.

Charlie studies pH indicators.

(a) What colour does methyl orange show in acid?

[1]

(b) What colour does methyl orange show in alkali?

[1]

(c) Explain how the universal indicator shows a gradual change in pH.

[2]

[Total: 4 marks]

Q40.

Noah investigates acids with metal carbonates.

(a) Write the word equation for the reaction of magnesium carbonate with hydrochloric acid.

[2]

(b) Explain why effervescence occurs in this reaction.

[2]

(c) Name the gas produced.

[1]

[Total: 5 marks]

Triple Science Tier

Q41.

James investigates the reaction between magnesium and hydrochloric acid.

(a) Write the balanced symbol equation for the reaction.

[2]

(b) 3.0 g of magnesium reacts with excess hydrochloric acid. Calculate the volume of hydrogen gas produced at room temperature and pressure.

(Relative atomic mass: Mg = 24, 1 mol gas = 24 L)

[4]

[Total: 6 marks]

Q42.

Tom studies the reactivity of metals with acids.

(a) Explain why zinc reacts with hydrochloric acid but copper does not.

[3]

(b) Predict what happens when magnesium reacts with dilute sulfuric acid.

[2]

[Total: 5 marks]

Q43.

Harry investigates neutralisation reactions.

(a) Write the ionic equation for the reaction of hydrochloric acid with sodium hydroxide.

[2]

(b) Explain why neutralisation produces a salt and water.

[3]

[Total: 5 marks]

Q44.

Ben studies pH and acidity.

(a) Explain why a strong acid has a lower pH than a weak acid of the same concentration.

[3]

(b) A solution of hydrochloric acid has a pH of 2. Calculate the concentration of H⁺ ions in mol/dm³.

[2]

[Total: 5 marks]

Q45.

Daniel observes displacement reactions.

(a) Write a balanced symbol equation for the reaction of iron with copper(II) sulfate solution.

[2]

(b) Explain why iron displaces copper.

[2]

(c) Suggest one practical application of displacement reactions.

[2]

[Total: 6 marks]

Q46.

Oliver is investigating acids with carbonates.

(a) Write a balanced symbol equation for the reaction of calcium carbonate with hydrochloric acid.

[2]

(b) 10 g of calcium carbonate reacts with excess acid. Calculate the mass of CO_2 produced. (Relative formula masses: $\text{CaCO}_3 = 100$, $\text{CO}_2 = 44$)

[3]

[Total: 5 marks]

Q47.

Ethan studies the reactivity series.

(a) Explain why potassium reacts more vigorously with water than sodium.

[3]

(b) Suggest why gold does not react with water or dilute acids.

[2]

[Total: 5 marks]

Q48.

Sam investigates metal oxides.

(a) Explain why magnesium oxide reacts with hydrochloric acid but copper oxide does not.

[3]

(b) Write the word equation for the reaction of magnesium oxide with hydrochloric acid.

[2]

[Total: 5 marks]

Q49.

Charlie observes reactions of acids with bases.

(a) Explain the difference between a strong acid and a weak acid.

[3]

(b) Give one example of a weak acid used in the laboratory.

[1]

(c) Explain what happens to H^+ ions during neutralisation.

[2]

[Total: 6 marks]

Q50.

Noah investigates the pH scale.

(a) What is the pH range of acidic solutions?

[1]

(b) Explain why universal indicator shows a gradual colour change across the pH scale.

[2]

(c) A solution has pH 11. Is it acidic, neutral, or alkaline? Explain your answer.

[2]

[Total: 5 marks]

Q51.

William studies acids and alkalis.

(a) Write the general word equation for the reaction of an acid with a metal hydroxide.

[2]

(b) Explain why this reaction is called neutralisation.

[2]

(c) Give an example of a neutralisation reaction.

[1]

[Total: 5 marks]

Q52.

Alex observes reactions of metals with acids.

(a) Which gas is produced when magnesium reacts with hydrochloric acid?

[1]

(b) Explain why hydrogen gas is produced in this reaction.

[2]

(c) Write the balanced symbol equation for the reaction.

[2]

[Total: 5 marks]

Q53.

Jacob studies displacement reactions.

(a) Write a word equation for the reaction of zinc with copper(II) sulfate.

[2]

(b) Explain why zinc displaces copper from copper(II) sulfate.

[2]

(c) Suggest one use of displacement reactions in industry.

[2]

[Total: 6 marks]

Q54.

James investigates acids with carbonates.

(a) Write a balanced symbol equation for the reaction of sodium carbonate with hydrochloric acid.

[2]

(b) Explain why bubbles are produced during the reaction.

[2]

(c) Suggest one method to collect the gas produced safely.

[1]

[Total: 5 marks]

Q55.

Luke plans an experiment to investigate the reaction between a metal and an acid.

In your answer, include:

- the apparatus he would use
- how he would carry out the experiment
- the measurements he would take

[6]

[Total: 6 marks]