

AQA (GCSE Notes)

Chapter 8: Chemical Analysis

- Q1. What is meant by a pure substance in chemistry?
- Q2. How can melting point data help identify whether a substance is pure?
- Q3. Why do pure substances have specific boiling points?
- Q4. What is the main difference between a pure substance and a mixture?
- Q5. How does the melting point of a mixture compare with that of a pure substance?
- Q6. Why does an impure substance melt over a range of temperatures?
- Q7. What is the definition of a formulation?
- Q8. Why are formulations used in everyday products?
- Q9. How can the properties of a formulation be controlled?
- Q10. Give an example of a formulation and explain its components' purposes.
- Q11. How do formulations differ from simple mixtures?
- Q12. Why is it important to mix the components of a formulation in the correct amounts?
- Q13. What types of products are often made as formulations?
- Q14. Why are medicines often formulated with more than one chemical?
- Q15. How would you identify if a product is a formulation from its label?
- Q16. Why might a paint formulation contain both pigments and solvents?
- Q17. What role do fertilisers play as formulations in agriculture?
- Q18. How can you test the purity of a chemical substance?
- Q19. What would happen to the boiling point of a substance if it is contaminated?
- Q20. In what way does the everyday definition of "pure" differ from the scientific definition?
- Q21. Why might a pure substance from nature still be considered impure in chemistry?

- Q22.** How do alloys demonstrate the concept of formulations?
- Q23.** What is the role of chromatography in identifying pure substances?
- Q24.** Why are boiling point and melting point data useful in forensic science?
- Q25.** Why is it important for food products to be pure?
- Q26.** What makes a good cleaning agent formulation?
- Q27.** What property of a mixture changes if an extra component is added?
- Q28.** Why do scientists measure both melting and boiling points during purity testing?
- Q29.** How do temperature changes affect the properties of mixtures?
- Q30.** How does a drug formulation ensure that the medicine works effectively?
- Q31.** Why can formulations not be separated by simple physical means?
- Q32.** What is the importance of accurate measuring when making formulations?
- Q33.** How does the presence of impurities affect the safety of chemicals?
- Q34.** Why is it important that fuels are carefully formulated?
- Q35.** What is the function of binders in paint formulations?
- Q36.** Why do scientists analyse formulations in forensic investigations?
- Q37.** How do changes in component ratios affect the performance of a formulation?
- Q38.** Why is it important to test the consistency of formulations during manufacturing?
- Q39.** What makes instrumental methods more reliable than qualitative tests?
- Q40.** How can chromatography help identify unknown chemicals in a mixture?
- Q41.** Why is it difficult to identify the components of a complex mixture without instrumental methods?
- Q42.** What advantage do instrumental methods offer when only a small sample is available?
- Q43.** How do impurities affect the appearance of a substance during testing?
- Q44.** What is meant by the term “sensitive” in relation to instrumental testing?
- Q45.** Why must forensic scientists use accurate and sensitive tests?



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- Q46.** How can you tell if a liquid is a formulation?
- Q47.** Why are insoluble solids formed during some purity tests?
- Q48.** Why do cleaning products often contain multiple components?
- Q49.** What would happen if the components in a formulation were not well mixed?
- Q50.** How can you use chromatography to check the purity of a sample?
- Q51.** What is the purpose of the stationary phase in paper chromatography?
- Q52.** What is the role of the mobile phase in paper chromatography?
- Q53.** Why do different substances move different distances in paper chromatography?
- Q54.** What is meant by the R_f value in chromatography?
- Q55.** How is the R_f value of a substance calculated?
- Q56.** What does an R_f value tell you about a substance in chromatography?
- Q57.** Why must the baseline in paper chromatography be drawn in pencil?
- Q58.** What would happen if the baseline in chromatography was drawn in ink?
- Q59.** What does it mean if a chromatogram shows more than one spot for a substance?
- Q60.** How can you tell if a substance is pure using chromatography?
- Q61.** What does a single spot on a chromatogram suggest about a substance?
- Q62.** Why is it important to keep the solvent level below the baseline in chromatography?
- Q63.** Why do different solvents produce different chromatograms for the same mixture?
- Q64.** What safety precautions should be taken during the chromatography experiment?
- Q65.** How do you prepare a chromatography paper for separating food colours?
- Q66.** What is the significance of placing the lid on the chromatography container?
- Q67.** What can you do if two substances have very similar R_f values?
- Q68.** What is the effect of temperature on the movement of substances in chromatography?
- Q69.** Why is it important to allow the solvent to rise to a suitable height on the paper?



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- Q70.** How can paper chromatography be used to identify an unknown substance?
- Q71.** In a chromatography experiment, what would you do if the solvent front is not straight?
- Q72.** How do impurities in a sample affect the chromatography results?
- Q73.** What are some common solvents used in paper chromatography?
- Q74.** How can you compare R_f values obtained in an experiment with known values?
- Q75.** How would you measure the distance moved by the solvent?
- Q76.** How would you measure the distance moved by a coloured spot?
- Q77.** What units are used when calculating R_f values?
- Q78.** What is the maximum value an R_f value can have?
- Q79.** Why should R_f values be recorded to two decimal places?
- Q80.** What is the test for hydrogen gas?
- Q81.** What observation confirms the presence of hydrogen during the test?
- Q82.** Why is a burning splint used when testing for hydrogen?
- Q83.** What is the test for oxygen gas?
- Q84.** What does it mean when a glowing splint relights?
- Q85.** Why is it important to use a glowing splint instead of a burning one when testing for oxygen?
- Q86.** Why must the test tube be open during the test for gases?
- Q87.** What might cause a false positive result when testing for hydrogen?
- Q88.** How can you make sure the gas being tested is not contaminated?
- Q89.** Why is it useful to test for gases in chemical reactions?
- Q90.** How do you safely collect hydrogen gas in the lab?
- Q91.** Why is hydrogen collected over water?
- Q92.** What safety concerns are there when testing for hydrogen?
- Q93.** Why does hydrogen make a 'pop' sound when tested?

- Q94.** In what type of reaction is oxygen usually produced?
- Q95.** How can you distinguish between hydrogen and oxygen using tests?
- Q96.** What would happen if you used a glowing splint to test for hydrogen?
- Q97.** How could you show that a gas produced is not oxygen?
- Q98.** Why should you carry out the gas tests quickly after collecting the gas?
- Q99.** What is the advantage of using simple gas tests in school laboratories?
- Q100.** How can you confirm that a gas collected in an experiment is not air?
- Q101.** What is the name of the solution used to test for carbon dioxide?
- Q102.** Describe what happens to limewater when carbon dioxide is bubbled through it.
- Q103.** Why does limewater turn cloudy when carbon dioxide is present?
- Q104.** What gas turns damp litmus paper white?
- Q105.** What is the reason for dampening the litmus paper when testing for chlorine?
- Q106.** How does chlorine affect litmus paper?
- Q107.** What colour does lithium produce in a flame test?
- Q108.** What colour does sodium produce in a flame test?
- Q109.** What flame colour is observed for potassium compounds?
- Q110.** What flame colour is produced by calcium ions?
- Q111.** What is the flame colour for copper compounds?
- Q112.** Why might some flame colours be difficult to see in a sample with mixed ions?
- Q113.** What is the purpose of a flame test?
- Q114.** Why is it important to clean the wire loop before performing a flame test?
- Q115.** Name two metal ions that give a white precipitate when sodium hydroxide is added.
- Q116.** Which white precipitate dissolves in excess sodium hydroxide?
- Q117.** How would you distinguish between calcium and aluminium ions using sodium hydroxide?



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- Q118.** What colour precipitate is formed when copper(II) ions react with sodium hydroxide?
- Q119.** What colour precipitate does iron(II) form with sodium hydroxide?
- Q120.** What colour precipitate does iron(III) form with sodium hydroxide?
- Q121.** How could you distinguish between iron(II) and iron(III) using sodium hydroxide?
- Q122.** What is the name of the solid formed when a metal ion reacts with sodium hydroxide?
- Q123.** Write a word equation for the reaction of copper(II) sulfate with sodium hydroxide.
- Q124.** Write a balanced symbol equation for the reaction of iron(II) sulfate with sodium hydroxide.
- Q125.** Write a balanced chemical equation for the reaction of aluminium nitrate with sodium hydroxide.
- Q126.** What is a precipitate?
- Q127.** What does it mean if a precipitate dissolves in excess sodium hydroxide?
- Q128.** How can you test whether a white precipitate is aluminium hydroxide?
- Q129.** What is the appearance of magnesium hydroxide when formed in a reaction?
- Q130.** How can you distinguish between magnesium and calcium ions using flame tests?
- Q131.** Why is it useful to use both flame tests and sodium hydroxide tests when identifying metal ions?
- Q132.** What safety precautions should be taken when using chlorine gas in a test?
- Q133.** What should be done if no flame colour is seen in a flame test?
- Q134.** Why must the wire used in a flame test be platinum or nichrome?
- Q135.** Describe how to carry out a flame test.
- Q136.** What would you observe if you added sodium hydroxide to a solution containing iron(III) ions?
- Q137.** How does the test for chlorine differ from the test for carbon dioxide?
- Q138.** Why can some metal hydroxides not be identified by colour alone?
- Q139.** What ion causes limewater to turn milky?
- Q140.** What gas is formed when calcium carbonate reacts with an acid?

- Q141.** Why is calcium hydroxide described as a test reagent?
- Q142.** What happens to litmus paper in the presence of an acidic gas like chlorine?
- Q143.** Why must the litmus paper be damp when testing for chlorine?
- Q144.** How would you test a solution for the presence of copper(II) ions?
- Q145.** What ion gives a green precipitate with sodium hydroxide?
- Q146.** Explain why flame colours are not reliable for samples with more than one metal ion.
- Q147.** What is the role of sodium hydroxide in ion identification?
- Q148.** Why is it important to use clean apparatus when testing for metal ions?
- Q149.** What would you expect to see when sodium hydroxide is added to magnesium chloride?
- Q150.** Suggest how a student could confirm that a white precipitate is not calcium hydroxide.
- Q151.** What gas is produced when a carbonate reacts with a dilute acid?
- Q152.** How can you test for the presence of carbon dioxide?
- Q153.** What happens to limewater when carbon dioxide is bubbled through it?
- Q154.** Which ion is tested using silver nitrate solution and dilute nitric acid?
- Q155.** What colour precipitate is formed when silver nitrate reacts with chloride ions?
- Q156.** What is the colour of the precipitate when silver nitrate reacts with bromide ions?
- Q157.** Which halide forms a yellow precipitate when tested with silver nitrate?
- Q158.** Why is dilute nitric acid added before silver nitrate in the halide test?
- Q159.** What is the purpose of adding dilute hydrochloric acid before testing for sulfate ions?
- Q160.** What colour precipitate indicates the presence of sulfate ions?
- Q161.** Which chemical is used with hydrochloric acid to test for sulfate ions?
- Q162.** What do all the halide ion tests have in common?
- Q163.** Why is it important to carry out ion tests in a specific order?
- Q164.** Why must a flame test be done before precipitation tests?



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- Q165.** What is the general term for tests used to identify ions in a solution?
- Q166.** What is one limitation of using chemical tests to identify ions?
- Q167.** What is meant by the term 'instrumental method' in chemical analysis?
- Q168.** Give one advantage of instrumental methods over chemical tests.
- Q169.** Why are instrumental methods considered more accurate than chemical tests?
- Q170.** Why are instrumental methods faster than traditional chemical tests?
- Q171.** What is meant by sensitivity in the context of instrumental methods?
- Q172.** What is flame emission spectroscopy used for?
- Q173.** What is the role of the spectroscope in flame emission spectroscopy?
- Q174.** What does a line spectrum show?
- Q175.** How can a line spectrum help identify a metal ion?
- Q176.** How can the concentration of a metal ion be determined using flame emission spectroscopy?
- Q177.** What must be done to compare a sample spectrum to identify the metal ion?
- Q178.** Why is flame emission spectroscopy more useful than a flame test?
- Q179.** In what form must the sample be for flame emission spectroscopy?
- Q180.** What happens to the sample in the flame during flame emission spectroscopy?
- Q181.** How does the colour of the flame relate to the metal ion present?
- Q182.** What information is needed to interpret a line spectrum?
- Q183.** What does each line on the spectrum represent?
- Q184.** What is the advantage of using a reference spectrum when analysing results?
- Q185.** Which ion tests can be done using only one solution?
- Q186.** What result confirms the presence of iodide ions in a solution?
- Q187.** What precautions should be taken when using silver nitrate?
- Q188.** How can you tell if a compound contains sulfate ions?



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- Q189.** What is observed if no sulfate ions are present in a test?
- Q190.** Why is hydrochloric acid used instead of nitric acid in the sulfate test?
- Q191.** What is a positive result in the carbonate test?
- Q192.** What would happen if you used hydrochloric acid with silver nitrate?
- Q193.** Why should flame tests be carried out with a clean wire?
- Q194.** How can you clean a wire loop for a flame test?
- Q195.** Which test could help identify a white precipitate of silver halide?
- Q196.** What is the colour difference between silver chloride and silver iodide?
- Q197.** Why is a reference chart needed in flame emission spectroscopy?
- Q198.** What might cause an incorrect reading in a flame emission spectroscopy test?
- Q199.** How can two different metal ions be distinguished using spectroscopy?
- Q200.** Why is it important to test for both anions and cations in an unknown compound?