

1 A solution containing substance X was tested. The table shows the results.

test	result
flame test	lilac colour
acidified silver nitrate solution added	yellow precipitate

What is X?

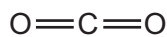
- A** lithium bromide
- B** lithium iodide
- C** potassium bromide
- D** potassium iodide

[1]

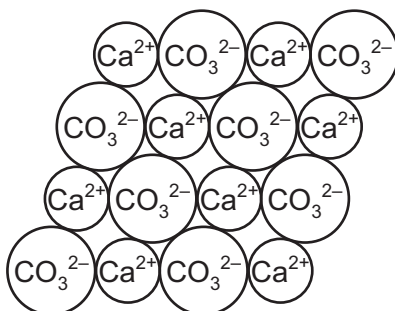
[Total: 1]

2 The structures of six substances containing carbon are shown below.

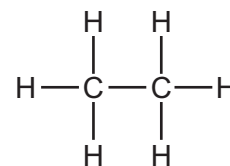
A



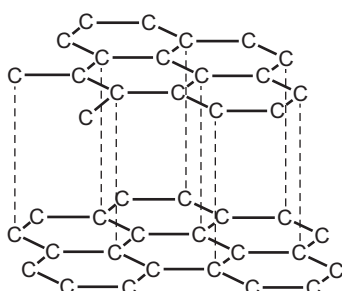
B



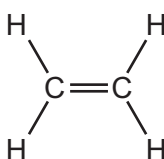
C



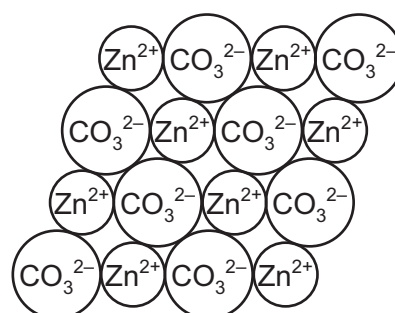
D



E



F



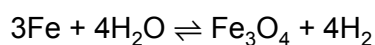
Describe a test for substance **A**.

test

result [2]

[Total: 2]

3 When iron is heated with steam, hydrogen is given off.



Describe a test for hydrogen.

test

result [2]

[Total: 2]

4 Aqueous ammonia is alkaline.

Which **one** of the following pH values could be the pH of aqueous ammonia?

Draw a circle around the correct answer.

pH 1 pH 5 pH 7 pH 9

[1]

[Total: 1]

5 Describe a test for hydrogen.

test

result [2]

[Total: 2]

6 The following formulae represent different substances.

Al Ag CaCO₃ CH₄ Cl₂ Cu SO₂

State which of these substances is a gas which bleaches damp litmus paper.

..... [1]

[Total: 1]

- 7 The names of nine gases are given.

ammonia

carbon monoxide

chlorine

ethane

ethene

helium

hydrogen

neon

oxygen

State which gas dissolves in water to form an alkali.

..... [1]

[Total: 1]

- 8 Cobalt reacts with dilute hydrochloric acid to make the salt cobalt(II) chloride. Bubbles of hydrogen gas are produced.

Describe a test for hydrogen.

test.....

result..... [2]

[Total: 2]

- 9 What is the colour of the precipitate formed when aqueous silver nitrate is added to aqueous sodium bromide?

..... [1]

[Total: 1]

10 The following substances are gases at room temperature.

letter	A	B	C	D	E	F	G	H
substance	SO ₂	Ar	CO	Cl ₂	NH ₃	CO ₂	CH ₄	C ₃ H ₈

Identify, by letter:

a gas which bleaches damp litmus paper [1]

[Total: 1]

11 Describe a test for carbon dioxide.

test.....

result..... [2]

[Total: 2]

12 Describe a test for carbon dioxide.

test

result [2]

[Total: 2]

13 Aqueous silver nitrate is used to test for chloride ions and iodide ions.

(a) The solutions are first acidified with dilute nitric acid.

Explain why dilute hydrochloric is **not** used to acidify the solution.

..... [1]

(b) Complete the table to show the expected observations.

ion	observations on adding aqueous silver nitrate
chloride (Cl^-)	
iodide (I^-)	

[3]

[Total: 4]

14 Aqueous sodium hydroxide can be used to test for chromium(III) ions and iron(II) ions.

Complete the table to show the expected observations.

ion	observation on adding a small volume of aqueous sodium hydroxide	observation on adding an excess of aqueous sodium hydroxide
chromium(III) (Cr^{3+})		
iron(II) (Fe^{2+})		

[3]

[Total: 3]

15 This question is about solids, liquids and gases.

(a) The list gives the names of nine substances.

aqueous copper(II) sulfate

aqueous potassium manganate(VII)

aqueous sodium chloride

dilute hydrochloric acid

ethanol

hexene

mercury

octane

water

Answer the following questions about these substances.
Each substance may be used once, more than once or not at all.

State which substance:

(a) is an alkane

..... [1]

(b) is used, when acidified, to test for sulfur dioxide

..... [1]

(c) turns blue litmus red

..... [1]

(d) reacts with sodium to produce only aqueous sodium hydroxide and hydrogen

..... [1]

(e) is produced by the addition of steam to ethene.

..... [1]

[Total: 5]

16 Aqueous ammonia can be used to test for aluminium ions and zinc ions.

Complete the table to show the expected observations.

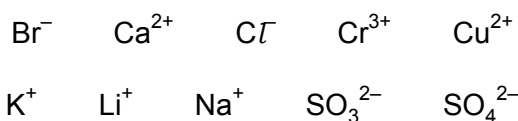
ion	observation on adding a small volume of aqueous ammonia	observation on adding an excess of aqueous ammonia
aluminium (Al^{3+})		
zinc (Zn^{2+})		

[3]

[Total: 3]

17 This question is about ions and ionic compounds.

Choose from the following list of ions to answer the questions.



Each ion may be used once, more than once or not at all.

- (a) State which ion gives a lilac colour in a flame test. [1]
- (b) State which ion forms a grey-green precipitate with aqueous ammonia [1]
- (c) State which ion forms a white precipitate with aqueous sodium hydroxide [1]
- (d) State which ion forms a cream precipitate with acidified aqueous silver nitrate [1]
- (e) State which ion forms a white precipitate with acidified aqueous barium nitrate [1]
- [Total: 5]

18 Describe how to do a flame test on a sample of a salt.

.....

.....

.....

..... [2]

[Total: 2]

19 Sulfur dioxide is a toxic gas.

- (a) State one **environmental** reason why sulfur dioxide should not be released into the atmosphere.
..... [1]
- (b) Describe the test for sulfur dioxide.
test
.....
observations
..... [2]
- [Total: 3]

20 Describe a test for bromide ions.

test
observations [2]

[Total: 2]

21 Describe a test for iron(II) ions.

test

observations [2]

[Total: 2]

22 Nitric acid contains nitrate ions.

Complete these sentences about the test for nitrate ions using words from the list.

aluminium ammonia blue chloride copper

green iron nitrate oxygen red

Aqueous sodium hydroxide and foil are added to the solution being tested. The mixture is warmed gently. The produced turns damp litmus paper

[3]

[Total: 3]

23 Describe a test for iodide ions.

test

observations [2]

[Total: 2]

24 Describe a test for sulfate ions.

test

observations [2]

[Total: 2]

25 Hot copper reacts with chlorine to form copper(II) chloride.

Describe a test for chloride ions.

test

result [2]

[Total: 2]

26 Describe a test for potassium ions.

test

result [2]

[Total: 2]

27 Describe what you would observe when aqueous silver nitrate is added to aqueous potassium bromide.

..... [2]

[Total: 2]

28 Describe what is observed in these **two** reactions.

(a) An excess of aqueous sodium hydroxide is added to a solution containing Ca^{2+} ions.

..... [1]

(b) An excess of aqueous ammonia is added to a solution containing Ca^{2+} ions.

..... [1]

[Total: 2]

29 The table shows the properties of some Group I elements.

element	density in g/cm ³	melting point in °C	relative hardness
sodium	0.97	98	4.9
potassium	0.86	63	2.6
rubidium	1.53		1.6
caesium		29	1.0

When potassium reacts with water, it floats and melts into a ball. A flame is observed.

(a) What colour does potassium give to the flame?

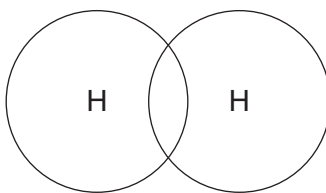
..... [1]

(b) Use the information in the table to suggest why potassium floats on water.

..... [1]

(c) Hydrogen is produced when potassium reacts with water.

Complete the dot-and-cross diagram to show the electron arrangement in a molecule of hydrogen.



[1]

[Total: 3]

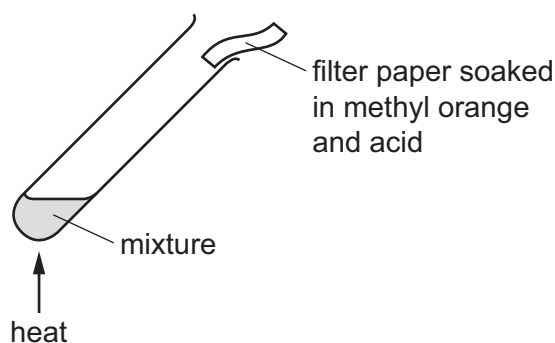
30 Describe a test for sodium ions.

test

result [2]

[Total: 2]

31 A mixture of ammonium chloride and aqueous sodium hydroxide is heated as shown.



The filter paper changes colour from red to yellow.

Explain why.

.....

..... [2]

[Total: 2]

32 Potassium hydrogensulfate, KHSO_4 , is an acid salt. It dissolves in water to produce an aqueous solution, **X**, containing K^+ , H^+ and SO_4^{2-} ions.

Describe what you would see when the following experiments are done.

(a) Magnesium ribbon is added to an excess of solution X.

.....
..... [2]

(b) A flame test is done on solution X.

..... [1]

(c) An aqueous solution containing barium ions is added to solution X.

..... [1]

[Total: 4]

33 Describe a test for oxygen.

test

result [2]

[Total: 2]

34 Describe a test for oxygen.

test.....

result..... [2]

[Total: 2]

35 The names of nine gases are given.

ammonia

carbon monoxide

chlorine

ethane

ethene

helium

hydrogen

neon

oxygen

State which gas bleaches damp litmus paper.

..... [1]

[Total: 1]

36 When iron reacts with dilute hydrochloric acid, iron(II) chloride is formed.

Describe a test for iron(II) ions

test.....

result..... [2]

[Total: 2]

37 The table shows the mass of each type of ion present in a 100 cm³ sample of milk.

name of ion	formula of ion	mass of ion present in 100 cm ³ milk/mg
calcium	Ca ²⁺	125
chloride	Cl ⁻	120
	Mg ²⁺	12
phosphate	PO ₄ ³⁻	95
potassium	K ⁺	140
sodium	Na ⁺	58
	SO ₄ ²⁻	30

negative ions of organic acids		160
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- (a) Calculate the mass of calcium ions present in a 20 cm³ sample of this milk.

mass of calcium ions = mg [1]

- (b) Which positive ion is present in the highest concentration in this sample of milk?

..... [1]

- (c) Name the compound formed from Mg²⁺ and SO₄²⁻ ions.

..... [1]

- (d) Describe a test for chloride ions.

test

.....

result [3]

[Total: 6]

- 38 Siderite is an ore of iron.

- (a) State the name of **one** other ore of iron.

..... [1]

- (b) Siderite contains mainly iron(II) carbonate.

Describe how to show that siderite contains a carbonate.

.....

.....

..... [3]

[Total: 4]

39 Sodium chloride contains chloride ions.

Describe a test for chloride ions.

test.....

result..... [2]

[Total: 2]

40 Describe a test for ammonia.

test.....

result..... [2]

[Total: 2]