

1 Aqueous potassium bromide reacts with aqueous chlorine.

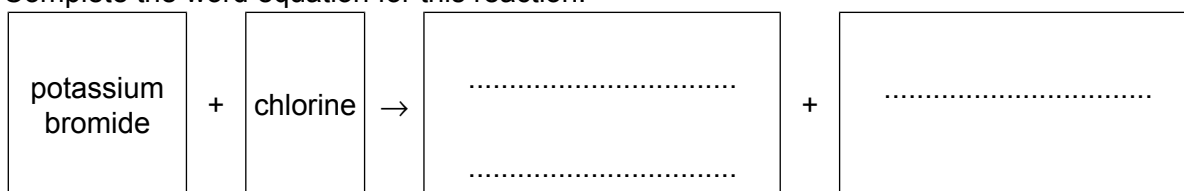
Using ideas about the reactivity of the halogens, explain why aqueous potassium bromide does **not** react with aqueous iodine.

.....  
..... [1]

[Total: 1]

2 Aqueous potassium bromide reacts with aqueous chlorine.

Complete the word equation for this reaction.



[2]

[Total: 2]

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

element	density in g/cm <sup>3</sup>	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?

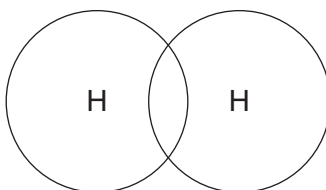
..... [1]

(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]

- 4 The table gives some information about four different particles, **A**, **B**, **C** and **D**.

particle	number of electrons	number of neutrons	number of protons	electronic structure	charge on particle
<b>A</b>	11	12	11	2,8,1	0
<b>B</b>		14	11	2,8,1	0
<b>C</b>	18	20		2,8,8	0
<b>D</b>	18	20	17		

- (a) Complete the table. The first row has been done for you.

[4]

- (b) Give **two** particles from the table which are isotopes of each other.

..... [1]

- (c) Element **Z** is in the same group of the Periodic Table as **A** and is less reactive than **A**.

State the identity of element **Z**.

..... [1]

- (d) **C** is unreactive.

Use information from the table to explain why.

..... [1]

[Total: 7]

5 Manganese is a transition element. Sodium is an element in Group I of the Periodic Table.

Describe **three** ways in which the properties of manganese differ from those of sodium.

1.....

2.....

3..... [3]

[Total: 3]

6 This question is about Group I elements and their compounds.

The properties of some Group I elements are shown in the table.

element	boiling point / °C	atomic radius / pm	relative thermal conductivity	observations when it reacts with cold water
sodium	883	186	3.9	rapid bubbling but does <b>not</b> burst into flame
potassium	759	227		very rapid bubbling and bursts into flame
rubidium	688		1.6	
caesium	671	265	1.0	explodes

(a) Complete the table to estimate

- the relative thermal conductivity of potassium
- the atomic radius of rubidium

[2]

(b) Describe the trend in the boiling points of the Group I elements.

..... [1]

(c) Use the information in the table to predict what you would observe when rubidium reacts with cold water.

..... [1]

[Total: 4]

7 The properties of some Group VII elements are shown in the table.

Complete the table to suggest:

- the density of iodine
- the melting point of astatine
- the colour of astatine.

element	melting point in °C	boiling point in °C	density at room temperature in g/cm <sup>3</sup>	colour
chlorine	-101	-35	0.0032	green
bromine	-7	59	3.1	red-brown
iodine	114	184		grey-black
astatine		337	6.4	

[3]

[Total: 3]

8 The properties of some Group VII elements are shown in the table.

element	melting point in °C	boiling point in °C	density at room temperature in g/cm <sup>3</sup>	colour
chlorine	-101	-35	0.0032	green
bromine	-7	59	3.1	red-brown
iodine	114	184		grey-black
astatine		337	6.4	

Suggest why the density of chlorine at room temperature is much lower than the density of bromine and astatine at room temperature.

.....

..... [1]

[Total: 1]

- 9 Cobalt is a transition element. Lithium is an element in Group I of the Periodic Table.

Describe **three** ways in which the properties of cobalt differ from those of lithium.

- 1 .....
- 2 .....
- 3 ..... [2]

[Total: 2]

- 10 When chlorine is bubbled through a colourless aqueous solution of zinc iodide, the solution turns brown.

Name the brown substance.

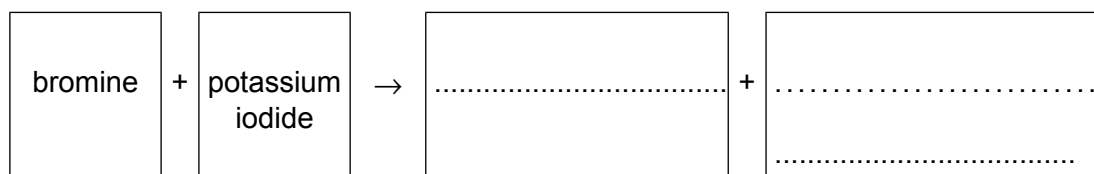
Suggest, using ideas about the reactivity of the halogens, why this reaction occurs.

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

[Total: 2]

- 11 Aqueous bromine reacts with aqueous potassium iodide.

Complete the word equation for this reaction.



[2]

[Total: 2]

- 12 When chlorine is bubbled through a colourless aqueous solution of sodium bromide, the solution turns orange-brown.

Name the orange-brown substance. Suggest, using ideas about reactivity of the halogens, why the reaction occurs.

orange-brown substance .....

why the reaction occurs .....

- ..... [2]

[Total: 2]

13 The properties of some Group I elements are shown in the table.

element	melting point / °C	relative hardness	observations when it reacts with cold water
lithium	181	23	
sodium	98	3	rapid bubbling but does <b>not</b> burst into flame
potassium	63		very rapid bubbling and bursts into flame
rubidium		1	bursts into flame and explodes

(a) Complete the table to estimate:

- the relative hardness of potassium
- the melting point of rubidium.

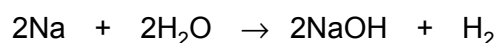
[2]

(b) Use the information in the table to predict what you would observe when lithium reacts with cold water.

..... [1]

[Total: 3]

14 When sodium reacts with water, an alkaline solution is formed.



(a) Use the information in the equation to explain why the solution formed is alkaline.

..... [1]

(b) Describe how you could use a named indicator solution to show that the solution is alkaline.

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

[Total: 3]

15 The table shows the properties of some halogens.

halogen	melting point in °C	boiling point in °C	density when liquid in g/cm <sup>3</sup>	colour
fluorine	-220	-188		

chlorine		-29	1.56	light green
bromine	-7	59	3.12	red-brown
iodine	114	184	3.96	grey-black

(a) Complete the table to estimate:

- the density of liquid fluorine
- the melting point of chlorine.

[2]

(b) Is fluorine lighter or darker in colour than chlorine?

Explain your answer.

.....

.....

[1]

(c) What is the physical state of bromine at 40 °C?

Give a reason for your answer.

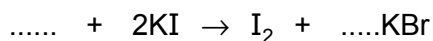
.....

.....

[2]

[Total: 5]

16 Complete the chemical equation for the reaction of aqueous bromine with aqueous potassium iodide.



[2]

[Total: 2]

17 The properties and relative reactivity with water of some Group I elements are shown in the table.

element	density in g/cm <sup>3</sup>	boiling point in °C	relative reactivity with water
sodium		883	forms bubbles rapidly but does not burst into flames
potassium	0.86	760	forms bubbles very rapidly and bursts into flames
rubidium	1.53		
caesium	1.88	669	reacts explosively

(a) Complete the table

- to predict the boiling point of rubidium,
- for the relative reactivity of rubidium with water.

[2]

(b) Describe the general trend in the density of the Group I elements.

..... [1]

[Total: 3]

18 Some properties of hydrogen and helium are given in the table.

element	density of the liquid in g/cm <sup>3</sup>	melting point in °C	boiling point in °C
hydrogen	0.07	-259	-253
helium	0.15	-272	-269

Use the information to suggest why the layer of liquid hydrogen in Saturn floats on top of the liquid helium.

..... [1]

[Total: 1]

19 Aqueous iodine is formed when aqueous chlorine is added to aqueous potassium iodide.

Use ideas about reactivity to explain why this reaction occurs.

.....

..... [1]

[Total: 1]



- 20 Titanium is a transition element.  
Sodium is a Group I element.

Describe **two** differences in the physical properties of titanium and sodium.

- 1 .....
- .....
- 2 .....
- ..... [2]

[Total: 2]

- 21 The properties and relative reactivity with water of some Group I elements are shown in the table.

element	density in g/cm <sup>3</sup>	melting point in °C	relative reactivity with water
lithium	0.53	181	
sodium		98	forms bubbles rapidly but does not burst into flames
potassium	0.86		forms bubbles very rapidly and bursts into flames
rubidium	1.53	39	reacts explosively

- (a) Complete the table:

- for the relative reactivity of lithium with water
- to predict the melting point of potassium.

[2]

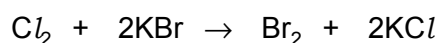
- (b) Describe the general trend in the density of the Group I elements.

..... [1]

[Total: 3]

- 22 Chlorine is an element in Group VII of the Periodic Table.

Aqueous chlorine reacts with aqueous potassium bromide.



- (a) How does this equation show that chlorine is more reactive than bromine?

..... [1]

- (b) Aqueous potassium bromide and aqueous potassium chloride are both colourless.

Predict the colour change when aqueous chlorine reacts with aqueous potassium bromide.

..... [1]

- (c) Complete the chemical equation for the reaction of aqueous bromine with aqueous potassium iodide.



[Total: 4]

- 23 Chlorine is used to make the polymer PVC.

- (a) Give **one** other use of chlorine.

..... [1]

- (b) The monomer used to make PVC is made by the thermal decomposition of dichloroethane.



Explain what is meant by the term *thermal decomposition*.

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

- (c) PVC is a non-biodegradable plastic.

Describe **two** pollution problems caused by non-biodegradable plastics.

1 .....

2 ..... [2]

[Total: 5]

- 24 Chlorine is an element in Group VII of the Periodic Table.

Chlorine is a diatomic molecule.

Explain what is meant by the term *diatomic*.

..... [1]

[Total: 1]

25 An element, X, is a dark grey crystalline solid at room temperature.

It has a melting point of  $114\text{ }^{\circ}\text{C}$  and a density of  $4.9\text{ g/cm}^3$ .

When heated gently it forms a purple vapour.

Where in the Periodic Table is X found?

[1]

[Total: 1]

26 Astatine, At, is below iodine in Group VII of the Periodic Table.

(a) The table shows the states of the Group VII elements at room temperature.

element	state
fluorine	gas
chlorine	gas
bromine	liquid
iodine	solid

Use this information to deduce the state of astatine at room temperature.

..... [1]

(b) Astatine is radioactive. A lot of heat is given off due to this radioactivity. The small samples of astatine that have been isolated are often liquid. Suggest why they are often liquid.

..... [1]

(c) Although few compounds of astatine have been made, scientists think that sodium astatide will react with iodine. Complete the equation for this reaction.



[2]

[Total: 4]

27 Describe the properties of chlorine, bromine and iodine.

In your answer, include the trends in:

- their state,
- their colour,
- their reactivity.

.....

.....

.....

.....

.....

..... [4]

[Total: 4]

28 Lithium reacts with water. An alkaline solution and a colourless gas are formed.

Complete the word equation for this reaction.

lithium + water → ..... + ..... [2]

[Total: 2]

29 Lithium is in Group I of the Periodic Table.

The table shows some properties of the Group I elements.

metal	melting point / °C	atomic radius / nm
lithium		0.157
sodium	98	0.191
potassium	63	
rubidium	39	0.250
caesium	29	0.272

Deduce:

the melting point of lithium, ..... °C

the atomic radius of potassium, ..... nm [2]

[Total: 2]

30 In the 1860s, John Newlands listed the elements in order of increasing atomic mass. Part of his table is shown.

H 1	Li 2	Be 3	B 4	C 5	N 6	O 7
F 8	Na 9	Mg 10	Al 11	Si 12	P 13	S 14
Cl 15	K 16	Ca 17	Cr 18	Ti 19	Mn 20	Fe 21

- (a) (i) Describe the differences between Newlands' table and the Periodic Table we use today.

.....  
 .....  
 .....  
 .....  
 ..... [3]

- (ii) What evidence is there, from Newlands' table, that some elements with similar properties are grouped together?

.....  
 ..... [1]

[Total: 4]

- 31 Titanium is a transition element. Sodium is a metal in Group I of the Periodic Table.

State **three** differences in the physical properties of titanium and sodium.

1.....  
 2.....  
 3..... [3]

[Total: 3]

32 The table below shows some properties of some of the halogens.

halogen	melting point / °C	boiling point / °C	colour
chlorine	-101	-7	yellow-green
bromine	-7		red-brown
iodine	+114	+184	grey-black
astatine	+302	+337	

Deduce:

the colour of astatine, .....

the boiling point of bromine, .....

the state of iodine at 190 °C..... [3]

[Total: 3]

33 Complete the following sentences about the Periodic Table of elements using words from the list below.

**argon**

**colour**

**density**

**sodium**

**one**

**similarity**

**trend**

**seven**

Chlorine, bromine and iodine are elements in Group..... of the Periodic Table.

These elements show a ..... in ..... down the group.

They all react rapidly with ..... to form ionic compounds. [4]

[Total: 4]

34 Dmitri Mendeleev published his first Periodic Table in 1869. Part of this table is shown below.

**Ti = 50**

**V = 51**

**Cr = 52**

**Mn = 55**

**Fe = 56**

**Co = 59**

**H = 1**

**Cu = 63.4**

	<b>Be = 9.4</b>	<b>Mg = 24</b>	<b>Zn = 65.2</b>
	<b>B = 11</b>	<b>Al = 27.4</b>	<b>?</b>
	<b>C = 12</b>	<b>Si = 28</b>	<b>?</b>
	<b>N = 14</b>	<b>P = 31</b>	<b>As = 75</b>
	<b>O = 16</b>	<b>S = 32</b>	<b>Se = 79.4</b>
	<b>F = 19</b>	<b>Cl = 35.5</b>	<b>Br = 80</b>
<b>Li = 7</b>	<b>Na = 23</b>	<b>K = 39</b>	<b>Rb = 85.4</b>

- (a) What differences are there between Mendeleev's table and the Periodic Table we use today?

.....

.....

.....

.....

.....

.....

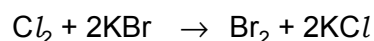
..... [4]

- (b) State the names of any **two** elements in the table above which exist as diatomic molecules.

.....and..... [1]

[Total: 5]

- 35 Aqueous chlorine reacts with aqueous potassium bromide.



- (a) Describe the colour change you would observe in this reaction.

..... [1]

- (b) State the name of the salt formed in this reaction.

..... [1]

- (c) Explain why aqueous bromine does not react with aqueous potassium chloride.

.....

..... [1]

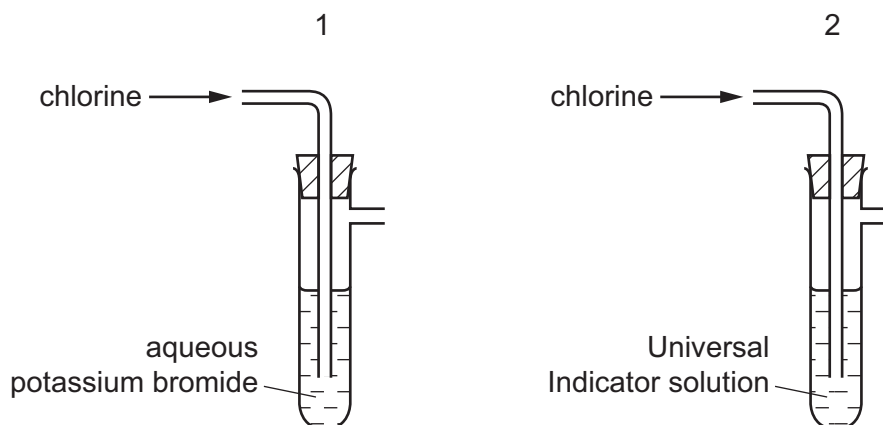
[Total: 3]

- 36 The halogens exist as diatomic molecules.  
What is meant by the term *diatomic*?

..... [1]

[Total: 1]

- 37 The diagrams show apparatus used to test the reaction of chlorine with different liquids.



In which test-tubes is an orange-brown colour produced?

- A both 1 and 2  
B 1 only  
C 2 only  
D neither 1 nor 2

[1]

[Total: 1]

- 38 Which substances react with aqueous potassium bromide to form bromine?

	chlorine	iodine
<b>A</b>	✓	✓
<b>B</b>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x

[1]

[Total: 1]



39 When chlorine reacts with aqueous potassium bromide a displacement reaction occurs.

(a) Describe the colour change of the solution.

from ..... to ..... [2]

(b) Write a chemical equation for this reaction.

..... [2]

[Total: 4]

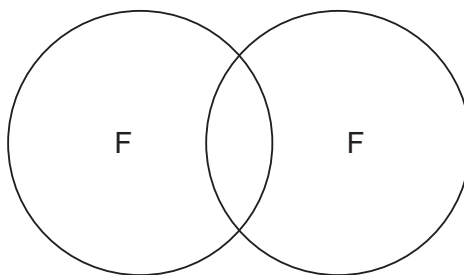
40 Fluorine is a Group VII element. Fluorine forms compounds with metals and non-metals.

(a) Predict the physical state of fluorine at room temperature and pressure.

..... [1]

(b) Fluorine exists as diatomic molecules.

Complete the dot-and-cross diagram to show the electron arrangement in a molecule of fluorine. Show outer shell electrons only.



[2]

(c) Write a chemical equation for the reaction between sodium and fluorine.

..... [2]

(d) Explain why chlorine does **not** react with aqueous sodium fluoride.

.....  
 ..... [1]

[Total: 6]