

Group 1, 7, and 0 Trends and Reactions

Q1. (2018) – 2b

- (b) Describe what you would **see** if damp, blue litmus paper is placed into chlorine gas.

(2)

Q2. (2018) – 2d

- (d) When the gas hydrogen chloride, HCl, is dissolved in water, a solution forms. Blue litmus paper dipped in this solution turns red.

State why the litmus paper turns red.

(1)

Q3. (2018) – 3c

- (c) In an experiment equal-sized pieces of lithium, sodium and potassium are added to separate samples of water.

A flame is produced only with potassium because potassium

(1)

- ☐ **A** is the softest metal
- ☐ **B** has the lowest melting point
- ☐ **C** is the most reactive
- ☐ **D** is the only flammable metal

Q4. (2018) – 3d

- (d) Explain, in terms of electronic configurations, the increase in reactivity from lithium to sodium to potassium.

(2)

Q5. (2018)

- 7 (a) Describe what is **seen** when chlorine water is added to potassium bromide solution and the mixture shaken.

(2)

Q6. (2019) – 3c

- (c) Chlorine reacts with hydrogen to form hydrogen chloride.

Write the balanced equation for this reaction.

(3)

Q7. (2019) – 6b

A)

- (b) Lithium, potassium and rubidium are alkali metals.

- (i) Describe what you would see when a small piece of rubidium is dropped on to water.

(2)

B)

- (ii) The electronic configuration of lithium is 2.1
The electronic configuration of potassium is 2.8.8.1
Lithium is less reactive than potassium.

Explain, in terms of their electronic configurations, why lithium is less reactive than potassium.

(3)

Q8. (2019)

A)

9 Fluorine, chlorine, bromine, iodine and astatine are elements in group 7.

(a) Describe the test to show that a gas is chlorine.

(2)

B)

(b) Bromine reacts with hydrogen to form hydrogen bromide.
Hydrogen bromide dissolves in water to form a solution.

State the name of the solution formed.

(1)

C)

(c) There is a trend in the colour and the state of the halogens at room temperature.

Predict the colour and state of astatine at room temperature.

(2)

colour

state

Q9. (2019) – 9e

(e) Fluorine reacts vigorously with iron to produce iron(III) fluoride, FeF₃.

Write the balanced equation for this reaction.

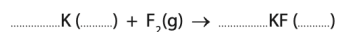
(2)

Q10. (2020) – 2d

(d) Potassium reacts with fluorine to form potassium fluoride.
Potassium fluoride is a solid.

Complete the balanced equation for this reaction and add the state symbols.

(3)



Q11. (2020) – 7c

(c) Four of the noble gases are argon, helium, krypton and neon.

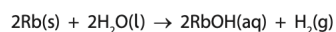
Give these gases in order of increasing density.

(2)

Q12. (2020)

8 The first four elements in group 1 are lithium, sodium, potassium and rubidium.

(a) Rubidium reacts with water to form rubidium hydroxide and hydrogen.



A)

(i) Predict what you would **see** when a small piece of rubidium is placed in a large volume of water.

(3)

B)

(ii) Why is rubidium more reactive than potassium?

(1)

- ☒ A the metallic bonds in rubidium are weaker than those in potassium
- ☒ B rubidium is a softer metal than potassium
- ☒ C the outer electron of a rubidium atom is further from the nucleus than potassium's
- ☒ D rubidium has a more exothermic reaction with water than potassium does

Q13. (2021)

5 This question is about potassium and zinc.

- (a) Which of the following temperatures is most likely to be the melting point of potassium?

(1)

- ☐ A -63°C
☐ B 6.3°C
☐ C 63°C
☐ D 630°C

Q14. (2021)

8 This question is about some of the elements in group 7 of the periodic table.

- (a) Which row in the table correctly shows the colours and physical states of the elements at room temperature?

(1)

☐ A	iodine: purple gas	bromine: yellow liquid
☐ B	chlorine: pale green gas	iodine: brown solid
☐ C	bromine: red-brown liquid	chlorine: yellow liquid
☐ D	iodine: dark grey solid	bromine: red-brown liquid

Q15. (2021) – 8d

*(d) Group 1 metals react with the elements from group 7 to form salts.

Some examples of these reactions are shown in Figure 10.

reaction	word equation
W	lithium + chlorine $\rightarrow$ lithium chloride
X	potassium + fluorine $\rightarrow$ potassium fluoride
Y	rubidium + iodine $\rightarrow$ rubidium iodide
Z	potassium + bromine $\rightarrow$ potassium bromide

Figure 10

You will find the position of these elements in their groups on the periodic table.

Explain, in terms of their electronic configurations and the relative reactivity of these elements, which of the reactions shown in Figure 10 would be the most violent.

(6)

Q16. (2022)

3 This question is about gases.

- (a) When sodium is added to water, hydrogen gas is produced.

Which observation shows that a gas has been produced?

(1)

- ☐ A a white precipitate forms
☐ B effervescence is seen
☐ C the sodium sinks in the water
☐ D the water changes to a pink colour

Q17. (2022) – 3b

- (b) Some damp litmus paper is placed in a gas.
The litmus paper is bleached.

Which gas bleaches damp litmus paper?

(1)

- ☐ A carbon dioxide
☐ B chlorine
☐ C hydrogen
☐ D oxygen

Q18. (2022) – 3d

- (d) A diagram of an atom of helium is shown in Figure 5.

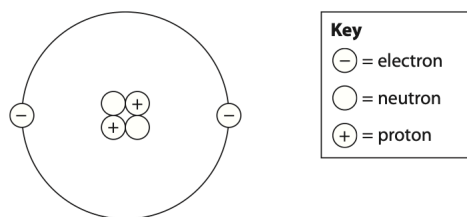


Figure 5

A)

- (i) Explain, using Figure 5, why helium is inert.

(2)

B)

- (ii) Helium is used to fill balloons.

State one property of helium, apart from it being inert, that makes it suitable for filling balloons.

(1)

Q19. (2022)

A)

- 6 The elements in group 7 of the periodic table are known as the halogens.

- (a) Name the halogen that is in period 4 of the periodic table.

(1)

B)

- (b) Explain why chlorine is more reactive than iodine.

(3)

C)

- (c) A piece of burning sodium is placed into a gas jar containing chlorine gas, as shown in Figure 9.

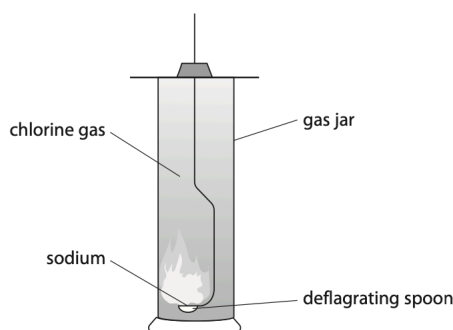


Figure 9

At the end of the reaction, the inside of the gas jar is coated with white crystals. Identify the white crystals.

(1)

D)

- (d) Sodium also reacts with bromine.
(i) Write the balanced equation for the reaction between sodium and bromine.

(2)

Q20. (2023) – 3b, 3c

3 Figure 6 shows some information about the group 1 metals.

group 1 metal	atomic number	relative atomic mass
lithium	3	7
sodium	11	23
potassium	19	39
rubidium	37	85
caesium	55	133

Figure 6

A)

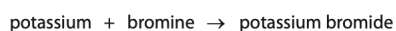
- (b) Which row shows two correct properties of group 1 metals?

(1)

properties of group 1 metals		
☐ A	compounds are white in colour	high density
☐ B	low melting points	compounds are blue in colour
☐ C	soft enough to be cut by a knife	low melting points
☐ D	high density	conduct electricity

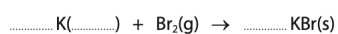
B)

- (c) The word equation for the reaction of potassium with bromine is



Add the missing state symbol and balance the equation for this reaction.

(2)



Q21. (2023) – 6c

- 6 Chlorine gas can be prepared by reacting concentrated hydrochloric acid with solid potassium manganate(VII).

Figure 10 shows the apparatus used.

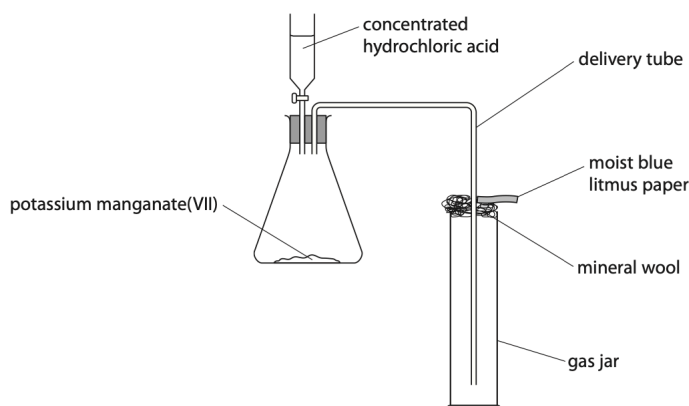


Figure 10

- (c) Suggest why damp blue litmus is placed at the top of the gas jar.

(2)

Q22. (2024) – 3c

A)

- (c) Helium, neon and argon are all inert.

- (i) Explain, in terms of electrons, why these gases are inert.

(2)

B)

- (ii) Two pieces of steel can be joined by heating the metal pieces with a very hot flame.

This process is often carried out in an argon atmosphere rather than in air.

Which property makes argon gas suitable for this use?

(1)

- ☒ A argon has a low density
☒ B argon has a low melting point
☒ C argon is colourless
☒ D argon is unreactive

Q23. (2024) – 7b

- (b) Potassium reacts with water to form two products.

- (i) Give the formulae of both products.

(1)

..... and

Q24. (2024)

A)

- 9 The elements in group 7 of the periodic table are the halogens.

- (a) Which row shows the colour and physical state of iodine at room temperature?

(1)

	colour	physical state
☒ A	dark grey	solid
☒ B	red brown	liquid
☒ C	green	solid
☒ D	purple	gas

B)

(b) Iron wool is heated with bromine vapour as shown in Figure 12.

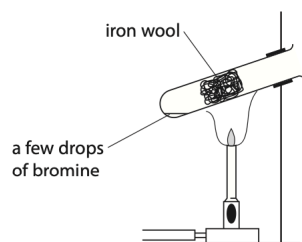


Figure 12

At the end of the reaction, a solid forms at the top of the test tube.

Identify the solid.

(1)

C)

(c) Aluminium reacts with bromine.

Write the balanced equation for the reaction between aluminium and bromine.

(3)