The Periodic Table – 2021 IGCSE 0620

1. Nov/2021/Paper_11,12,13,22&23/No.21

A period of the Periodic Table is shown.

group	I	II	III	IV	V	VI	VII	VIII
element	R	S	T	V	W	X	Y	Z

The letters are not their chemical symbols.

Which statement is correct?

A Element R does not conduct electricity.

B Elements R and Y react together to form an ionic compound.

C Element Z exists as a diatomic molecule.

D Element Z reacts with element T.

2. Nov/2021/Paper_11/No.22

What are the products of the reaction between sodium and water?

A hydrogen and sodium hydroxide

B hydrogen and sodium oxide

C oxygen and sodium hydroxide

D oxygen and sodium oxide

3. Nov/2021/Paper_11/No.23

Element X has a high density, a high melting point and a high electrical conductivity.

It forms many coloured compounds.

Element X and many of its compounds act as catalysts.

What could be the atomic number of X?

A 19 **B** 26 **C** 33 **D** 35

4. Nov/2021/Paper_11,12&13/No.24

The noble gases are in Group VIII of the Periodic Table.

Which statement explains why noble gases are unreactive?

A They all have eight electrons in their outer shells.

B They all have full outer shells.

C They are all gases.

D They are all monoatomic.

5. Nov/2021/Paper_12/No.22

Which statement about the elements in Group VII of the Periodic Table is correct?

A Chlorine can displace bromine from bromides.

B Group VII elements are all solids at room temperature.

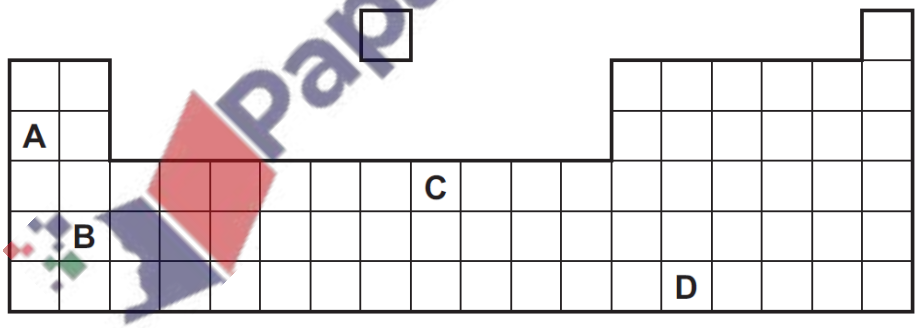
C Group VII elements occur as monoatomic covalent molecules.

D Reactivity increases down Group VII.

6. Nov/2021/Paper_12/No.23

Part of the Periodic Table is shown.

Which element is a transition element?



7. Nov/2021/Paper_13/No.22

Lithium, sodium and potassium are elements in Group I of the Periodic Table.

Which statement about sodium is correct?

A Sodium is more dense than potassium.

B Sodium reacts with water more vigorously than lithium.

C Sodium has a lower melting point than potassium.

D Solid sodium does not conduct electricity.

8. Nov/2021/Paper_13/No.23

Which property of transition elements is different from the properties of Group I metals?

A They conduct electricity.

B They are malleable.

C They form coloured compounds.

D They form basic oxides.

9. Nov/2021/Paper_21/No.20

Moving from right to left across the Periodic Table the elements show increasing metallic character.

Why does metallic character increase from right to left across a period?

A The atoms have more electrons in their outer shells.

B The atoms more readily gain electrons to form negative ions.

C The atoms more readily lose electrons to form positive ions.

D The charge on the nucleus of each atom gets larger.

10. Nov/2021/Paper_21/No.21

A period of the Periodic Table is shown.

group	I	II	III	IV	V	VI	VII	VIII
element	R	S	T	V	W	X	Y	Z

The letters are not their chemical symbols.

Which statement is correct?

A Element R does not conduct electricity.

B Elements R and Y react together to form an ionic compound.

C Element Z exists as a diatomic molecule.

D Element Z reacts with element T.

11. Nov/2021/Paper_21/No.22

Group VII elements show trends in their physical properties going down the group.

element	X	Y	Z
chlorine	–101	–34	0.003
bromine	–7	59	3.1
iodine	114	184	4.9

Which row shows the missing headings for the properties in the table?

	X	Y	Z
A	density in g / cm^3	boiling point in °C	melting point in °C
B	melting point in °C	boiling point in °C	density in g / cm^3
C	boiling point in °C	density in g / cm^3	melting point in °C
D	boiling point in °C	melting point in °C	density in g / cm^3

12. Nov/2021/Paper_21/No.23

Some properties of two metals, G and H, are shown.

metal G	metal H
the formula of the chloride is GCl	high melting point
reacts with cold water	has more than one oxidation state

Which row about metals G and H is correct?

	metal G	metal H
A	in Group I of the Periodic Table	in Group II of the Periodic Table
B	in Group I of the Periodic Table	transition metal
C	in Group II of the Periodic Table	in Group I of the Periodic Table
D	in Group II of the Periodic Table	transition metal

13. Nov/2021/Paper_21,22&23/No.24

The noble gases are in Group VIII of the Periodic Table.

Which statement explains why noble gases are unreactive?

A They all have eight electrons in their outer shells.

B They all have full outer shells.

C They are all gases.

D They are all monoatomic.

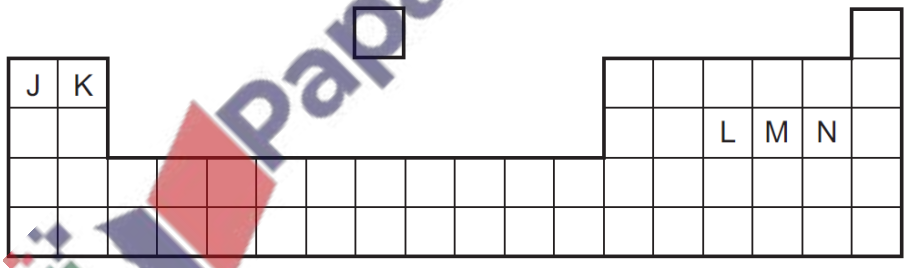
14. Nov/2021/Paper_22/No.23

Which row describes properties of transition elements?

	property 1	property 2	property 3
A	coloured compounds	high density	variable oxidation states
B	high density	high melting point	one oxidation state
C	high melting point	coloured compounds	one oxidation state
D	low melting point	high density	variable oxidation states

15. Nov/2021/Paper_23/No.22

Part of the Periodic Table is shown.



Which pairs of the elements J, K, L, M and N react together to form a product with a 1 : 1 ratio?

A J and L K and M

B J and M K and N

C J and N K and L

D J and N K and M

16. Nov/2021/Paper_23/No.23

Which property is shown by transition metals but **not** shown by Group I metals?

A good electrical conductivity

B good thermal conductivity

C loss of electrons to form positive ions

D variable oxidation states

17. Nov/2021/Paper_31/No.4

The table shows some properties of the Group I elements.

element	melting point /°C	density in g/cm^3	observations during reaction with water
lithium	181		slow bubbling no flame
sodium	98		rapid bubbling no flame
potassium	63	0.86	rapid bubbling lilac flame
rubidium		1.53	
caesium	29	1.88	explodes

(a) (i) Complete the table by predicting:

- the melting point of rubidium
- the density of lithium. [2]

(ii) Predict the observations when rubidium reacts with water.

.....

..... [1]

(b) Deduce the electronic structure of potassium.
Use the Periodic Table to help you.

..... [1]

(c) Lithium reacts with water to produce aqueous lithium hydroxide and a gas which 'pops' with a lighted splint.

(i) Name the gas which 'pops' with a lighted splint.

..... [1]

(ii) Choose **one** pH value from the list that best describes the pH of aqueous lithium hydroxide.

Draw a circle around the correct answer.

pH 2 **pH 5** **pH 7** **pH 13** [1]

(iii) Lithium reacts with nitrogen.

Complete the chemical equation for this reaction.

$$.....Li + N_2 \rightarrow .....Li_3N$$ [2]

[Total: 8]

18. Nov/2021/Paper_32/No.4

The table shows some properties of the Group I elements.

element	melting point / °C	density in g / cm^3	observations during reaction with water
lithium	181	0.53	
sodium	98		rapid bubbling no flame
potassium		0.86	rapid bubbling lilac flame
rubidium	39	1.53	very rapid bubbling red flame
caesium	29	1.88	explodes
francium	27		

(a) (i) Complete the table by predicting:

- the melting point of potassium
- the density of francium. [2]

(ii) Describe the observations when lithium reacts with water.

.....

..... [1]

(b) (i) Deduce the electronic structure of sodium.
Use the Periodic Table to help you.

..... [1]

(ii) Explain why a potassium ion has a single positive charge.

.....

..... [1]

(c) Sodium reacts with water to produce aqueous sodium hydroxide and a gas which 'pops' with a lighted splint.

(i) Complete the chemical equation for this reaction.

$$2Na + 2H_2O \rightarrow .....NaOH + ...$$ [2]

(ii) Choose **one** value from the list that best describes the pH of aqueous sodium hydroxide.

Draw a circle around the correct answer.

pH 1 **pH 4** **pH 7** **pH 14** [1]

[Total: 8]

19. Nov/2021/Paper_33/No.4

The table shows some properties of four halogens in Group VII.

halogen	melting point / °C	boiling point / °C	density of liquid at boiling point in g / cm^3
chlorine	–101	–35	1.56
bromine	–7	59	
iodine	114		4.93
astatine	302	337	6.35

(a) (i) Complete the table by predicting:

- the boiling point of iodine
- the density of bromine. [2]

(ii) Describe the trend in the melting points of the halogens down Group VII.

..... [1]

(b) (i) Deduce the electronic structure of chlorine.
Use the Periodic Table to help you.

..... [1]

(ii) Explain why a bromide ion has a single negative charge.

.....

..... [1]

(c) Scientists have predicted that sodium astatide reacts with chlorine.

Complete the word equation for this reaction.

sodium astatide	+	chlorine	→	....	+	.....

[2]

(d) Hydrogen chloride is produced when chlorine reacts with ammonia.
An aqueous solution of hydrogen chloride is acidic.

Describe how you could determine the pH of an acidic solution without using a pH meter.

.....

.....

..... [2]

[Total: 9]

20. Nov/2021/Paper_42/No.4

Iron is a transition element. Potassium is a Group I element.

(a) Iron and potassium have the same type of bonding.

Name and describe the type of bonding in these two elements.

name .....

description .....

.....

.....

.....

[4]

(b) Transition elements and Group I elements have some similar physical properties.

They can both:

- be hammered into a shape
- conduct electricity
- be stretched into wires.

(i) Name the term used to describe the ability of elements to be hammered into a shape.

..... [1]

(ii) Describe what happens to the particles in iron when it is hammered into a shape.

.....

..... [1]

(iii) Suggest why copper, rather than other transition elements, is used for wires which conduct electricity.

..... [1]

(c) Transition elements are harder and stronger than Group I elements.

Describe how **two** other **physical** properties of transition elements are different from those of Group I elements.

1 .....

2 .....

[2]

(d) Chemical properties of some Group I elements are shown in the table.

element	reaction with cold water	reaction with oxygen	flame test colour
lithium	• steadily effervesces • forms a colourless solution	very slowly forms an oxide layer	red
sodium	• strongly effervesces • forms a colourless solution	slowly forms an oxide layer	
potassium	• very strongly effervesces • forms a colourless solution	quickly forms an oxide layer	
rubidium			ruby red

(i) Add to the table:

- the flame test colours for sodium and potassium
- the predicted reactions of rubidium with water and with oxygen.

[4]

(ii) Name the gas produced when Group I elements react with water.

..... [1]

(iii) Name the solution formed when potassium reacts with water.

..... [1]

(iv) Predict the pH of the colourless solution formed when potassium reacts with water.

..... [1]

(v) Write the chemical equation for the reaction of sodium with oxygen.

..... [2]

(e) Iron is a typical transition element. It is the catalyst used in the Haber process.

(i) Write the equation for the reaction that occurs in the Haber process.

..... [2]

(ii) State the temperature and pressure used in the Haber process. Include units.

temperature .....

pressure .....

[2]

[Total: 22]