The Periodic Table – 2023 IGCSE Chemistry 0620

1. Nov/2023/Paper_0620/11/No.20

Which compound is likely to be coloured?

A $KMnO_4$ **B** KNO_3 **C** K_2CO_3 **D** K_2SO_4

2. Nov/2023/Paper_0620/11/No.21

Chlorine, bromine and iodine are in the same group of the Periodic Table.

Which statements about these three elements are correct?

1 Iodine is more reactive than chlorine.

2 They are diatomic covalent molecules.

3 They are all gases at room temperature.

4 Their atoms have seven electrons in their outer shell.

A 1 and 3 **B** 1 and 4 **C** 2 and 3 **D** 2 and 4

3. Nov/2023/Paper_0620/11/No.22

The electronic configurations of four elements, P, Q, R and S, are shown.

element	electronic configuration
P	2
Q	2,2
R	2,6
S	2,8

Which elements are unreactive monatomic gases?

A P and Q **B** P and S **C** Q and R **D** S only

4. Nov/2023/Paper_0620/11/No.23

The table shows some physical properties of four different substances.

Which row describes the properties of a non-metallic element?

	melting point / °C	conductivity when solid	conductivity when melted
A	63	good	good
B	119	poor	poor
C	659	good	good
D	808	poor	good

5. Nov/2023/Paper_0620/11/No.24

The equation shows the reaction between a halogen and the aqueous ions of another halogen.

$$X_2 + 2Y^- \rightarrow 2X^- + Y_2$$

What is X_2 and the colour of Y^-?

	X_2	Y^-
A	chlorine	brown
B	chlorine	colourless
C	iodine	brown
D	iodine	colourless

6. Nov/2023/Paper_0620/12/No.21

Some properties of element R are shown.

melting point in °C	98
boiling point in °C	883
reaction with cold water	gives off H_2 gas
reaction when heated with oxygen	burns to give a white solid

In which part of the Periodic Table is R found?

A Group I

B Group VII

C Group VIII

D transition elements

7. Nov/2023/Paper_0620/12/No.22

Lithium, sodium and potassium are elements in Group I.

Statements about these elements are listed.

1 Lithium is more dense than sodium.

2 Sodium is more reactive than potassium.

3 They all conduct electricity at room temperature.

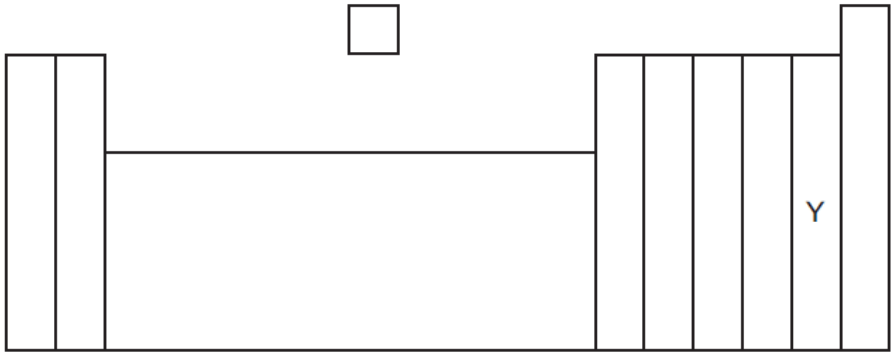
4 They all react with oxygen at room temperature.

Which statements are correct?

A 1 and 2 **B** 1 and 4 **C** 2 and 3 **D** 3 and 4

8. Nov/2023/Paper_0620/12/No.23

An outline of the Periodic Table is shown.



Which name is given to the elements in column Y?

A alkali metals

B halogens

C noble gases

D transition elements

9. Nov/2023/Paper_0620/13/No.20

Which row shows properties of an element that is in the same group of the Periodic Table as lithium?

	electrical conductivity	density in g/cm^3
A	high	0.97
B	high	8.93
C	low	0.07
D	low	3.12

10. Nov/2023/Paper_0620/13/No.22

Which row describes how the properties of Group I elements change as the group is descended?

	melting point	density	reactivity
A	increases	increases	increases
B	increases	decreases	decreases
C	decreases	increases	increases
D	decreases	decreases	decreases

11. Nov/2023/Paper_0620/13/No.20

The elements in Group VII include chlorine, bromine and iodine.

Which statements are correct?

1 Iodine is more dense than chlorine.

2 Iodine displaces chlorine from a solution containing chloride ions.

3 Bromine is a diatomic non-metal.

4 Chlorine gas is darker in colour than bromine vapour.

A 1 and 2 **B** 1 and 3 **C** 2 and 4 **D** 3 and 4

12. Nov/2023/Paper_0620/13/No.24

Cobalt is a transition element.

What is a property of cobalt?

A It can form coloured compounds.

B It is a poor electrical conductor.

C It has a low density.

D It has a low melting point.

13. Nov/2023/Paper_0620/21/No.22

The electronic configurations of four elements, P, Q, R and S, are shown.

element	electronic configuration
P	2
Q	2,2
R	2,6
S	2,8

Which elements are unreactive monatomic gases?

A P and Q **B** P and S **C** Q and R **D** S only

14. Nov/2023/Paper_0620/22/No.22

Some properties of element R are shown.

melting point in °C	98
boiling point in °C	883
reaction with cold water	gives off H_2 gas
reaction when heated with oxygen	burns to give a white solid

In which part of the Periodic Table is R found?

A Group I

B Group VII

C Group VIII

D transition elements

15. Nov/2023/Paper_0620/22/No.23

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

Some properties of the first four noble gases are shown.

noble gas	boiling point in °C	density in g / dm^3
helium	–267	0.179
neon	–246	0.900
argon	–186	1.782
krypton	–152	3.708

Which row identifies the trends in boiling point and in density as Group VIII is descended?

	boiling point	density
A	decreasing	increasing
B	increasing	increasing
C	decreasing	decreasing
D	increasing	decreasing

16. Nov/2023/Paper_0620/22/No.24

Which pair of compounds shows that transition elements have variable oxidation states?

A Cr_2O_3 and $CrBr_3$

B $CuSO_4$ and $CuCl_2$

C Fe_2O_3 and $FeCl_2$

D NiO and $NiCl_2$

17. Nov/2023/Paper_0620/23/No.23

Which row shows properties of an element that is in the same group of the Periodic Table as lithium?

	electrical conductivity	density in g/cm^3
A	high	0.97
B	high	8.93
C	low	0.07
D	low	3.12

18. Nov/2023/Paper_0620/23/No.24

The elements in Group VII include chlorine, bromine and iodine.

Which statements are correct?

1 Iodine is more dense than chlorine.

2 Iodine displaces chlorine from a solution containing chloride ions.

3 Bromine is a diatomic non-metal.

4 Chlorine gas is darker in colour than bromine vapour.

A 1 and 2 **B** 1 and 3 **C** 2 and 4 **D** 3 and 4

19. Nov/2023/Paper_0620/31/No.1(f)

A list of substances is shown.

ammonium nitrate
carbon monoxide
copper(II) chloride
ethane
ethene
litmus
methane
methyl orange
sodium chloride
sodium sulfate
sulfur dioxide
thymolphthalein

Answer the following questions using only the substances from the list.
Each substance may be used once, more than once or not at all.

Give the name of the substance that:

(f) is a compound of a transition element.

..... [1]

20. Nov/2023/Paper_0620/32/No.1(f)

A list of compounds is shown.

ammonia
carbon dioxide
carbon monoxide
cobalt(II) chloride
ethane
ethene
glucose
methane
potassium sulfate
sodium phosphate
sulfur dioxide

Answer the following questions using only the compounds from the list.
Each compound may be used once, more than once or not at all.

Give the name of the compound that:

(f) is a compound of a transition element.

..... [1]

21. Nov/2023/Paper_0620/41/No.2(e)

Boron and aluminium are Group III elements.

(e) Explain the apparent unreactivity of aluminium.

.....

..... [2]

22. Nov/2023/Paper_0620/41/No.3

Order of reactivity can be determined by displacement reactions.

(a) A student investigates the reactivities of four metals by carrying out a series of experiments.

Each of the metals lead, manganese, silver and zinc are added separately to aqueous metal nitrates of the other metals.

(i) Table 3.1 shows some of the results.

Table 3.1

aqueous solution	lead Pb	manganese Mn	silver Ag	zinc Zn
lead(II) nitrate		✓		
manganese(II) nitrate				
silver nitrate	✓	✓		✓
zinc nitrate	✗	✗		

key

✓ = displacement reaction occurs

✗ = displacement reaction does not occur

Complete Table 3.1 and place the four metals in their order of reactivity with the most reactive first.

1 ..... most reactive

2 .....

3 .....

4 .....

[3]

(ii) Suggest why the metal nitrates and not the metal sulfates of these four metals are used as the aqueous solutions.

..... [1]

(iii) Write the symbol equation for the reaction between zinc and silver nitrate.

..... [2]

(b) The reactivity of Group VII elements can be investigated experimentally.

A student bubbles chlorine gas into a test-tube containing aqueous potassium bromide.

(i) Describe the colour change seen in the test-tube.

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

(ii) Complete the ionic equation for this reaction.

Include state symbols.

..... + ...Br^-(aq) → ..... + ... [3]

(iii) The reactivity trend seen in Cl, Br and I applies to all the elements in Group VII.

Use the Periodic Table to identify the Group VII element which cannot displace any other Group VII elements.

..... [1]

[Total: 12]

23. Nov/2023/Paper_0620/42/No.1

Table 1.1 gives the electronic configurations of some atoms and ions, **A** to **G**.

Table 1.1

	electronic configuration
A	2,5
B	2,8
C	2,8,2
D	2,8,4
E	2,8,5
F	2,8,6
G	2,8,18,7

Answer the following questions about **A** to **G**.
Each letter may be used once, more than once or not at all.

State which of the atoms or ions, **A** to **G**, could be:

(a) a noble gas atom

..... [1]

(b) an atom of an element in Group VI

..... [1]

(c) an atom with an atomic number of 14

..... [1]

(d) atoms from the same group

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

(e) a halogen atom

..... [1]

(f) an atom of an element which is a good conductor of electricity

..... [1]

(g) a stable ion of a Group V element

..... [1]

(h) an atom that forms an ion with a 2– charge.

..... [1]

[Total: 8]

24. Nov/2023/Paper_0620/42/No.2(b)

(b) One physical property of transition elements such as copper and cobalt is that they are hard. Other metals such as lithium are softer.

State **two** other physical properties of copper and cobalt which are significantly different from lithium.

1 .....

2 .....

[2]