The Periodic Table – 2023 June IGCSE Chemistry 0620

1. June/2023/Paper_ 0620/11/No.18

Which statements about the trends across a period of the Periodic Table are correct?

1 Aluminium is more metallic than sodium.

2 Beryllium is more metallic than carbon.

3 Boron is more metallic than lithium.

4 Magnesium is more metallic than silicon.

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

2. June/2023/Paper_ 0620/11/No.19

Which row shows the trend in melting point, density and reactivity as Group I is descended?

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

3. June/2023/Paper_ 0620/11/No.20

Which row describes a similarity and a difference between chlorine and bromine?

	similarity	difference
A	both are gases at room temperature and pressure	chlorine and bromine have different colours
B	both exist as diatomic molecules	chlorine is more dense than bromine
C	both have atoms with seven outer-shell electrons	only bromine will react with aqueous sodium chloride
D	both react with aqueous potassium iodide	chlorine is more reactive than bromine

4. June/2023/Paper_ 0620/11/No.21

Which statement describes transition elements?

A They have high densities and high melting points.

B They have high densities and low melting points.

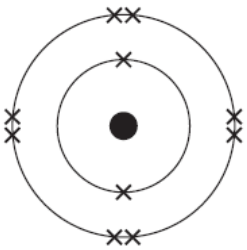
C They have low densities and high melting points.

D They have low densities and low melting points.

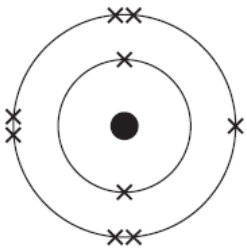
5. June/2023/Paper_ 0620/11/No.22

Which diagram shows the electronic structure of a noble gas?

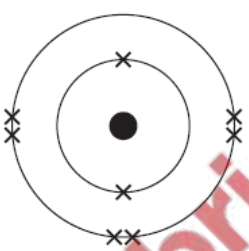
A



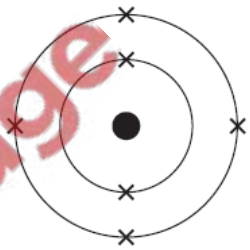
B



C



D



6. June/2023/Paper_ 0620/12/No.18

Q and R are elements in the same period of the Periodic Table.

Q has 7 electrons in its outer shell and R has 2 electrons in its outer shell.

Which statement about Q and R is correct?

A Q is a metal and R is a non-metal.

B Q and R have different numbers of electron shells.

C R is found to the right of Q in the Periodic Table.

D The proton number of R is less than the proton number of Q.

7. June/2023/Paper_ 0620/12/No.19

Which statement about alkali metals is correct?

A Lithium is more dense than sodium.

B Sodium is more reactive than potassium.

C Sodium has a higher melting point than potassium.

D They are in Group II of the Periodic Table.

8. June/2023/Paper_ 0620/12/No.20

Aqueous bromine is added to aqueous sodium iodide.

bromine + sodium iodide → .....1..... + ...2.....

What are the products of this reaction?

	1	2
A	iodide	sodium bromide
B	iodide	sodium bromine
C	iodine	sodium bromide
D	iodine	sodium bromine

9. June/2023/Paper_ 0620/12/No.21

Which row describes the properties of a transition element?

	melting point	density	forms coloured compounds
A	high	low	no
B	high	high	yes
C	low	low	no
D	low	low	yes

10. June/2023/Paper_ 0620/12/No.22

Which row describes the properties of argon?

	property 1	property 2
A	inert	diatomic
B	inert	monatomic
C	reactive	diatomic
D	reactive	monatomic

11. June/2023/Paper_ 0620/13/No.18

Which set of elements shows the change from metallic to non-metallic character across a period of the Periodic Table?

A beryllium → magnesium → calcium

B fluorine → bromine → iodine

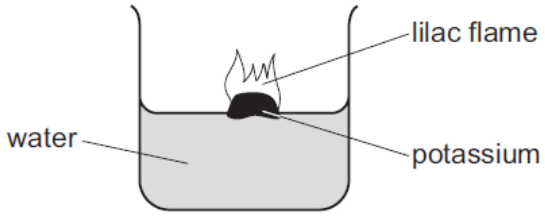
C oxygen → boron → lithium

D sodium → silicon → chlorine

12. June/2023/Paper_ 0620/13/No.19

The diagram shows the reaction that occurs when potassium is dropped into water.

$$2K + 2H_2O \rightarrow 2KOH + H_2$$



Which row is correct?

	density of potassium	pH of resulting solution
A	high	above 7
B	high	below 7
C	low	above 7
D	low	below 7

13. June/2023/Paper_ 0620/13/No.20

Which statement about bromine is correct?

A Bromine has a greater density than chlorine.

B Bromine is a gas at room temperature and pressure.

C Bromine has a grey-black colour.

D Bromine is less reactive than iodine.

14. June/2023/Paper_ 0620/13/No.21

What is a typical property of transition elements?

A can act as catalysts

B poor electrical conductivity

C low melting point

D low density

15. June/2023/Paper_ 0620/13/No.22

Which description of elements in Group VIII of the Periodic Table is correct?

A They are diatomic.

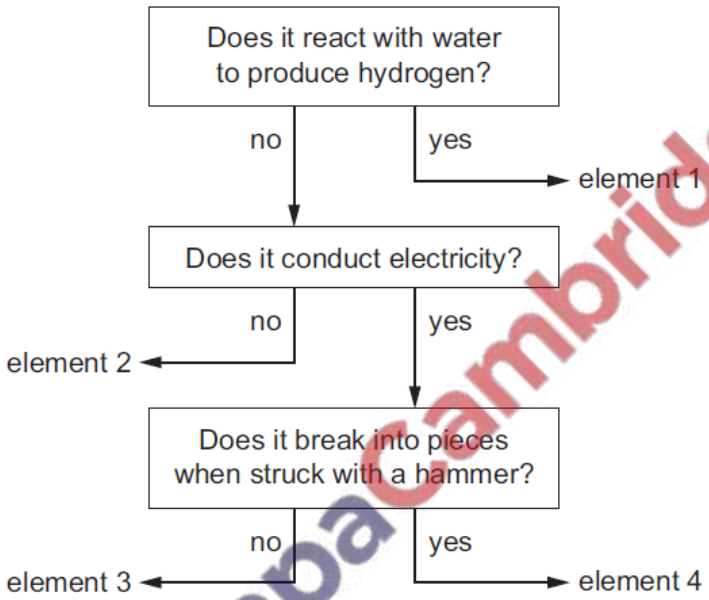
B All atoms have eight outer electrons.

C They have high melting points.

D They are unreactive.

16. June/2023/Paper_ 0620/13/No.23

The flow chart shows some properties of four solid elements.



Which elements are non-metals?

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

17. June/2023/Paper_ 0620/21/No.18

Which statements about the trends across a period of the Periodic Table are correct?

1 Aluminium is more metallic than sodium.

2 Beryllium is more metallic than carbon.

3 Boron is more metallic than lithium.

4 Magnesium is more metallic than silicon.

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

18. June/2023/Paper_ 0620/21/No.19

Some information about elements in Group II of the Periodic Table is shown.

element	time taken to make 10 cm^3 of hydrogen gas when 1 g of metal is added to cold water	density in g/cm^3	melting point / °C
beryllium	no reaction	1.85	1280
magnesium	>300 seconds	1.74	650
calcium	60 seconds	1.54	850
strontium	30 seconds	2.62	768
barium	10 seconds	3.51	714

Which row shows the correct trends in reactivity, density and melting point of the elements going down Group II of the Periodic Table?

	reactivity	density	melting point
A	decreases down group	increases down group	decreases down group
B	decreases down group	decreases down group	no clear trend
C	increases down group	no clear trend	increases down group
D	increases down group	no clear trend	no clear trend

19. June/2023/Paper_ 0620/21/No.20

A new element oxfordium, Ox, was discovered with the following properties.

solubility	electrical conduction	formula of element	bonding in a molecule of Ox_2
insoluble in water	does not conduct	Ox_2	Ox═Ox

In which group of the Periodic Table should the new element be placed?

A Group III

B Group V

C Group VII

D Group VIII

20. June/2023/Paper_ 0620/21/No.21

Which row describes a similarity and a difference between chlorine and bromine?

	similarity	difference
A	both are gases at room temperature and pressure	chlorine and bromine have different colours
B	both exist as diatomic molecules	chlorine is more dense than bromine
C	both have atoms with seven outer-shell electrons	only bromine will react with aqueous sodium chloride
D	both react with aqueous potassium iodide	chlorine is more reactive than bromine

21. June/2023/Paper_ 0620/21/No.22

Which statement describes transition elements?

A They have high densities and high melting points.

B They have high densities and low melting points.

C They have low densities and high melting points.

D They have low densities and low melting points.

22. June/2023/Paper_ 0620/22/No.19

Q and R are elements in the same period of the Periodic Table.

Q has 7 electrons in its outer shell and R has 2 electrons in its outer shell.

Which statement about Q and R is correct?

A Q is a metal and R is a non-metal.

B Q and R have different numbers of electron shells.

C R is found to the right of Q in the Periodic Table.

D The proton number of R is less than the proton number of Q.

23. June/2023/Paper_ 0620/22/No.20

Which statement about alkali metals is correct?

A Lithium is more dense than sodium.

B Sodium is more reactive than potassium.

C Sodium has a higher melting point than potassium.

D They are in Group II of the Periodic Table.

24. June/2023/Paper_ 0620/22/No.22

Which row describes the properties of a transition element?

	melting point	density	forms coloured compounds
A	high	low	no
B	high	high	yes
C	low	low	no
D	low	low	yes

25. June/2023/Paper_ 0620/23/No.21

Which set of elements shows the change from metallic to non-metallic character across a period of the Periodic Table?

A beryllium → magnesium → calcium

B fluorine → bromine → iodine

C oxygen → boron → lithium

D sodium → silicon → chlorine

26. June/2023/Paper_ 0620/23/No.23

What is a typical property of transition elements?

A can act as catalysts

B poor electrical conductivity

C low melting point

D low density

27. June/2023/Paper_ 0620/23/No.40

Element X burns in air to form an acidic gas that decolourises potassium manganate(VII).

What is X?

A carbon

B nitrogen

C magnesium

D sulfur

28. June/2023/Paper_ 0620/31/No.1

Fig. 1.1 shows part of the Periodic Table.

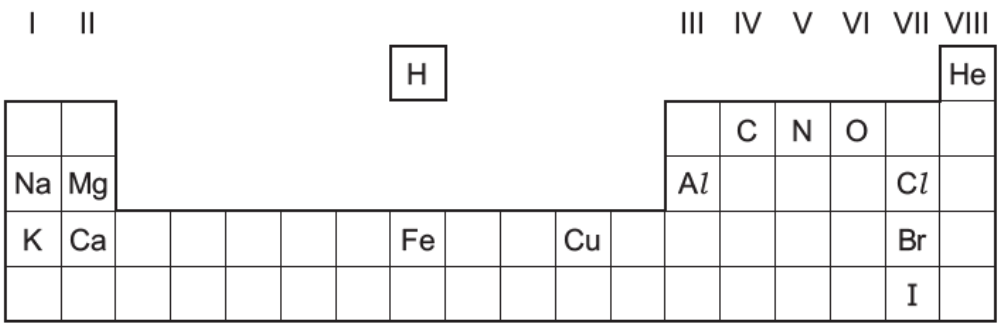


Fig. 1.1

Answer the following questions using only the elements in Fig. 1.1.
Each symbol of the element may be used once, more than once or not at all.

Give the symbol of the element that:

(a) forms 78% by volume of clean, dry air

..... [1]

(b) has an atom with a complete outer electron shell

..... [1]

(c) has an atom with five occupied electron shells

..... [1]

(d) forms an ion with a charge of 2–

..... [1]

(e) forms an ion that gives a green precipitate on addition of aqueous sodium hydroxide

..... [1]

(f) is used in food containers because of its resistance to corrosion.

..... [1]

[Total: 6]

29. June/2023/Paper_ 0620/31/No.2

(a) Table 2.1 shows some properties of the halogens.

Table 2.1

halogen	melting point in °C	boiling point in °C	density at room temperature and pressure in g/cm^3
fluorine	–220	–188	0.0016
chlorine	–101	–35	0.0032
bromine		+59	3.1
iodine	+114	+184	

Use the information in Table 2.1 to predict:

(i) the melting point of bromine

..... [1]

(ii) the density of iodine at room temperature and pressure

..... [1]

(iii) the physical state of chlorine at –10 °C. Give a reason for your answer.

physical state .....

reason .....

.....

[2]

(b) The equation for the reaction of aqueous chlorine with aqueous potassium iodide is shown.

$$Cl_2 + 2KI \rightarrow I_2 + 2KCl$$

(i) Choose the word which best describes this type of chemical reaction.
Draw a circle around your chosen answer.

addition **displacement** **neutralisation** **polymerisation** [1]

(ii) Explain why aqueous iodine does **not** react with aqueous potassium chloride.

..... [1]

(c) Complete the diagram in Fig. 2.1 to show the electronic configuration of a chlorine atom.

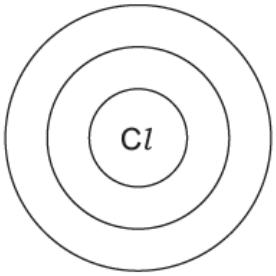


Fig. 2.1

[1]

(d) Describe a test for chlorine.

test .....

observations .....

[2]

[Total: 9]

30. June/2023/Paper_ 0620/32/No.1

Fig. 1.1 shows part of the Periodic Table.

I	II											III	IV	V	VI	VII	VIII
																	He
													C	N	O		Ne
																Cl	
K	Ca				Cr					Cu	Zn					Br	
	Sr															I	

Fig. 1.1

Answer the following questions using only the elements in Fig. 1.1.
Each symbol of the element may be used once, more than once or not at all.

Give the symbol of the element that:

(a) forms 21% by volume of clean, dry air

..... [1]

(b) has an atom with only three occupied electron shells

..... [1]

(c) has an atom with only one electron in its outer shell

..... [1]

(d) is a grey-black solid at room temperature

..... [1]

(e) forms an ion that gives a green precipitate on addition of aqueous ammonia

..... [1]

(f) is used in electrical wiring because of its good ductility.

..... [1]

[Total: 6]

31. June/2023/Paper_ 0620/32/No.2

(a) Table 2.1 shows some properties of the halogens.

Table 2.1

halogen	melting point in °C	boiling point in °C	density at room temperature and pressure in g/cm^3
chlorine	–101	–35	0.003
bromine	–7	+59	3.12
iodine	+114		4.93
astatine	+302	+337	

Use the information in Table 2.1 to predict:

(i) the boiling point of iodine ..... [1]

(ii) the density of astatine at room temperature and pressure ..... [1]

(iii) the physical state of bromine at +50 °C. Give a reason for your answer.

physical state .....

reason .....

.....

[2]

(b) Aqueous bromine reacts with aqueous potassium iodide.

(i) Complete the word equation for this reaction.

bromine	+	potassium iodide	→	.....	+	....

[2]

(ii) Explain why aqueous iodine does **not** react with aqueous potassium bromide.

..... [1]

(iii) Describe a test for iodide ions.

test .....

observations .....

[2]

[Total: 9]

32. June/2023/Paper_ 0620/32/No.8(a)

This question is about non-metals and compounds of non-metals.

(a) Describe **two** physical properties which are typical of non-metals.

1 .....

2 .....

[2]

33. June/2023/Paper_ 0620/33/No.2

Fig. 1.1 shows part of the Periodic Table.

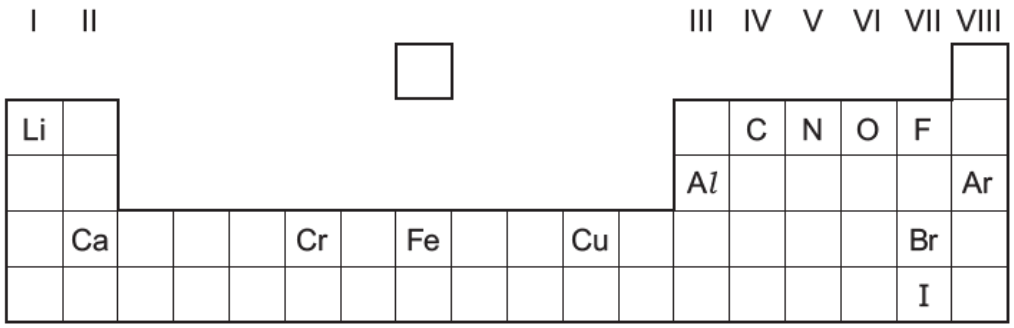


Fig. 1.1

Answer the following questions using only the elements in Fig. 1.1.
Each symbol of the element may be used once, more than once or not at all.

Give the symbol of the element that:

(a) is present in diamond

..... [1]

(b) forms an oxide that contributes to acid rain

..... [1]

(c) has an atom with five occupied electron shells

..... [1]

(d) forms an ion with a charge of 1+

..... [1]

(e) forms an ion that gives a red-brown precipitate on addition of aqueous ammonia

..... [1]

(f) is used in the manufacture of aircraft because of its low density.

..... [1]

[Total: 6]

34. June/2023/Paper_ 0620/33/No.2

(a) Table 2.1 shows some properties of the halogens.

Table 2.1

halogen	melting point in °C	boiling point in °C	density at room temperature and pressure in g/cm^3
fluorine	–220	–188	
chlorine	–101		0.003
bromine	–7	+59	3.12
iodine	+114	+184	4.93

Use the information in Table 2.1 to predict:

(i) the boiling point of chlorine ..... [1]

(ii) the density of fluorine at room temperature and pressure ..... [1]

(iii) the physical state of iodine at +100 °C. Give a reason for your answer.

physical state .....

reason .....

.....

[2]

(b) Aqueous chlorine reacts with aqueous sodium bromide.

(i) Complete the word equation for this reaction.

chlorine + sodium bromide → ..... + ...
.....

[2]

(ii) State a test for sodium ions.

test .....

observations .....

[2]

[Total: 8]

35. June/2023/Paper_ 0620/33/No.8(a)

This question is about non-metals.

(a) Non-metals are poor thermal conductors.

Describe two **other** physical properties which are typical of non-metals.

1 .....

2 .....

[2]

36. June/2023/Paper_ 0620/41/No.1

Some symbol equations and word equations, **A** to **J**, are shown.

A $Fe^{3+} + 3OH^- \rightarrow Fe(OH)_3$

B $H^+ + OH^- \rightarrow H_2O$

C ethane + chlorine → chloroethane + hydrogen chloride

D $C_{12}H_{26} \rightarrow C_8H_{18} + C_4H_8$

E ethene + steam → ethanol

F chlorine + aqueous potassium iodide → iodine + aqueous potassium chloride

G $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2$

H ethanoic acid + ethanol → ethyl ethanoate + water

I calcium carbonate → calcium oxide + carbon dioxide

J $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$

Use the equations to answer the questions that follow.
Each equation may be used once, more than once, or not at all.

Give the letter, **A** to **J**, for the equation that represents:

(a) a neutralisation reaction ..... [1]

(b) a precipitation reaction ..... [1]

(c) the formation of an ester ..... [1]

(d) photosynthesis ..... [1]

(e) fermentation ..... [1]

(f) cracking. ..... [1]

[Total: 6]

37. June/2023/Paper_ 0620/41/No.2(a)

(a) The symbols of the elements in Period 2 of the Periodic Table are shown.

Li Be B C N O F Ne

Use the symbols of the elements in Period 2 to answer the questions that follow.
Each symbol may be used once, more than once or not at all.

Give the symbol of the element that:

(i) makes up approximately 78% of clean, dry air ..... [1]

(ii) contains atoms with only three electrons in the outer shell ..... [1]

(iii) contains atoms with only nine protons ..... [1]

(iv) exists as graphite ..... [1]

(v) is an alkali metal ..... [1]

(vi) **only** has an oxidation number of zero. ..... [1]

38. June/2023/Paper_ 0620/42/No.1

A list of oxides, **A** to **H**, is shown.

A calcium oxide

B aluminium oxide

C silicon(IV) oxide

D sulfur dioxide

E carbon dioxide

F iron(III) oxide

G silver oxide

H carbon monoxide

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

State which of the oxides, **A** to **H**:

(a) is responsible for acid rain

..... [1]

(b) has a giant covalent structure

..... [1]

(c) is a reducing agent in the blast furnace

..... [1]

(d) is the main constituent of bauxite

..... [1]

(e) is the main impurity in iron ore

..... [1]

(f) can be reduced by heating with copper.

..... [1]

[Total: 6]

39. June/2023/Paper_ 0620/42/No.2

Fluorine, chlorine and bromine are in Group VII of the Periodic Table.

(a) State the name given to Group VII elements.

..... [1]

(b) Explain why Group VII elements have similar chemical properties.

..... [1]

(c) Complete Table 2.1 to show the colour and state at r.t.p. of some Group VII elements.

Table 2.1

element	colour	state at r.t.p.
fluorine	pale yellow	
chlorine		
bromine		liquid

[3]

(d) Bromine has two naturally occurring isotopes, ^{79}Br and ^{81}Br.

(i) State the term given to the numbers 79 and 81 in these isotopes of bromine.

..... [1]

(ii) Complete Table 2.2 to show the number of protons, neutrons and electrons in the atom and ion of bromine shown.

Table 2.2

	^{79}Br	$^{81}Br^-$
protons		
neutrons		
electrons		

[3]

(iii) Table 2.3 shows the relative abundances of the two naturally occurring isotopes of bromine.

Table 2.3

isotope	^{79}Br	^{81}Br
relative abundance	55%	45%

Calculate the relative atomic mass of bromine to **one** decimal place.

relative atomic mass = ... [2]

(e) Chlorine displaces bromine from aqueous potassium bromide but does **not** displace fluorine from aqueous sodium fluoride.

(i) Write the symbol equation for the reaction between chlorine and aqueous potassium bromide.

..... [2]

(ii) State why chlorine does **not** displace fluorine from aqueous sodium fluoride.

..... [1]

(f) Aqueous silver nitrate is a colourless solution containing $Ag^+(aq)$ ions.

(i) Describe what is seen when aqueous silver nitrate is added to aqueous sodium chloride.

..... [1]

(ii) Write the ionic equation for the reaction between aqueous silver nitrate and aqueous sodium chloride.

Include state symbols.

..... [3]

[Total: 18]

40. June/2023/Paper_ 0620/43/No.1

Some symbol equations and word equations, **A** to **J**, are shown.

A $H^+ + OH^- \rightarrow H_2O$

B $Cr^{3+} + 3OH^- \rightarrow Cr(OH)_3$

C methane + chlorine → chloromethane + hydrogen chloride

D propene + bromine → 1,2-dibromopropane

E $C_{10}H_{22} \rightarrow C_8H_{18} + C_2H_4$

F chlorine + aqueous potassium bromide → bromine + aqueous potassium chloride

G methane + oxygen → carbon monoxide + water

H $C_2H_5COOH + CH_3OH \rightarrow C_2H_5COOCH_3 + H_2O$

I hydrogen + oxygen → water

J $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$

Use the equations to answer the questions that follow.
Each equation may be used once, more than once, or not at all.

Give the letter, **A** to **J**, for the equation which represents:

(a) photosynthesis ..... [1]

(b) an addition reaction ..... [1]

(c) a precipitation reaction ..... [1]

(d) incomplete combustion ..... [1]

(e) a displacement reaction ..... [1]

(f) a substitution reaction. ..... [1]

[Total: 6]

41. June/2023/Paper_ 0620/43/No.2

(a) The symbols of the elements in Period 3 of the Periodic Table are shown.

Na Mg Al Si P S Cl Ar

Use the symbols of the elements in Period 3 to answer the questions that follow.
Each symbol may be used once, more than once, or not at all.

Give the symbol of the element that:

(i) is present in purified bauxite ..... [1]

(ii) contains atoms with a full outer shell of electrons ..... [1]

(iii) is used to kill microbes in water treatment ..... [1]

(iv) forms an amphoteric oxide ..... [1]

(v) forms an oxide which causes acid rain ..... [1]

(vi) has an oxidation number of –1 when it forms a compound with hydrogen.

..... [1]

(b) The relative atomic masses of elements can be calculated from the relative masses of isotopes and their percentage abundances.

(i) Identify the isotope to which all relative masses are compared.

..... [1]

(ii) Table 2.1 shows the relative masses and the percentage abundances of the two isotopes in a sample of magnesium.

Table 2.1

relative mass of isotope	percentage abundance of isotope
24	85
26	15

Calculate the relative atomic mass of magnesium to **one** decimal place.

relative atomic mass = ... [2]

(c) An ion contains 10 electrons, 13 protons and 14 neutrons.

(i) State the nucleon number of the ion.

..... [1]

(ii) Identify the element that forms this ion.

..... [1]

[Total: 11]

42. March/2023/Paper_ 0620/12/No.4

Which statement about elements in the Periodic Table is correct?

A A potassium ion, K^+, has the same electronic configuration as a chloride ion, Cl^-.

B The electronic configuration of a Ca^{2+} ion is 2,8,8,2.

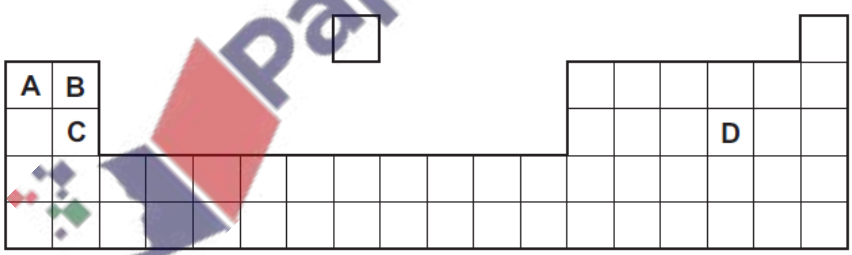
C The halogens are in Group VI and so their atoms have six electrons in their outer shell.

D Magnesium is in Period 3 and so a magnesium ion, Mg^{2+}, has three occupied electron shells.

43. March/2023/Paper_ 0620/12/No.19

Part of the Periodic Table is shown.

Which element has two electrons in its outer shell and three electron shells?



44. March/2023/Paper_ 0620/12/No.20

Some information about element X is given.

- melting point = 64 °C
- density = 0.86 g / cm^3
- vigorous reaction with water

Where in the Periodic Table is X placed?

A Group 0

B Group I

C Group VII

D transition metals

45. March/2023/Paper_ 0620/12/No.21

The properties of the element titanium, Ti, can be predicted from its position in the Periodic Table.

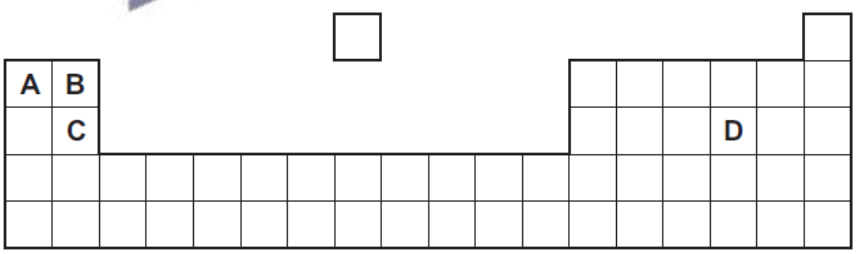
Which row identifies the properties of titanium?

	can be used as a catalyst	conducts electricity when solid	has low density	forms coloured compounds
A	✓	✓	✓	x
B	✓	✓	x	✓
C	✓	x	✓	✓
D	x	✓	✓	✓

46. March/2023/Paper_ 0620/22/No.22

Part of the Periodic Table is shown.

Which element has two electrons in its outer shell and three electron shells?



47. March/2023/Paper_ 0620/22/No.23

Elements in Group I and Group II show the same trends in their reactions with water and in their density.

Which row shows how the properties of barium compare with calcium?

	reaction with water	density
A	faster	higher
B	faster	lower
C	slower	higher
D	slower	lower

48. March/2023/Paper_ 0620/22/No.24

Which pair of compounds shows a transition element in two different oxidation states?

A Cr_2O_3 and $Cr_2(SO_4)_3$

B Cu_2O and $CuCO_3$

C ZnS and $ZnSO_4$

D NiO and $Ni(NO_3)_2$

49. March/2023/Paper_ 0620/42/No.4(c)

(c) Copper is a transition element.

Some physical and chemical properties of transition elements are shown.

physical properties:
- high density
- high strength

chemical properties:
- form coloured compounds
- have ions with variable oxidation numbers

(i) State one **other** physical property of transition elements.

..... [1]

(ii) State one **other** chemical property of transition elements.

..... [1]