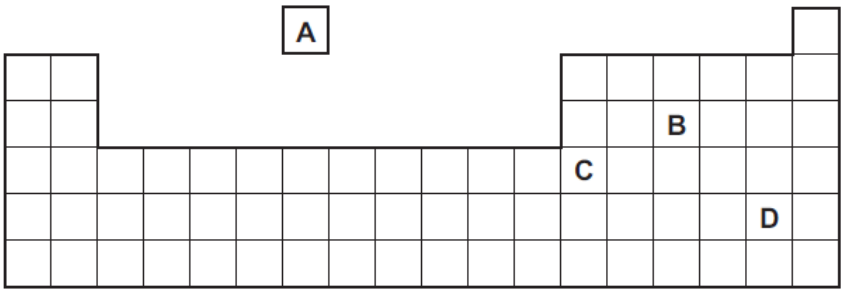
The Periodic Table – 2022 IGCSE

1. June/2022/Paper_11/No.21

Part of the Periodic Table is shown.

Which element is a metal?



2. June/2022/Paper_11/No.22

The elements sodium to argon form Period 3 of the Periodic Table.

Which row describes the trend across Period 3 from left to right?

	number of outer-shell electrons	metallic character	group number
A	decreases	decreases	decreases
B	decreases	increases	decreases
C	increases	decreases	increases
D	increases	increases	increases

3. June/2022/Paper_11/No.23

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

Which statement about these elements is correct?

A Lithium has the highest melting point and the lowest density.

B Lithium has the highest density and the most violent reaction with water.

C Potassium has the highest melting point and the highest density.

D Potassium has the lowest melting point and the least violent reaction with water.

4. June/2022/Paper_11/No.24

Which statement describes a transition element?

A It can act as a catalyst and some of its compounds can also act as catalysts.

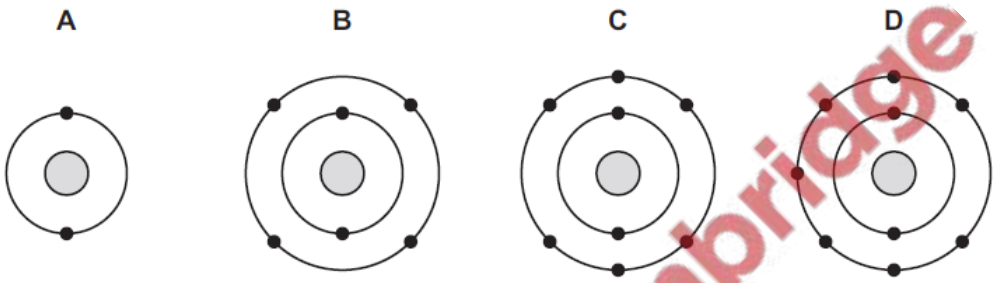
B It forms white compounds with sulfur, oxygen, chlorine and bromine.

C It has a low density and a piece of it will float on water.

D It is a very poor conductor of electricity.

5. June/2022/Paper_11/No.25

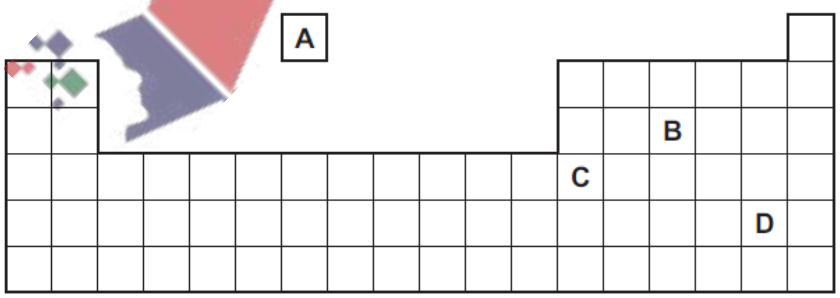
Which diagram represents the arrangement of the outer-shell electrons of a noble gas?



6. June/2022/Paper_12/No.21

Part of the Periodic Table is shown.

Which element is a metal?



7. June/2022/Paper_12/No.22

The elements sodium to argon form Period 3 of the Periodic Table.

Which row describes the trend across Period 3 from left to right?

	number of outer-shell electrons	metallic character	group number
A	decreases	decreases	decreases
B	decreases	increases	decreases
C	increases	decreases	increases
D	increases	increases	increases

8. June/2022/Paper_12/No.24

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

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

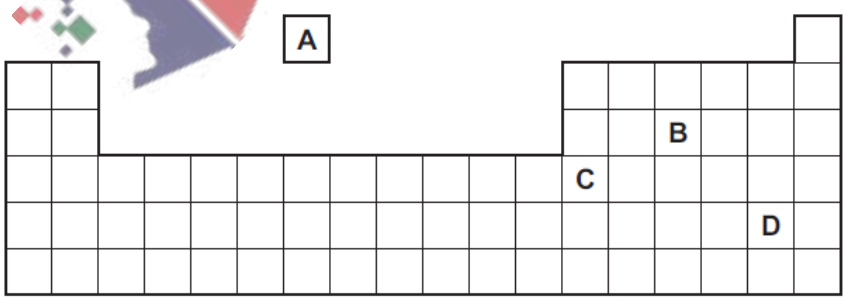
Which row identifies the **least** dense of these elements in each group?

	Group I	Group VII
A	lithium	chlorine
B	lithium	iodine
C	potassium	chlorine
D	potassium	iodine

9. June/2022/Paper_13/No.21

Part of the Periodic Table is shown.

Which element is a metal?



10. June/2022/Paper_13/No.22

The elements sodium to argon form Period 3 of the Periodic Table.

Which row describes the trend across Period 3 from left to right?

	number of outer-shell electrons	metallic character	group number
A	decreases	decreases	decreases
B	decreases	increases	decreases
C	increases	decreases	increases
D	increases	increases	increases

11. June/2022/Paper_13/No.23

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

Which statements about the properties of lithium and sodium are correct?

1 Lithium has a lower melting point than sodium.

2 They both produce hydrogen when they react with water.

3 Lithium is less dense than sodium.

4 Lithium is more reactive than sodium.

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

12. June/2022/Paper_13/No.24

Which row describes the properties of a typical transition element?

	melting point	density	used as catalyst
A	high	high	yes
B	high	low	no
C	low	high	yes
D	low	low	no

13. June/2022/Paper_13/No.25

Which row describes an atom of a noble gas?

	number of protons	number of neutrons	number of electrons
A	2	2	0
B	2	2	2
C	8	8	8
D	8	8	10

14. June/2022/Paper_21/No.21

Elements in Group IV of the Periodic Table are shown.

carbon

silicon

germanium

tin

lead

What does **not** occur in Group IV as it is descended?

A The proton number of the elements increases.

B The elements become more metallic.

C The elements have more electrons in their outer shell.

D The elements have more electron shells.

15. June/2022/Paper_21/No.22

Element M forms both M^+ and M^{2+} ions.

In which part of the Periodic Table is M placed?

A Group I

B Group II

C Group III

D transition elements

16. June/2022/Paper_22/No.21

Elements in Group IV of the Periodic Table are shown.

carbon

silicon

germanium

tin

lead

What does **not** occur in Group IV as it is descended?

A The proton number of the elements increases.

B The elements become more metallic.

C The elements have more electrons in their outer shell.

D The elements have more electron shells.

17. June/2022/Paper_22/No.23

Which elements have both a high melting point and variable oxidation states?

A alkali metals

B transition elements

C halogens

D noble gases

18. June/2022/Paper_22/No.24

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

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

Which row identifies the **least** dense of these elements in each group?

	Group I	Group VII
A	lithium	chlorine
B	lithium	iodine
C	potassium	chlorine
D	potassium	iodine

19. June/2022/Paper_23/No.21

Elements in Group IV of the Periodic Table are shown.

carbon

silicon

germanium

tin

lead

What does **not** occur in Group IV as it is descended?

A The proton number of the elements increases.

B The elements become more metallic.

C The elements have more electrons in their outer shell.

D The elements have more electron shells.

20. June/2022/Paper_23/No.22

W, X, Y and Z are elements in Period 3 of the Periodic Table.

The numbers of outer-shell electrons in an atom of each element are shown.

element	number of outer-shell electrons
W	1
X	2
Y	7
Z	8

Which elements are non-metals?

A W, X and Y **B** W and X only **C** Y and Z **D** Z only

21. June/2022/Paper_23/No.23

Selenium is an element in Group VI.

Group VI elements follow similar trends to Group VII elements.

Which statement about selenium is correct?

A It has a higher density than sulfur.

B It has a lower melting point than sulfur.

C It has six electron shells.

D It is a monoatomic element.

22. June/2022/Paper_23/No.24

Which row describes the properties of a typical transition element?

	melting point	density	used as catalyst
A	high	high	yes
B	high	low	no
C	low	high	yes
D	low	low	no

23. June/2022/Paper_23/No.25

Which row describes an atom of a noble gas?

	number of protons	number of neutrons	number of electrons
A	2	2	0
B	2	2	2
C	8	8	8
D	8	8	10

24. June/2022/Paper_31/No.3

This question is about halogens and halogen compounds.

(a) Deduce the number of electrons, neutrons and protons in one atom of the isotope of chlorine shown.

$$^{37}_{17}Cl$$

number of electrons .....

number of neutrons .....

number of protons .....

[3]

(b) State why chlorine is used in water treatment.

..... [1]

(c) Aqueous chlorine reacts with aqueous potassium iodide.

(i) Complete the chemical equation for this reaction.

$$Cl_2 + ...KI \rightarrow .....KCl + I_2$$ [2]

(ii) Explain in terms of the reactivity of the halogens why aqueous iodine does **not** react with aqueous potassium chloride.

.....

..... [1]

(d) The table shows some properties of four halogens.

halogen	melting point / °C	boiling point / °C	density of liquid at boiling point in g / cm^3
fluorine	–220	.....	1.51
chlorine	–101	–35	.....
bromine	–7	59	3.12
iodine	114	184	4.93

(i) Complete the table by predicting:
- the boiling point of fluorine
- the density of liquid chlorine at its boiling point. [2]

(ii) Predict the physical state of chlorine at –105 °C.
Give a reason for your answer.

.....

..... [2]

[Total: 11]

25. June/2022/Paper_32/No.3

This question is about Group I and Group VII elements.

(a) Deduce the number of electrons, neutrons and protons in one atom of the isotope of potassium shown.

$^{40}_{19}K$

number of electrons .....

number of neutrons .....

number of protons .....

[3]

(b) Complete the chemical equation for the reaction of potassium with water to form potassium hydroxide and a gas which pops with a lighted splint.

$2K + ...H_2O \rightarrow 2KOH + ...$ [2]

(c) The table shows some properties of four Group I elements.

element	melting point /°C	boiling point /°C	relative hardness
lithium	181	1342	5.0
sodium	.....	883	0.7
potassium	63	760	.....
rubidium	39	686	0.2

(i) Complete the table by predicting:

- the melting point of sodium
- the relative hardness of potassium. [2]

(ii) Predict the physical state of potassium at 100 °C.
Give a reason for your answer.

.....

..... [2]

(d) Aqueous bromine reacts with aqueous potassium iodide.

$$Br_2 + 2KI \rightarrow 2KBr + I_2$$

(i) Explain how this equation shows that bromine is more reactive than iodine.

.....

..... [1]

(ii) State the colour of aqueous iodine.

..... [1]

(e) Bromine is a diatomic molecule.

State the meaning of the term *diatomic*.

..... [1]

(f) Bromine liquid turns into a gas very easily at room temperature.

Choose the word which best describes a substance that evaporates easily.

Draw a circle around your chosen answer.

conductor **flammable** **malleable** **volatile** [1]

[Total: 13]

26. June/2022/Paper_33/No.5(c)

(c) Deduce the electronic structure of sulfur.

Use the Periodic Table to help you.

..... [1]

27. June/2022/Paper_33/No.3

This question is about Group I and Group VII elements.

(a) Deduce the number of electrons, neutrons and protons in one atom of the isotope of sodium shown.

$^{23}_{11}Na$

number of electrons .....

number of neutrons .....

number of protons .....

[3]

(b) Sodium reacts with chlorine to produce sodium chloride.

(i) State the colour of chlorine gas.

..... [1]

(ii) Chlorine is a diatomic molecule.

State the meaning of the term *diatomic*.

..... [1]

(iii) Complete the chemical equation for the reaction of sodium with chlorine.

2Na + ... → .....NaCl [2]

(iv) Sodium chloride is an ionic compound.

Describe **two** physical properties of ionic compounds.

1 .....

2 .....

[2]

(c) The table shows some properties of four Group I elements.

element	melting point /°C	boiling point /°C	atomic radius /nm
lithium	181	1342	0.157
sodium	98	883	.....
potassium	.....	760	0.235
rubidium	39	686	0.250

(i) Complete the table by predicting:
- the melting point of potassium
- the atomic radius of sodium. [2]

(ii) Predict the physical state of rubidium at 700 °C.
Give a reason for your answer.

.....

..... [2]

(iii) Give **two** physical properties of Group I metals that are different from transition elements and state how they are different.

1 .....

.....

2 .....

.....

[2]

(d) Aqueous chlorine reacts with aqueous sodium iodide.

$$Cl_2 + 2NaI \rightarrow 2NaCl + I_2$$

Explain how this equation shows that chlorine is more reactive than iodine.

.....

..... [1]

[Total: 16]

28. June/2022/Paper_41/No.7(a_ d)

The Periodic Table can be used to classify elements.

(a) Group I elements react with cold water to form alkaline solutions.

(i) Place the Group I elements caesium, lithium, potassium, rubidium and sodium in their order of reactivity with water.

Put the most reactive element first.

most reactive ⟶ least reactive

[1]

(ii) Name the alkaline solution formed when caesium reacts with cold water.

..... [1]

(b) Group I elements have lower melting points than transition elements.

Describe one **other** difference in the **physical** properties of Group I elements and transition elements.

..... [1]

(c) Group VII elements are known as the halogens.

Astatine is below iodine in Group VII.

Predict the physical state of astatine at room temperature and pressure.

..... [1]

(d) Some Group VII elements react with aqueous solutions containing halide ions.

When aqueous chlorine is added to aqueous potassium bromide a reaction occurs.

The ionic half-equations for the reaction are shown.

$$Cl_2(aq) + 2e^- \rightarrow 2Cl^-(aq)$$

$$2Br^-(aq) \rightarrow Br_2(aq) + 2e^-$$

(i) Describe the colour change of the solution.

original colour of potassium bromide solution .....

final colour of reaction mixture .....

[2]

(ii) Identify the species that is oxidised.

Explain your decision.

species oxidised .....

explanation .....

[2]

29. June/2022/Paper_42/No.1

The symbols of the elements of Period 3 of the Periodic Table are shown.

Na	Mg	A*l*	Si	P	S	C*l*	Ar

Answer the following questions about these elements.
Each symbol may be used once, more than once or not at all.

Write the symbol of the element which:

(a) forms a stable ion with a 2+ charge ..... [1]

(b) is the least reactive in the period ..... [1]

(c) is used in water treatment ..... [1]

(d) forms an oxide which is the main impurity in iron ore ..... [1]

(e) is an important component of fertilisers ..... [1]

(f) is stored under oil ..... [1]

(g) is used in food containers ..... [1]

(h) is found in the ore zinc blende. ..... [1]

[Total: 8]

30. June/2022/Paper_42/No.3

Transition elements are found in the middle block of the Periodic Table.

(a) Chromium has several isotopes. Manganese has only one isotope.

(i) State what is meant by the term *isotopes*.

.....

..... [2]

(ii) State the nucleon number of manganese.

..... [1]

(iii) Complete the table to show the number of protons, neutrons and electrons in a $^{52}_{24}Cr^{3+}$ ion.

protons	neutrons	electrons

[3]

(b) One chemical property of transition elements is that they form coloured compounds.

(i) Give the colours of the following hydrated salts.

- hydrated copper(II) sulfate .....
- hydrated cobalt(II) chloride .....

[2]

(ii) State two **other** chemical properties of transition elements.

1 .....

2 .....

[2]

(c) Transition elements and Group I elements are metals. They share many physical properties including the ability to:

- conduct electricity
- be hammered into shape.

(i) Explain why transition elements and Group I elements conduct electricity.

..... [1]

(ii) State the property that describes a material which can be hammered into shape.

..... [1]

(d) Transition elements and Group I elements differ in other physical properties. Transition elements are harder and stronger than Group I elements.

Describe two **other** ways in which the physical properties of transition elements differ from Group I elements.

1 .....

2 .....

[2]

[Total: 14]

31. June/2022/Paper_43/No.6

The Periodic Table can be used to classify elements.

(a) The Group I metals react with cold water. Transition elements do not react with cold water.

(i) Describe two **other** differences in the **chemical** properties between Group I metals and transition elements.

1 .....

2 .....

[2]

(ii) Describe the observations when potassium is added to cold water. Write a balanced equation for the reaction. Include state symbols.

observations .....

.....

.....

.....

equation .....

[5]

(b) Transition elements are stronger than Group I metals.

Describe two **other** differences in the **physical** properties of Group I metals and transition elements.

1 .....

2 .....

[2]

(c) Some Group VII elements react with aqueous solutions containing halide ions.

When aqueous bromine is added to aqueous potassium iodide a reaction occurs.

The ionic half-equations for the reaction are shown.

$$Br_2(aq) + 2e^- \rightarrow 2Br^-(aq)$$

$$2I^-(aq) \rightarrow I_2(aq) + 2e^-$$

(i) Describe the colour change of the solution.

original colour of potassium iodide solution .....

final colour of reaction mixture .....

[2]

(ii) State the name of the general term given to the type of reaction in which electrons are transferred from one species to another.

..... [1]

(iii) Identify the oxidising agent in this reaction. Give a reason for your answer.

oxidising agent .....

reason .....

[2]

(d) Use the key to complete the table to show the results of adding aqueous halogens to aqueous solutions of halides. One has been completed for you.

		halides		
		KC*l*(aq)	KBr(aq)	KI(aq)
halogens	Cl_2(aq)			
	Br_2(aq)			✓
	I_2(aq)			

key
✓ = reaction
✗ = no reaction

[2]

[Total: 16]

32. March/2022/Paper_22/No.22

Which statement about the Periodic Table is correct?

A Elements with the highest atomic number in each period are metallic.

B Elements with the lowest group numbers are non-metals.

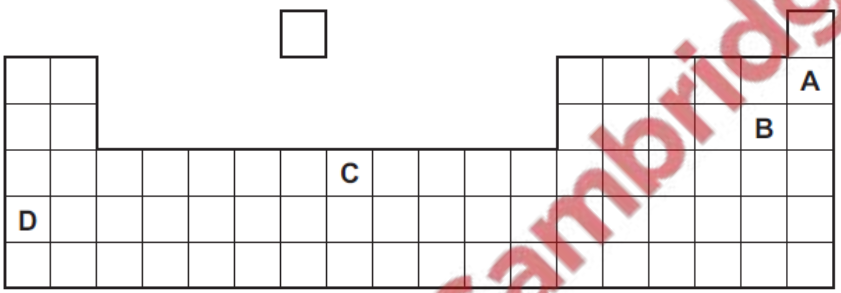
C Elements with similar chemical properties are placed in groups.

D Elements with similar physical properties are placed in periods.

33. March/2022/Paper_22/No.23

Part of the Periodic Table is shown.

Which element is a soft solid that reacts violently with cold water?



34. March/2022/Paper_22/No.24

Three properties of element X are listed.

- It contains atoms with a full outer shell of electrons.
- It is monoatomic.
- It is unreactive.

In which part of the Periodic Table is the element placed?

A Group I

B Group VII

C Group VIII

D transition elements

35. March/2022/Paper_22/No.25

Some properties of the elements in Group VII of the Periodic Table are shown.

element	melting point / °C	boiling point / °C	colour
F	–220	–188	pale yellow
Cl	–101	–35	green
Br	–7	59	brown
I	114	184	
At	302	380	

Which statement is correct?

A Bromine is a brown solid at room temperature.

B Fluorine is a pale yellow gas at room temperature.

C Iodine is a brown liquid at room temperature.

D Astatine is a black liquid at room temperature.

36. March/2022/Paper_22/No.24

Three properties of element X are listed.

- It contains atoms with a full outer shell of electrons.
- It is monoatomic.
- It is unreactive.

In which part of the Periodic Table is the element placed?

A Group I

B Group VII

C Group VIII

D transition elements

37. March/2022/Paper_22/No.25

Which word equation represents a reaction that occurs?

A sodium oxide + carbon → sodium + carbon dioxide

B sodium oxide + iron → sodium + iron(II) oxide

C iron(II) oxide + copper → iron + copper(II) oxide

D iron(III) oxide + carbon → iron + carbon dioxide

38. March/2022/Paper_32/No.6(a, b)

The table shows some properties of four Group I elements.

element	melting point / °C	boiling point / °C	relative hardness
lithium	181	1342	.....
sodium	98	.....	0.70
potassium	63	760	0.36
rubidium	39	686	0.22

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

- the boiling point of sodium
- the relative hardness of lithium. [2]

(ii) Predict the physical state of lithium at 200 °C.

Give a reason for your answer.

.....

..... [2]

(b) Potassium reacts with water.

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

Describe **two** observations when potassium reacts with water.

1 .....

2 .....

[2]

39. March/2022/Paper_32/No.8(a, d)

This question is about chlorine and compounds of chlorine.

(a) Chlorine is an element in Group VII of the Periodic Table.

State the meaning of the term *element*.

.....

..... [1]

(d) Chlorine reacts with aqueous sodium bromide.

(i) Complete the word equation for this reaction.

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

[2]

(ii) Describe a test for bromide ions.

test .....

observations .....

[2]

(iii) When bromine is mixed with aqueous sodium chloride there is no reaction.

Suggest in terms of chemical reactivity why there is no reaction.

..... [1]

40. March/2022/Paper_42/No.1

This question is about the first 30 elements in the Periodic Table.

Name the element which:

(a) is 78% of clean, dry air ..... [1]

(b) has atoms with an electronic structure of 2,8,1 ..... [1]

(c) is extracted from hematite ..... [1]

(d) forms an oxide with a giant covalent structure ..... [1]

(e) is the gas with the slowest rate of diffusion at room temperature

..... [1]

(f) has an anhydrous chloride which turns pink when water is added

..... [1]

(g) has aqueous ions which form a white precipitate when added to aqueous silver ions

..... [1]

(h) forms a blue hydroxide which dissolves in aqueous ammonia

.....[1]

(i) is added to molten iron to remove impurities in the steel making process

..... [1]

(j) is used to galvanise iron. ..... [1]

[Total: 10]