

Multiple choice

1. 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. Elements in Group I of the Periodic Table react with water.

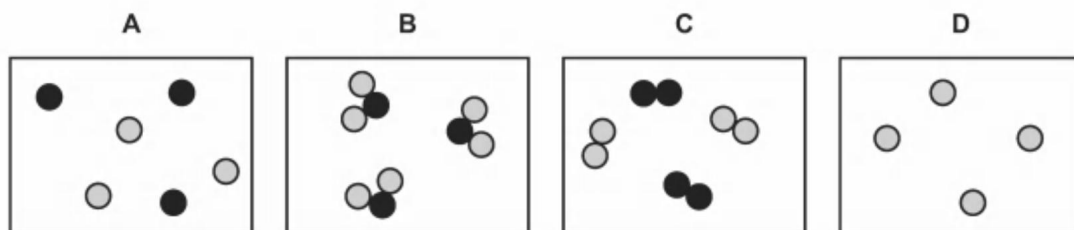
Which row describes the products made in the reaction and the trend in reactivity of the elements?

	products	trend in reactivity
A	metal hydroxide and hydrogen	less reactive down the group
B	metal hydroxide and hydrogen	more reactive down the group
C	metal oxide and hydrogen	less reactive down the group
D	metal oxide and hydrogen	more reactive down the group

3. Iron reacts with dilute hydrochloric acid to form iron(II) chloride, FeCl_2 . Iron reacts with chlorine to form iron(III) chloride, FeCl_3 .

Which property of transition elements is shown by this information?

- A Transition elements have high melting points.
- B Transition elements can act as catalysts.
- C Transition elements have variable oxidation states.
- D Transition elements have coloured compounds.
4. Which diagram shows a mixture of noble gases?



5. Period 3 of the Periodic Table contains the elements sodium to argon.

Element Q is a non-metal from this period.

Which statement about Q is correct?

- A It conducts electricity.
- B It has a lower proton number than sodium.
- C It has electrons in only three shells.
- D It is malleable.

6. Elements P and Q have the same number of electron shells.

Q has more electrons in its outer shell than P.

Which statements are correct?

- 1 P and Q are in the same group of the Periodic Table.
- 2 P and Q are in the same period of the Periodic Table.
- 3 P has a greater tendency to form positive ions than Q.
- 4 The oxides of Q are more basic than those of P.

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

7. Which statement about the halogens and their compounds is correct?

- A The colour of the element gets lighter going down Group VII.
- B The elements get less dense going down Group VII.
- C When chlorine is added to sodium iodide solution, iodine is formed.
- D When iodine is added to sodium bromide solution, bromine is formed.

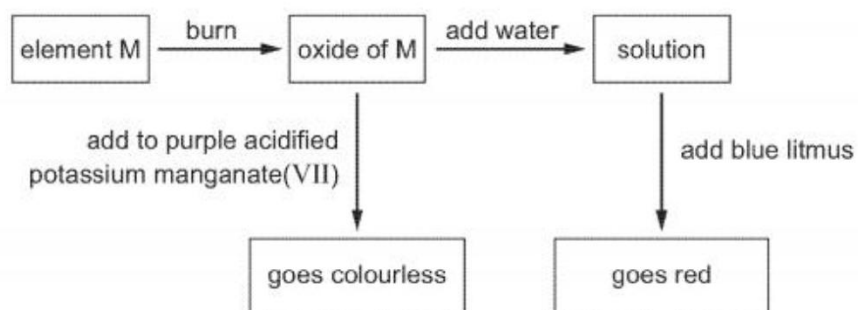
8. A new element oxfordium, Ox, was discovered with the following properties.

solubility	electrical conduction	formula of element	bonding in a molecule of Ox ₂
insoluble in water	doesn't 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

9. Some reactions of element M are shown.



What is element M?

- A carbon
- B iron
- C magnesium
- D sulfur

Theory

1. The symbols of the elements in Period 2 of the Periodic Table are shown.

Li Be B C N O F Ne

For each of the following, give the symbol of an element from Period 2 which matches the description.

Each element may be used once, more than once or not at all.

Which element:

- (a)** combines with hydrogen to produce ammonia

..... [1]

- (b)** makes up approximately 21% of clean, dry air

..... [1]

- (c)** has atoms with only two electrons in the outer shell

..... [1]

- (d)** has atoms with only seven protons

..... [1]

- (e)** is a monoatomic gas

..... [1]

- (f)** is a soft metal stored in oil?

..... [1]

[Total: 6]

2. This question is about elements in the Periodic Table.

(a) The table shows some properties of five elements, **P**, **Q**, **R**, **S** and **T**.

element	melting point /°C	density in g/cm ³	electrical conductivity of the solid	atomic radius /nm
P	63	0.86	very good	0.235
Q	-7	3.12	does not conduct	0.114
R	839	1.54	very good	0.174
S	1495	8.9	very good	0.126
T	-157	0.0035	does not conduct	0.110

Use only the elements shown in the table to answer this question.

State which two of the elements, **P**, **Q**, **R**, **S** and **T**, are covalent molecules.
Give **two** reasons for your answer.

elements and

reason 1

reason 2 [3]

(b) Describe how the metallic character of the elements depends on their position in the Periodic Table.

.....

..... [1]

(c) Identify element **Z**.

..... [1]

(d) Explain in terms of electron transfer why **Z** behaves chemically as a non-metal.

.....

..... [2]

3. This question is about Group I elements.

The properties of some Group I elements are shown in the table.

element	melting point in °C	boiling point in °C	relative thermal conductivity	atomic radius / pm
lithium	1342	84	152
sodium	97	883	142	186
potassium	63	760	102
rubidium	39	686	58	248

- (a) Complete the table to estimate:

- the melting point of lithium [2]
- the atomic radius of potassium. [2]

- (b) Describe the trend in the boiling points of the Group I elements down the group.

..... [1]

- (c) Caesium is below rubidium in Group I.

Use the information in the table to suggest why it is difficult to predict the thermal conductivity of caesium.

..... [1]

- (d) Predict the physical state of rubidium at 45 °C
Give a reason for your answer.

..... [2]

[Total: 6]

4. Cobalt is a transition element. Potassium is in Group I of the Periodic Table.

(a) State **one** physical property that is similar for cobalt and potassium.

..... [1]

(b) (i) State **one** physical property that is different for cobalt and potassium.

..... [1]

(ii) Describe how the physical property given in (b)(i) is different for cobalt compared to potassium.

..... [1]

(c) When a small piece of potassium is added to cold water, the potassium floats and disappears as it reacts.

Give **two** other observations that would be made when a small piece of potassium is added to cold water.

1

2 [2]

(d) Cobalt reacts with dilute hydrochloric acid to make the salt cobalt(II) chloride. Bubbles of hydrogen gas are produced.

(i) Describe a test for hydrogen.

test

result [2]

(ii) The rate of reaction of cobalt with dilute hydrochloric acid can be made faster by heating the acid or by increasing its concentration.

State **one** other way to make the rate of reaction faster.

..... [1]

(iii) Use collision theory to explain how heating the dilute hydrochloric acid makes the rate of reaction faster.

.....

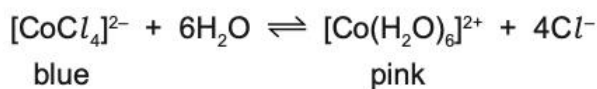
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.....

.....

..... [3]

- (e) When cobalt(II) chloride is added to water an equilibrium is established.



- (i) A student adds water to a blue solution containing $[\text{CoCl}_4]^{2-}$ ions.

Describe what the student observes. Give a reason for your answer in terms of the position of the equilibrium.

.....
.....
..... [2]

- (ii) Another student cools a blue solution containing $[\text{CoCl}_4]^{2-}$. The blue solution turns pink.

What does this information indicate about the forward reaction?

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

- (f) Another compound of cobalt is $\text{Co}(\text{OH})_3$.

Deduce the charge on the cobalt ion in $\text{Co}(\text{OH})_3$.

..... [1]

[Total: 15]

5. The halogens are the elements in Group VII of the Periodic Table.

(a) Predict the physical state and colour of astatine at room temperature and pressure.

physical state

colour

[2]

(b) When chlorine reacts with aqueous potassium bromide a displacement reaction occurs.

(i) Describe the colour change of the solution.

from to

[2]

(ii) Write a chemical equation for this reaction.

..... [2]

(c) Reactions occur when some aqueous solutions of halogens are added to aqueous solutions of halides.

Use the key to complete the table to show the results of adding halogens to halides.

key

✓ = reaction

✗ = no reaction

		halides		
		KCl(aq)	KBr(aq)	KI(aq)
halogens	Cl ₂ (aq)		✓	
	Br ₂ (aq)			
	I ₂ (aq)			

[2]

[Total: 8]