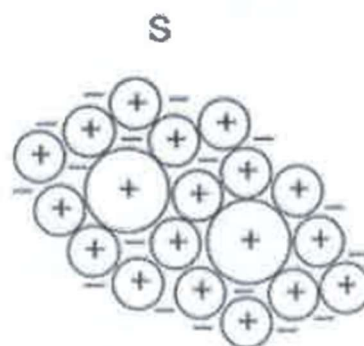
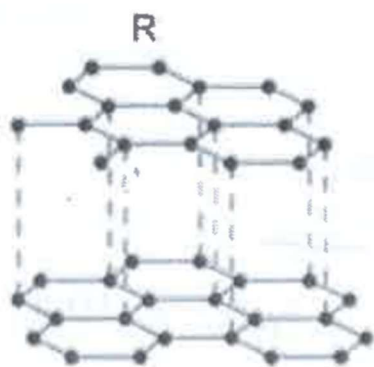
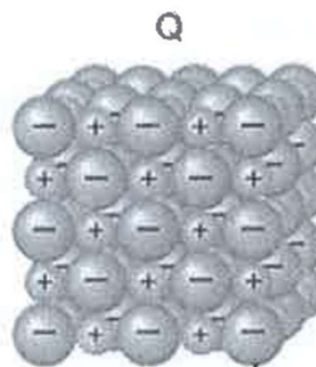
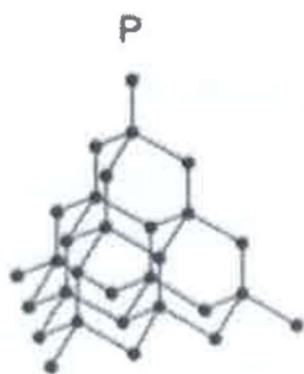


1. The diagrams below show the structures of substances P, Q, R and S.



Which of these structures conduct electricity because of mobile electrons?

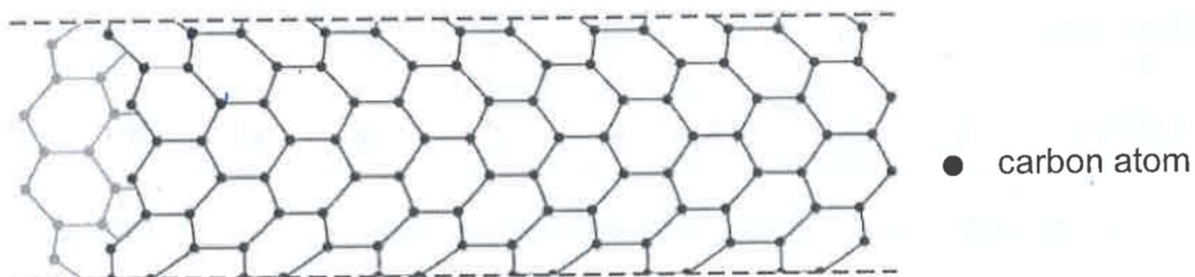
- A** P and R
B R and S
C Q and S
D Q, R and S

2. Magnesium silicate, MgSiO_3 , is often found as an odourless finely divided powder

What is the chemical formula of sodium silicate?

- A** NaSiO_3
B $\text{Na}(\text{SiO}_3)_2$
C Na_2SiO_3
D $\text{Na}_2\text{Si}_2\text{O}_3$

3. Diamond, graphite and carbon nanotubes are allotropes of carbon. Carbon nanotubes are large cylindrical carbon molecules that exhibit extraordinary strength and scientists are developing carbon nanotubes for different technological applications. The structure of a carbon nanotube molecule is shown below.



Which of the following are properties of carbon nanotubes?

	melting point	electrical conductivity	solubility in water
A	low	good	soluble
B	low	poor	insoluble
C	high	poor	soluble
D	high	good	insoluble

4. An iron oxide, Fe_3O_4 , reacts with dilute nitric acid to form iron (III) nitrate, nitrogen dioxide and water.

What is the equation for this reaction?

- A** $\text{Fe}_3\text{O}_4 + 10\text{HNO}_3 \rightarrow 3\text{Fe}(\text{NO}_3)_3 + \text{NO}_2 + 5\text{H}_2\text{O}$
- B** $\text{Fe}_3\text{O}_4 + 6\text{HNO}_3 \rightarrow 3\text{Fe}(\text{NO}_3)_2 + \text{NO} + 3\text{H}_2\text{O}$
- C** $\text{Fe}_3\text{O}_4 + 2\text{HNO}_3 \rightarrow \text{Fe}_3\text{NO}_3 + \text{NO}_2 + \text{H}_2\text{O}$ X
- D** $\text{Fe}_3\text{O}_4 + \text{HNO}_3 \rightarrow \text{FeNO}_3 + \text{NO}_2 + \text{H}_2\text{O}$

5. The elements sodium (Na), magnesium (Mg) and aluminium (Al) are consecutive elements in the Periodic Table. The more reactive the metal, the lesser the amount of energy required to remove one electron from its outermost shell. Which of the following shows the relative energy required to remove one electron from each of their outermost shell?

	Highest Energy	—————▶	Lowest Energy
A	Al	Na	Mg
B	Mg	Na	Al
C	Al	Mg	Na
D	Mg	Al	Na

6. Lithium, sodium, potassium and rubidium are elements in Group 1 of the Periodic Table
Which of the following shows the correct trends for lithium to rubidium?

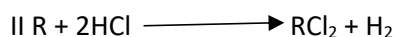
	melting point	density	chemical reactivity
A	decreases	decreases	decreases
B	decreases	increases	increases
C	increases	decreases	decreases
D	increases	increases	increases

7. Astatine is found in Group 17 of the Periodic Table.

Which of the following is not a property of astatine?

- A** Astatine is a solid at room temperature and pressure.
B Astatine can displace iodide ions from aqueous solution.
C Astatine reacts by gaining one electron to form astatide ion.
D Astatine reacts with Group 2 elements to form an ionic compound.

8. Metal R and its compounds undergo the following reactions.



What could metal R be?

- A** iron
B magnesium
C sodium
D zinc

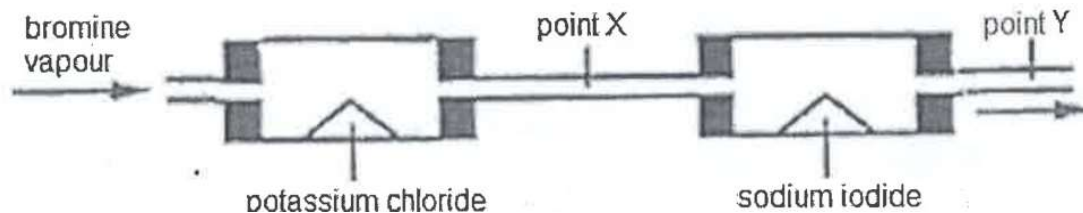
9. The table gives information of four different metals and some of their compounds.

metal	reaction with dilute hydrochloric acid	effect of heating metal oxide with carbon	action of metal on a solution of Z chloride
W	effervescence observed	reduced	no observable change
X	no observable change	reduced	no observable change
Y	effervescence observed	not reduced	metal Z is formed
Z	effervescence observed	not reduced	no observable change

Which of the following shows the metals in decreasing order of reactivity?

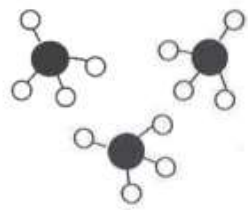
- A. Z, Y, W, X
- B. Z, Y, X, W
- C. Y, Z, W, X
- D. X, W, Z, Y

10. The reaction shown below was carried out. Which of the following gives the correct colour at point X and point Y?

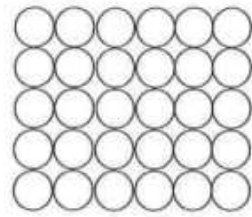


	point X	point Y
A	reddish-brown	purplish-black
B	reddish-brown	reddish-brown
C	greenish-yellow	purplish-black
D	greenish-yellow	greenish-yellow

11. The diagram shows 6 different substances R, S, T, U, X and Y.



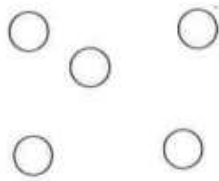
R



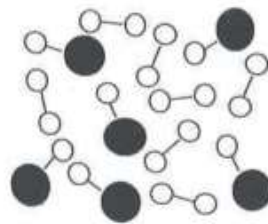
S



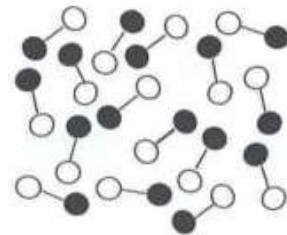
T



U



Y



X

EDUCATION CENTRE



At room temperature, which substance (R – X) is

- (i) helium,
- (ii) methane,
- (iii), solder?

Believe in yourself

[Total 3]

12. The table shows the names and formula of the chlorides of elements in period 3

element	metal/non-metal	formula of chloride	type of bonding in chloride	melting point of chloride/ $^{\circ}\text{C}$
Na	metal	NaCl	ionic	801
Mg	metal		ionic	714
Al	metal	AlCl_3	covalent	192
Si	non-metal	SiCl_4	covalent	-69
P	non-metal	PCl_3	covalent	-94
S	non-metal	S_2Cl_2	covalent	-80
Cl	non-metal	Cl_2	covalent	-101.5
Ar	non-metal	-	-	-

(a) State the formula of the chloride of magnesium.

.....[1]

(b) Explain why argon does not form any chlorides.

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

(c) Explain why phosphorus trichloride, PCl_3 , has a lower melting point than sodium chloride, NaCl?

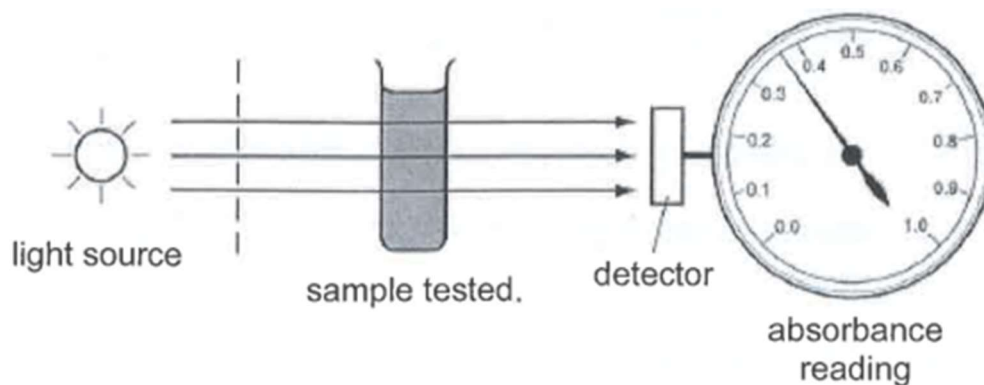
.....
.....
.....[2]

Total [4]

13. The amount of light that passes through a coloured solution can be measured using a colorimeter.

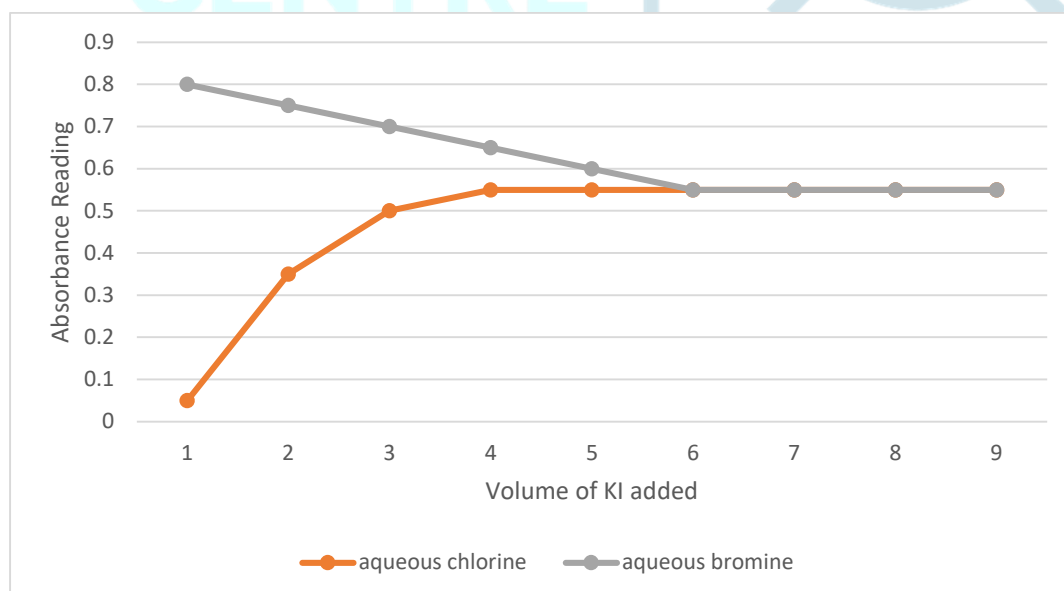
The darker the colour of the solution, the higher the absorbance reading as a higher amount of light is absorbed.

Fig. 13.1 shows how a colorimeter works.



1.0 cm³ of aqueous potassium iodide was added at regular time intervals to equal volumes of aqueous chlorine and aqueous bromine separately. The colour intensity of each reaction mixture was measured using the colorimeter after addition of 1 cm³ of aqueous potassium iodide.

Fig. 13.2 shows the results of the experiment.



(a) Name the products for the reaction between aqueous chlorine and aqueous potassium iodide

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

(b) write a chemical equation between aqueous chlorine and aqueous potassium iodide (including state symbols)

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

ci) With reference to figure, 13.2, describe the difference between the absorbance readings of aqueous bromine and aqueous chlorine.

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

cii) Explain your answer in ci

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

d) Chlorine is a more reactive element than bromine.

Use the volume of aqueous potassium iodide in figure 13.2, to achieve a constant absorbance to explain why.

.....
.....
.....[3]

[Total 10]

14. Displacement reactions can occur when a metal is added to a salt solution.

Table 14.1 shows the results of some displacement experiments

key ✓ shows a reaction happened

x shows no reaction happened

- shows experiment was not performed

	aqueous copper (II) nitrate	aqueous iron (II) nitrate	aqueous calcium nitrate	aqueous nickel (II) nitrate
copper	-	x	x	x
iron	✓	-	x	✓
calcium	✓	✓	-	✓
nickel	✓	x	x	-

(a) Place the metals in order of reactivity, from least to most reactive

.....[1]

(b) Manganese is found between magnesium and zinc in the reactivity series.

Complete Table 14.2 to show the reaction of manganese in each of the four salt solutions, using the key legends shown above.

	aqueous copper (II) nitrate	aqueous iron (II) nitrate	aqueous calcium nitrate	aqueous nickel (II) nitrate
manganese				

(c) Most metal carbonates decompose to form metal oxide and a colourless gas

(i) Name a metal carbonate from Table 14.1 that decomposes most readily to form metal oxide and a colourless gas.

.....[1]

(ii) Name the colourless gas formed.

.....[1]

(iii) How would you test and confirm the presence of the colourless gas named in (cii)

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

(iv) Calcium reacts with cold water.

(i) What would you expect to **see** when calcium reacts with water?

.....[1]

(ii) Name the products formed.

.....[1]

(e) Suggest why even though Aluminium is high up in the reactivity series, it does not react with cold water.

.....

.....[1]

