A Level Chemistry

Completion date:

FIRST Chemistry lesson

Self Assessment

Areas for revision.

Pre-course Task

Dear Chemistry Student,

The purpose of this task is to encourage you to refresh your knowledge of GCSE chemistry before you start the AS course.

You must bring the completed task with you to your first Chemistry lesson.

This task is not a test. You can use your previous notes, textbooks or other sources. You will need to use a periodic table.

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1. Use the periodic table and the information in the table below to help you to answer the questions.
The table shows part of an early version of the periodic table.

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7
H						
Li	Be	B	C	N	O	F
Na	Mg	Al	Si	P	S	Cl

(a) Hydrogen was placed at the top of Group 1 in the early version of the periodic table. The modern periodic table does **not** show hydrogen in Group 1.

(i) State one **similarity** between hydrogen and the elements in Group 1.

. **(1)**

(ii) State one **difference** between hydrogen and the elements in Group 1.

. **(1)**

(b) Fluorine, chlorine, bromine and iodine are in Group 7, the halogens. The reactivity of the halogens decreases down the group.

Bromine reacts with a solution of potassium iodide to produce iodine.

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

(i) In the reaction between bromine and potassium iodide, there is a reduction of bromine to bromide ions.

In terms of electrons, what is meant by reduction?

. **(1)**

(ii) Complete the half equation for the oxidation of iodide ions to iodine molecules.

$$2I^- \longrightarrow$$

(2)

(iii) Explain, in terms of electronic structure, why fluorine is the most reactive element in Group 7.

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(3)
(Total 8 marks)

2. This question is about sodium chloride and iodine.

(a) Describe the structure and bonding in sodium chloride.

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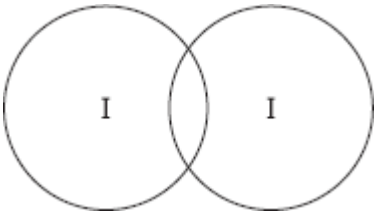
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. **(4)**

(b) The bonding in iodine is similar to the bonding in chlorine.

(i) Complete the diagram below to show the bonding in iodine.

Show the outer electrons only.



(2)

(ii) Explain why iodine has a low melting point.

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. **(3)**

(iii) Explain, in terms of particles, why liquid iodine does not conduct electricity.

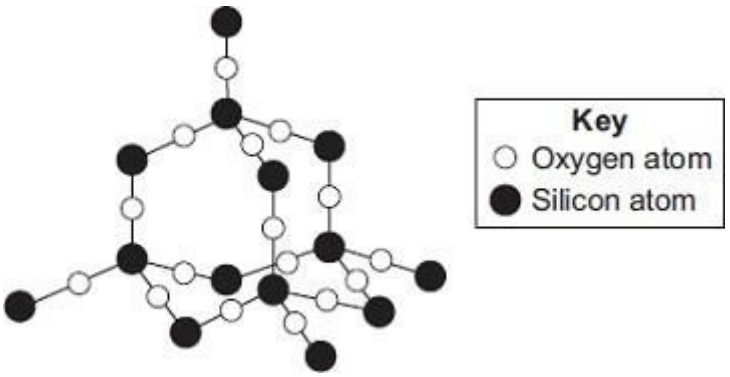
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..... **(2)**

(Total 11 marks)

3. Silicon dioxide is used as a lining for furnaces.

Furnaces can be used to melt iron for recycling.

The diagram shows a small part of the structure of silicon dioxide.



Explain why silicon dioxide is a suitable material for lining furnaces.

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(Total 4 marks)

4. Ammonia is produced from nitrogen and hydrogen.

The equation for this reaction is:

$$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$$

(a) (i) A company wants to make 6.8 tonnes of ammonia.

Calculate the mass of nitrogen needed.

Relative atomic masses (A_r): H = 1; N = 14

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Mass of nitrogen = tonnes

(3)

(ii) The company expected to make 6.8 tonnes of ammonia.

The yield of ammonia was only 4.2 tonnes.

Calculate the percentage yield of ammonia.

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Percentage yield of ammonia = ... % **(2)**

(iii) Use the equation above to explain why the percentage yield of ammonia was less than expected.

. **(1)**

(iv) The reaction of ammonia with sulfuric acid produces ammonium sulfate.

Use the formulae of the ions on the Chemistry Data Sheet.

Write the formula of ammonium sulfate.

. **(1)**

(Total 7 marks)

5. Lead compounds have been used for thousands of years as colours in paint.

A sample of a red oxide used in paint was found to contain 6.21 g of lead and 0.64 g of oxygen.

Calculate the empirical (simplest) formula of this compound.

You **must** show all your working to gain full marks.

Relative atomic masses: O = 16; Pb = 207.

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Lead white is also used in paint. The white colour slowly darkens when lead sulfide is produced. The painting can be restored with hydrogen peroxide. This converts the black lead sulfide into white lead sulfate.

Balance the equation for the reaction between lead sulfide and hydrogen peroxide (H_2O_2).

$$PbS(s) + H_2O_2(aq) \rightarrow PbSO_4(s) + H_2O(l)$$

(1)

(Total 5 marks)