

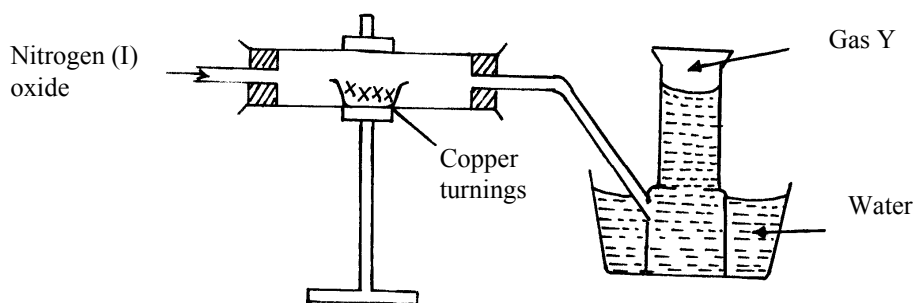
SAMPLE PAPER 5
PAPER 1
233/1

SECTION A; (40 Marks)

1. Draw the atomic structure of an element X whose atom is represented below as; (2mks)



2. a) Two samples of substance Q were bottled and labelled for storage. Labels dropped while the substances were being transported. State briefly how the purer sample can be identified. (4mks)
- b) State the effect of an impurity on melting point. (1mk)
3. The diagram below was used to investigate the reaction between nitrogen (I) oxide and copper turnings to produce gas Y.



Use it to answer the questions which follow.

- a) Identify what is missing in the set-up. (1mk)
- b) Write an equation of the reaction taking place in the combustion tube. (1mk)
- c) State one use of gas Y formed in the gas jar. (1mk)
4. A form three student weighed a piece of plain paper, wrote her name on it and re-weighed it.

The following results were obtained;

$$\text{Mass of plain paper} = 2.804\text{g}$$

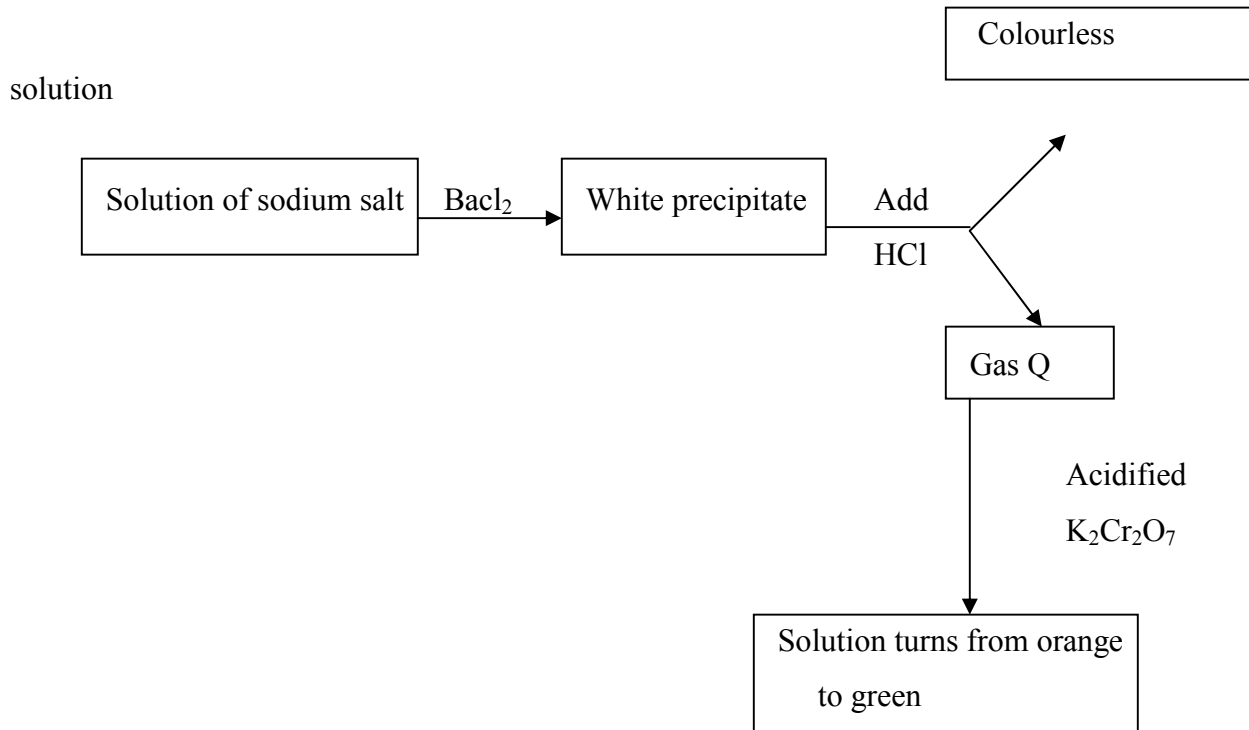
$$\text{Mass of paper + name} = 2.9053\text{g}$$

If she wrote her name using pure graphite, determine the number of carbon atoms used to write her name. (C=12, mole constant $L=6.0 \times 10^{23}$).

(3mks)

5. A hydrocarbon has a molecular mass 54. (C=12, H=1). It has four carbon atoms.
- a) Name the homologous series to which the hydrocarbon belongs.
- b) Draw and name two isomers of the hydrocarbon. (2mks)

6.



Use the flow chart to answer the questions which follow

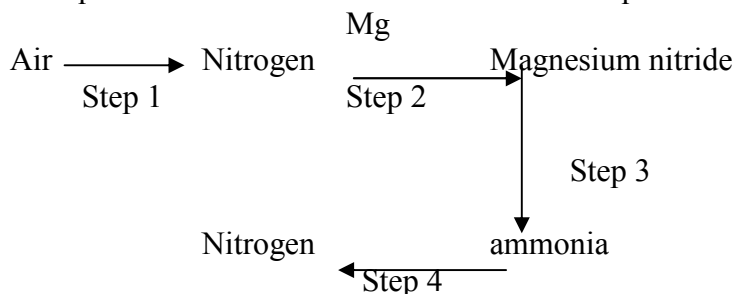
- Write the formula of the compound which forms the white precipitate on adding BaCl_2
- What property of gas Q is shown by passing it through acidified $\text{K}_2\text{Cr}_2\text{O}_7$ for the solution to change from orange to green.

(1mk)

- Identify the colourless solution formed.

(1mk)

7. Study the sequence of reactions below and answer the questions that follow



- Name the process in step 1.

(1mk)

- b) (i) What reactant is used to achieve step 4. (1mk)
(ii) Write a balanced chemical equation for step 3. (1mk)

8. Study the table below showing the solubility of a salt at various temperatures

Temperature ($^{\circ}\text{C}$)	Solubility (g/100g water)
0	30
30	24
70	19
100	14

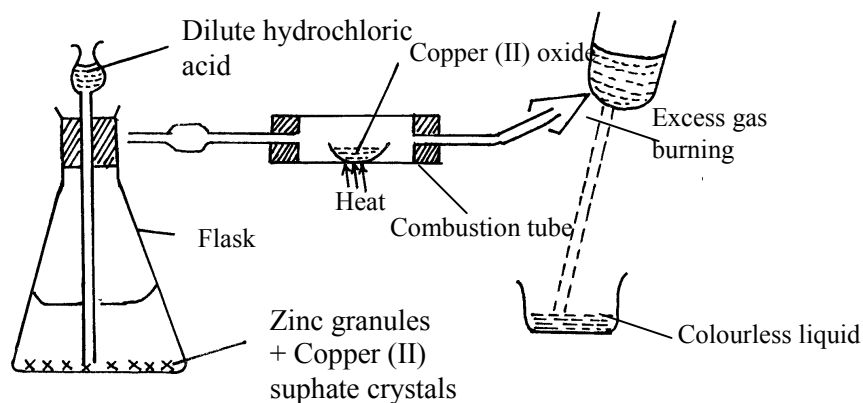
What would happen if a sample of a saturated solution of the salt at 30°C is heated to 70°C ?

Explain. (2mks)

9. Explain the observation made when chlorine gas is passed over moist blue litmus paper.

(2mks)

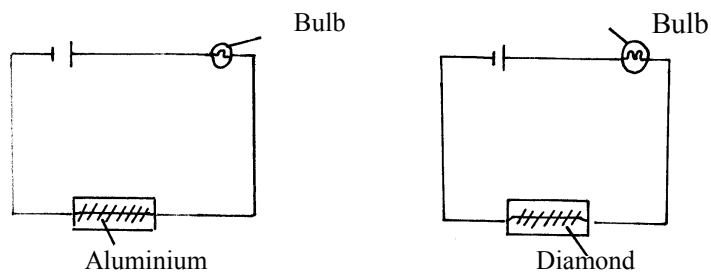
10. Study the set up below and use it to answer the questions that follow



a) Write the equation for the reaction in the flask. (1mk)

b) State and explain the observation made in the combustion tube. (2mks)

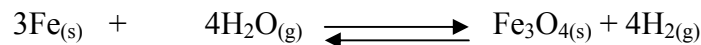
11. The following set ups were used by form two students to investigate electrical conductivities of two substances. Study and use it to answer the questions that follow.



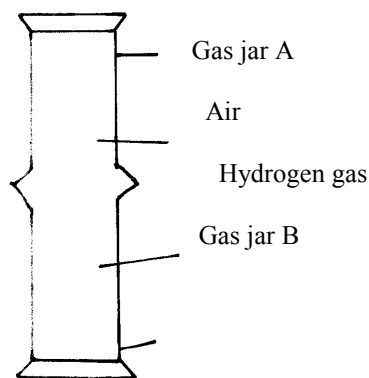
a) Explain the difference in observation made in set ups I and II above. (2mks)

b) State one use of diamond. (1mk)

12. When iron and steam are heated in a closed container, a dynamic equilibrium is reached.



- a) Define the dynamic equilibrium. (1mk)
- b) What is the effect on equilibrium if magnesium is added.
13. A gas jar B was full of dry hydrogen gas while gas jar A was full of air.

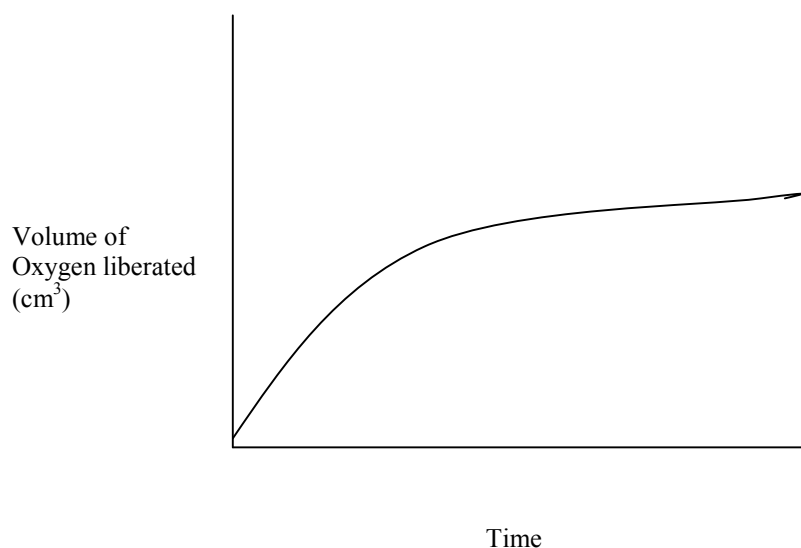


- a) What will happen after introducing a burning splint in gas jar A after some time? (1mk)
- b) What conclusion can you make about the density of hydrogen gas? (1mk)
14. If 25cm^3 of $0.1\text{M H}_2\text{SO}_4$ solution neutralized a solution containing 1.06g sodium carbonate in 250cm^3 of solution, Calculate the molarity and the volume of the sodium carbonate solution used. (3mks)
15. State one environmental effect of each of the oxides of carbon released when fossil fuels are burnt. (2mks)
16. Use the table below to answer the question that follow. The letters do not represent the actual symbols of the elements.

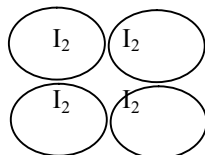
Element	Atomic number
A	11
B	13
C	14
D	17
E	19

- a) Write an equation for the reaction between element A and water. (1mk)

- b) Describe how a solid mixture of the sulphate of element E and lead (II) sulphate can be separated into solid samples. (2mks)
17. a) Baking powder which is a mixture of an acid and a hydrogen carbonate releases carbon (IV) oxide required to raise the dough only when water is added to the solid mixture. Explain the role of water. (2mks)
- b) Given the formulae of the acid as HX and the hydrogen carbonate being BHCO_3 , write an ionic equation of the reaction of the solutions in water. (1mk)
18. A carbonate was suspected to be an ore of iron. Describe how the presence of iron can be confirmed in the ore. (3mks)
19. Below is a graphical representation of results obtained when hydrogen peroxide was allowed to decompose without a catalyst.

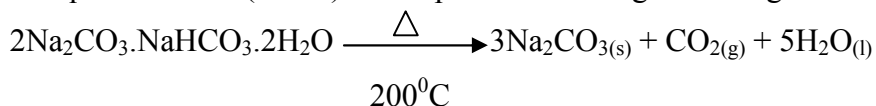


- a) Sketch another curve, using the same axes, that would be obtained when a catalyst is introduced. (2mks)
- b) Explain the role of catalysts in chemical reactions. (1mk)
20. The diagram below represents a piece of iodine solid.

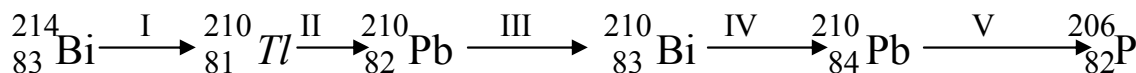


- a) Name the bond type(s) in the solid. (1mk)

- b) Explain the observation made that iodine has a very low melting point. (1mk)
21. Sodium sesqui-carbonate (Trona) decomposes on heating according to the equation below



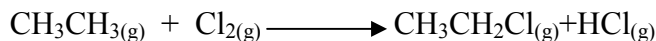
- Given the formula masses of trona and sodium carbonate to be 226 and 106 respectively, calculate the mass of trona that would yield 3 tonnes of sodium carbonate. (3mks)
22. Consider the reaction chain below.



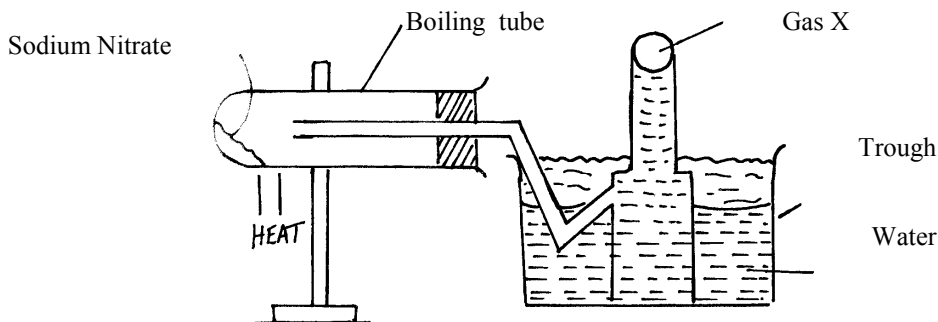
- a) Identify the particles emitted in (1mk)
- (i) I
- (ii) II
- b) Write the nuclear equation for the reaction that takes place in V. (1mk)
- c) State one environmental effects of radioisotopes. (1mk)
23. Study the information in the table below and use it to answer the questions that follow

Bond	Bond Energy in kJmol^{-1}
Cl – Cl	243
H – Cl	431
C – H	413
C – Cl	326

Calculate the enthalpy change for the reaction; (3mks)

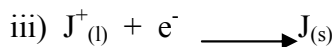
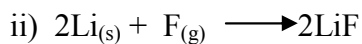
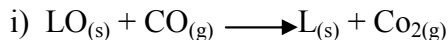


24. The diagram below represents a setup used by a student to investigate the effect of heat on sodium nitrate. Use it to answer the questions that follow.



- a) Write the chemical equation of the reaction in the boiling tube. (1mk)

- b) State the property of the gas that makes it to be collected by the method shown.(1mk)
 c) Predict the effect of water in the trough on the litmus paper after the experiment.(1mk)
25. Consider the equations below



Which of the reactions are redox reactions? Explain

26. A volume of 15cm^3 of ethane gas (C_2H_4) was exploded with 50cm^3 of oxygen. If both volumes were measured at the same temperature and pressure, calculate the volume of the resulting gaseous mixture.

(i) Write the equation of the reaction for the combustion of ethene. (1mk)

(ii) Calculate the volume of gaseous mixture. (2mks)

27. Some water samples A,B and C were tested with soap solution. The lathering produced was recorded as good or poor. The results are as in the table below.

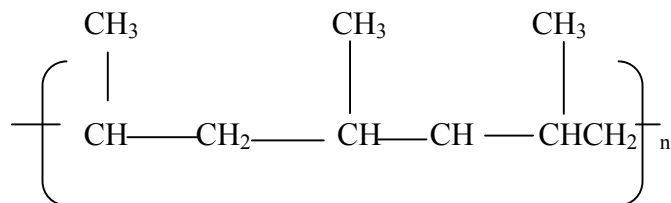
Test	Results		
	A	B	C
1). Shaken with soap solution	Poor	Poor	Good
2). Na_2CO_3 added then shaken with soap solution	Good	Good	Good
3). Boiled then shaken with soap solution	Poor	Good	Good

a) Identify the anions present in sample of water A. (1mk)

b) Give an industrial advantage of hard water. (1mk)

c) State one structural difference between a soapy and soapless detergent. (1mk)

28. The structure given below represents a segment of a polymer. Use it to answer the questions that follow.

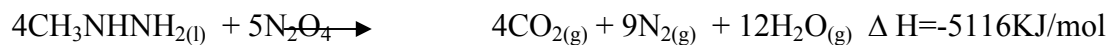


a) Derive the structure of the monomer. (1mk)

b) Given that the molecular mass of the polymer is 21,000, find the number of the monomers. (C=12, H=1)

(2mks)

29. A mixture of methyl hydrazine (CH_3NHNH_2) mixed with dinitrogen tetroxide (N_2O_4) is used as rocket fuel. The equation of the reaction is given below as:-



Draw the energy level diagram for the reaction. (2mks)

30. Determine the oxidation state of lead (Pb) in PbO_2 and hence cation in the compound.

(2mks)