Name .....Adm. No.....Class.....

Signature.....

Index Number.....

233/1
CHEMISTRY
PAPER 1
MAY 2016
TIME: 2 HOURS

ALLIANCE HIGH SCHOOL
Kenya Certificate of Secondary Education
PRE- TRIALS
CHEMISTRY
PAPER 1
(THEORY)

INSTRUCTIONS TO CANDIDATES

1. Write your name, index number, class and Adm. No. in the spaces provided.
2. Sign and write the date of examination in the spaces provided.
3. Answer ALL the questions in the spaces provided
4. Mathematical tables and electronic calculators may be used
5. All working MUST be clearly shown where necessary.
6. This paper consists of 14 printed pages
7. Candidates should check the question paper to ascertain that all the pages are printed as indicated and no questions are missing.

FOR EXAMINERS USE ONLY.

Questions	Maximum score	Candidate's score
1 – 26	80	

1. Sulphur (IV) Oxide and nitrogen (IV) Oxide react as shown in the equation below.
$SO_{2(g)} + NO_{2(g)} \longrightarrow SO_{3(g)} + NO_{(g)}$

i) Using oxidation numbers, show that this is a redox reaction. (1 mk)

ii) Identify the oxidizing agent (1 mk)

2. Draw the structure of (3 mks)

i) 3 – methylbutan – 2 – ol

ii) 3 –chloropent – 1 –yne

iii) Ethylpropanoate

3 a) What is meant by half-life of a radioactive substance? (1 mk)

b) 10g of chlorine 37 decays to 1.25g in 165 minutes. Determine its half – life (2 mks)

c) List two applications of radioactivity in agriculture. (1 mk)

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_____

4. The table below gives information on four elements A,B,C and D. Study it and answer the question that follow. The letters do not represent the actual symbols of the elements.

Element	Atomic No.	Melting point (°C)
A	13	660
B	17	-101
C	11	98
D	19	63.5

a) Which two elements have similar chemical properties? Explain. (1 mk)

_____

_____

b) Explain the difference in the melting point of A and C. (1 mk)

_____

_____

c) Compare the atomic radius of A and B. Explain. (1 mk)

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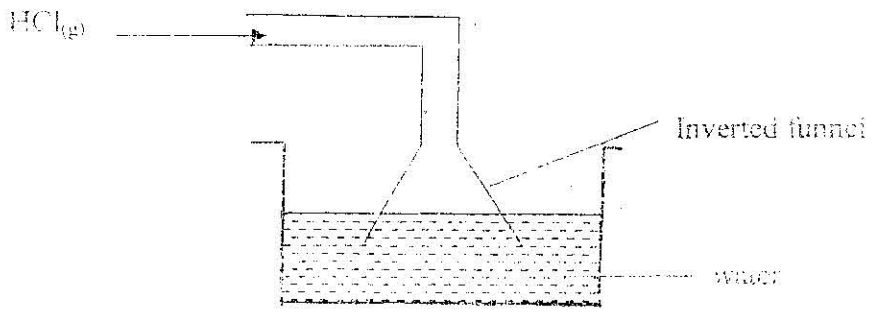
5. The following set – up is used to dissolve hydrogen chloride gas in water.



a) Explain why an inverted funnel is used. (1 mk)

_____

_____

b) i) State the effect of the resulting solution on litmus paper. (1 mk)

_____

_____

c) i) State the observation made when a glass rod dipped into silver nitrate solution is place inside a jar of hydrogen chloride gas. (2 mks)

_____

_____

ii) Write an equation for the reaction in c (i) above

_____

_____

6. 15.7g of an organic acid RCOOH was dissolved in $600cm^3$ of water and more water added to make 1 litre of solution. $25.0cm^3$ of this solution was found to require $21.5cm^3$ of 0.207M Potassium hydroxide solution for complete neutralization.
(C = 12.0, O = 16.0, H = 1.0).

i) Determine the formula mass of the acid. (2 mks)

ii) Hence the value of R. (1 mk)

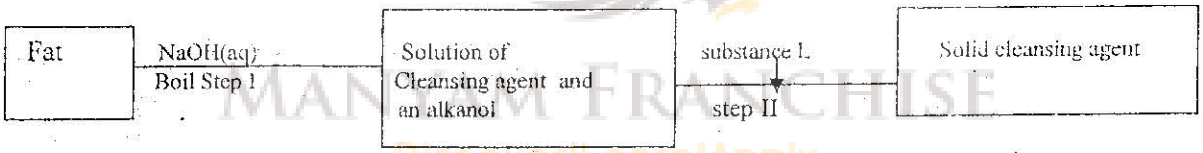
7. a) A solution of salt Q formed a white precipitate with barium chloride solution which was insoluble in dilute nitric (v) acid. Identify the acidic radical in salt Q (1 mk)

b) When dilute sodium hydroxide was added to a solution of salt Q above, a white precipitate which dissolved in excess of the alkali was formed.

i) Identify salt Q (1 mk)

ii) Write ionic equations for the reactions that took place. (2 mks)

8 Study the scheme below and answer the questions that follow.



a) What type of reaction takes place in step I? (1 mk)

Write the general formula of the type of cleansing agent prepared by the method shown in the scheme. (1 mk)

b) Identify substance L (1 mk)

9. a) State Gay Lussac's Law.

b) $100cm^3$ of hydrogen gas was exploded with $30cm^3$ of nitrogen gas. Determine the composition of the resultant gaseous mixture. (2 mks)

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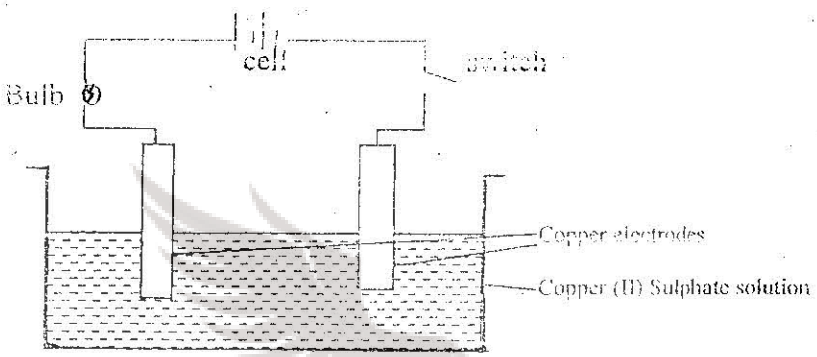
10. Study the set – up below for electrolysis of copper (II) Sulphate using copper electrodes.



a) Define electrolysis (1 mk)

_____

_____

b) State the observation made at the anode. (1 mk)

_____

_____

c) Write ionic equations for the reactions that took place at (1mk)

i) Anode

_____

_____

ii) Cathode

_____

_____

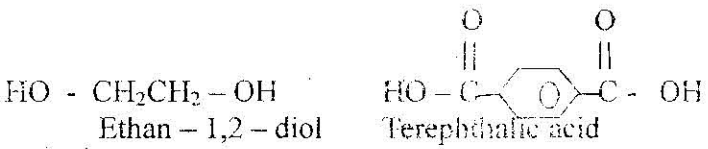
c) Write an equation for the reaction that took place at K. (1 mk)

13. When 1.15g of a compound containing carbon, hydrogen and oxygen was burnt in excess air 1.35g of water and 1.12dm^3 of carbon (IV) Oxide gas at s.t.p were produced . determine the empirical formula of the compound.
(molar gas volume at s.t.p = 22.4dm^3, C = 12, H = 1, O = 16 (3 mks)

14. Hydrogen sulphide gas was bubbled into an aqueous solution of Iron (III) Chloride.
a) State and explain the observations made. (2 mks)

b) Write the equation for the reaction that took place. (1 mk)

15. PET is a polyster formed from the following monomers



a) What type of polymer is PET? (1 mk)

b) Show how PET is formed from its monomers. (1 mk)

d) State and explain the observation made on the electrolyte. (1 mk)

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11. When extinguishing a fire caused by burning kerosene, carbon (IV) Oxide is preferred to water explain. (2 mks)

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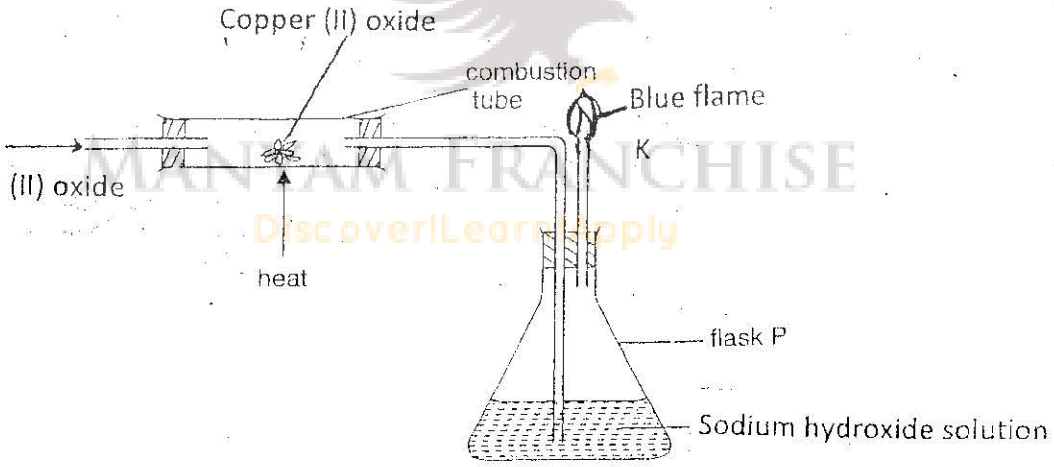
_____

_____

12. The apparatus shown below was used to investigate the effect of carbon (II) Oxide on Copper (II) Oxide.



a) State the observation made in the combustion tube. (1 mk)

_____

_____

b) State the function of sodium hydroxide solution. (1 mk)

_____

_____

c) Give one use of PET. (½ mk)

16. When a current of 125 amperes was passed through a cell containing ions of indium metal for 1 minute 10 seconds, the mass of the cathode increased by 3.45g. Determine the formula of indium sulphide .
(In= 115, 1Faraday = 96500 coulombs). (2 ½ mks)

17. Using dots ( ) and crosses (x) to represent electrons in the outermost show the energy level, show the bonding in
i) Carbon (II) Oxide (1 mk)

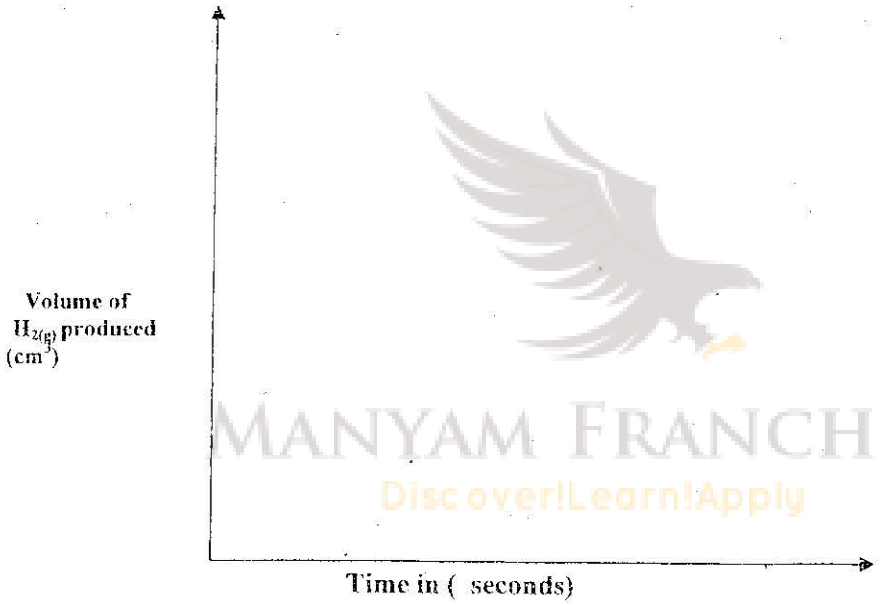
ii) Magnesium Chloride (1 mk)

18. Describe a chemical test that can be carried out in the laboratory to distinguish between propane and propene. (2 mks)

19. The table below gives three experiments on the reaction of $50cm^3$ hydrochloric acid with 0.2g zinc done under different conditions. In each case, the volume of hydrogen gas produced was recorded at different time intervals.(Zn = 65)

Experiment	Form of Zinc	Concentration of Hydrochloric acid
I	Powder	0.2 M
II	Powder	0.5M
III	Granules	0.2M

On the axes below, sketch the three curves that would be obtained from the results above. (2 mks)



20. Some bond energies are given below.

Bond	Energy
C-C	346
C-H	414
C = C	632

a) Calculate the energy change for the reaction below. (1 ½ mks)

$C_3H_{8(g)} \longrightarrow C_2H_4(g) + CH_{4(g)}$

b) Draw an energy level diagram for the reaction above, showing activation energy.
(1 ½ mks)

21. a) State Le Chatelier's Principle. (1 mk)

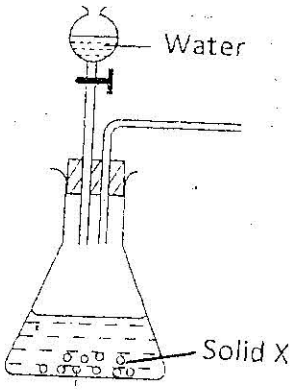
b) The equation below represents the catalytic oxidation of Sulphur (IV) Oxide to Sulphur (VI) Oxide.

$2SO_{2(g)} + O_{2(g)} \rightleftharpoons 2SO_{3(g)}$

What would be the effect of increasing the volume of the system on the yield of Sulphur (VI) Oxide. (2 mks)

c) Name the catalysts that can be used in this reaction. (1 mk)

22. The set – up below was used to prepare oxygen gas.



a) Identify solid X _____ (1mk)

b) Write an equation for the reaction producing oxygen gas (1 mk)

_____

_____

c) Complete the diagram to show how a sample of dry oxygen gas can be collected. (2 mks)

23. Describe how a sample of calcium carbonate can be prepared in the laboratory starting with calcium oxide. (3 mks)

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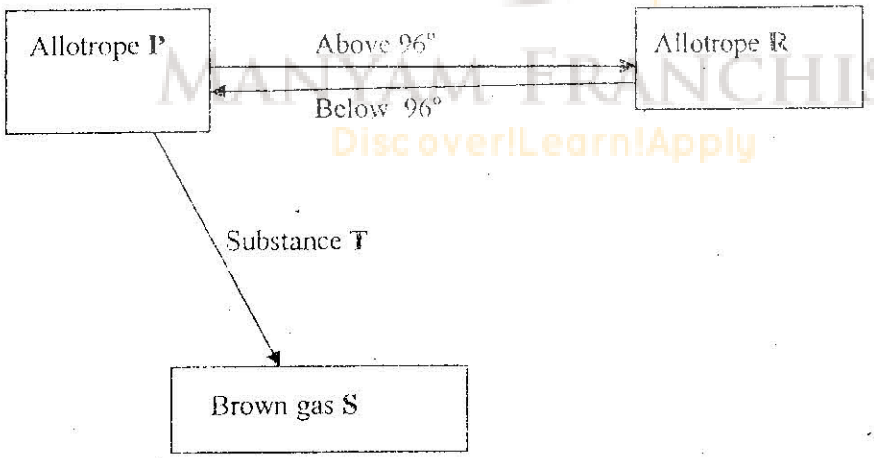
24. The flow chart below shows properties of two allotropes of element Q.



a) Identify the allotropes (1 mk)

P _____

R _____

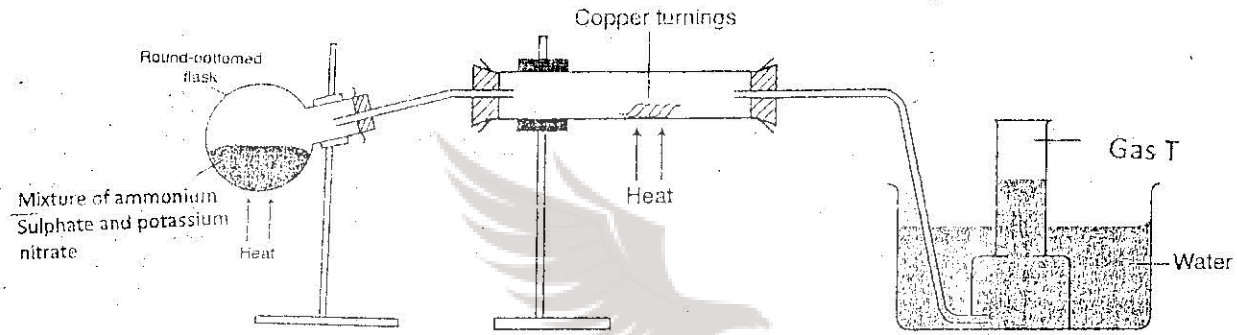
b) Name element Q _____ (1 mk)

c) Write a chemical equation for the formation of brown gas S. (1 mk)

_____

_____

25. The set – up below was used to investigate the properties of a certain gas T.



a) Identify gas T _____ (1 mk)

b) Write an equation for the reaction that occurs in the combustion tube. (1 mk)

_____

_____

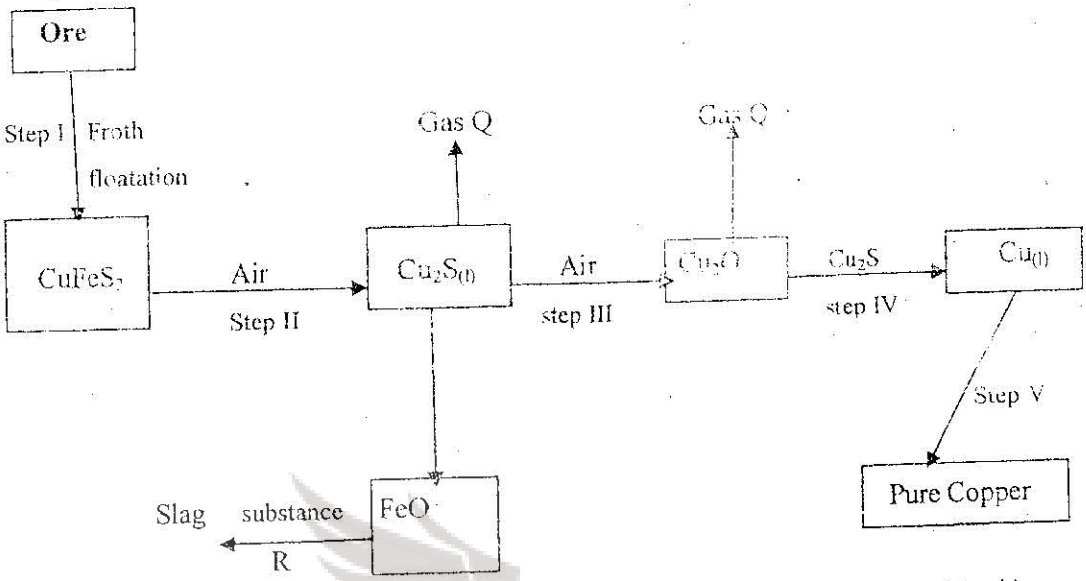
c) State and explain the effect of gas **T** on a glowing splint. (1 mk)

_____

_____

_____

26. Study the flow chart below and answer the questions that follow.



a) Name the chief ore from which Copper is extracted. (1 mk)

_____

b) Identify i) Gas Q _____ (1 mk)

ii) Substance R _____

c) Write an equation for the reaction in step (IV) (1 mk)

_____

_____

d) With the aid of a well labeled diagram, describe how step (V) is achieved. (2 mks)

e) Give two uses of copper metal. (1 mk)

_____

_____

END