NAME:……..……CLASS:…..…….ADM No.:……..

SIGNATURE:…… **INDEXNO:……**

DATE……

233/1
CHEMISTRY
Paper 1
THEORY
July 2013
2 Hours

SUPA JET EXAM

July 2013
Kenya Certificate of Secondary Education
Chemistry Paper 1

INSTRUCTIONS TO THE CANDIDATES:-

- Write your **Name** and **Index number** in the spaces provided.
- Answer ***all*** the questions in the spaces provided.
- Mathematical tables and electronic calculators may be used
- All working **MUST** be clearly shown where necessary.

For Examiner's Use Only

Question	Maximum score	Candidate's score
1-27	80	

1. You are provided with water, lead carbonate, dilute nitric (V) acid and solid sodium chloride. Describe in very clear steps how you would prepare a sample of lead chloride. (3 marks)

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2. (i) Using 'dots' and crosses to represent electrons, draw the electron diagram for ammonia molecule, NH_3. (N = 7, H = 1) (1 marks)

(ii) Explain the following observations; oxygen and sulphur are in the same group of the periodic table. The hydride of oxygen is liquid at rtp while that of sulphur is gaseous at rtp. (2 marks)

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3. Phosphorus is in group V of the periodic table. Explain the following observations.
(i) Phosphorus exhibits two melting points. (1 mark)

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(ii) The chloride of phosphorus forms musty fumes in damp air. (2 marks)

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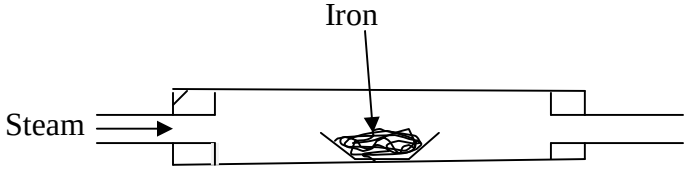
4. Steam was passed over iron in a combustion tube as shown below. Study the diagram and answer the questions that follow.



(i) What must be included in the diagram for Iron to react with steam? (1 mark)

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(ii) Write an equation for the reaction that takes place when the correction in (i) above is made. (1 mark)

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(iii) State and explain the precaution to be observed when carrying out the above experiment. (1 mark)

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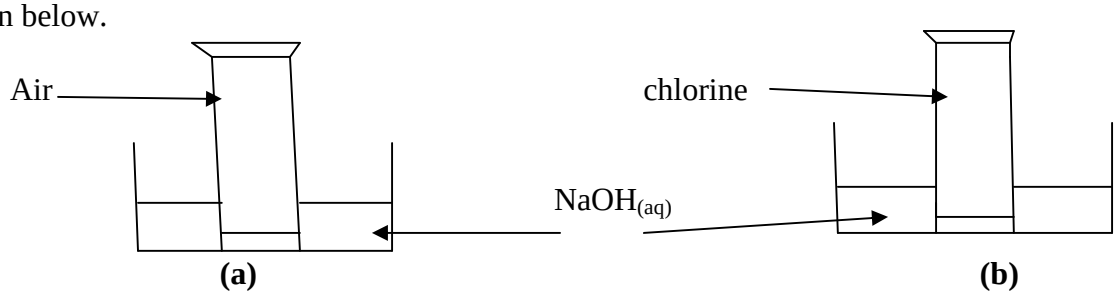
5. A gas jar of chlorine and air were inverted over a trough containing sodium hydroxide as shown below.



(i) In which case was there a larger change in volume of the gas jar? Explain. (2 marks)

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(ii) State any one important use of chlorine gas. (1 mark)

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6. (i) Nitric (V) acid prepared in the laboratory is yellow in colour. What causes the yellow colour? (1 mark)

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(ii) State any two observations that would be made when concentrated nitric(V) acid is added to copper turnings. (2 marks)

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7. (i) Give two reasons why laboratory apparatus are made of glass. (2 marks)

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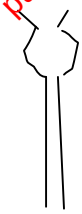
(ii) Name the apparatus drawn below. (1 mark)



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8. An organic compound contains carbon and hydrogen only. When this compound was completely burnt in excess air, it gave 9.6g of carbon (IV) Oxide and 4.9g of water vapour. The molecular mass of the hydrocarbon is 58. Determine the molecular formula.
(C = 12, O = 16, H = 1) (3 marks)

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9. An equilibrium was established between lead chloride and its ions as shown below.

$$PbCl_{2\,(s)} \leftrightharpoons Pb^{2+}_{(aq)} + 2Cl^{-}_{(aq)}$$

White colourless

(i) State and explain the observation made on the equilibrium when the mixture is heated. (2 marks)

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(ii) What happens to the position of the equilibrium if a few drops of hydrochloric acid are added tot eh equilibrium mixture. (1 mark)

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10. (i) State any two observations made when calcium is placed in a trough of water? (2 marks)

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(ii) State any one important use of the solution formed in (i) above. (1 mark)

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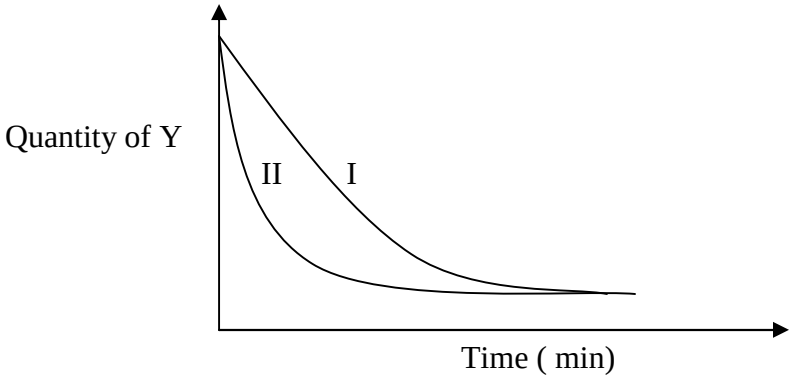
11. The curves below were obtained when equal volumes of HCl acid of same concentration were reacted with 25.0g of Mabel chips. In one case, the acid was first warmed to a high temperature.



(a) Which curve represents the reaction involving warm hydrochloric acid? (1 mark)

……..

(b) Suppose a graph of time against volume of CO_2 produced was plotted, draw on the same axes a sketch to show the graphs of the reaction above. (2 marks)

12. Given the follow ……..electrode potentials,

	E^{θ} (V)
$A^{+}_{(aq)} + e^{-} \longrightarrow A_{(s)}$	+0.76
$B^{2+}_{(aq)} + 2e^{-} \longrightarrow B_{(s)}$	-0.48
$\frac{1}{2} Q_{2(g)} + 2e^{-} \longrightarrow Q^{2-}_{(aq)}$	+1.62

(a) Determine the maximum emf that can be obtained by combining two of the given half cells. (1 mark)

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(b) Write the cell representation for the cell in (a) above. (1 mark)

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(c) What would be the electrode potential of A if B was made the standard electrode. (1 mark)

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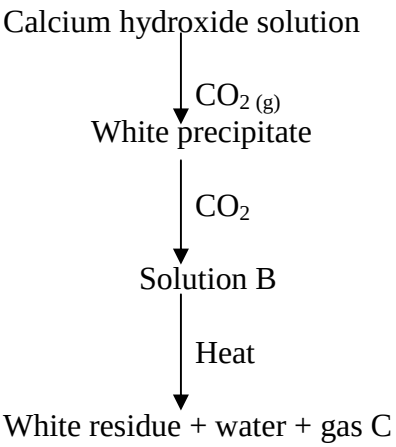
13. Study the flow chart below and answer the questions the follow.



Name:

(a) White precipitate A…… (1 mark)

(b) Solution B ……. (1 mark)

(c) Gas C……. (1 mark)

14. Equal volumes of ammonia gas and hydrogen chloride gas were introduced into opposite ends of a tube. Explain what happened. (2 marks)

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15. A gas occupies 4 litres at 250K and 152mmHg pressure. At what pressure will its volume be halved, if the temperature then is 227^0C? (3 marks)

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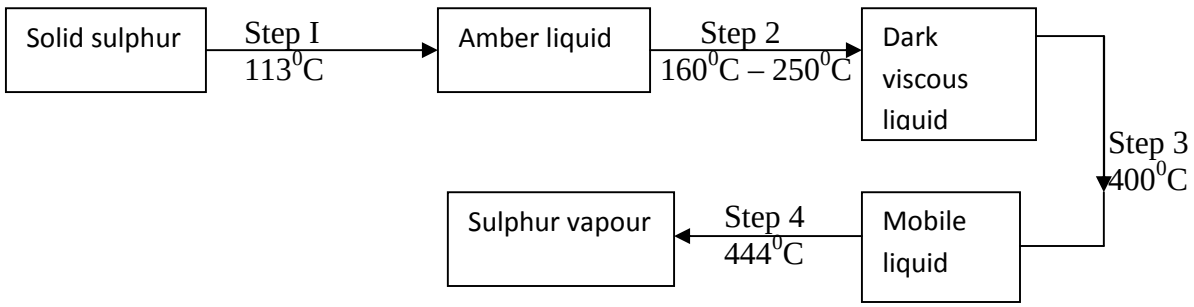
16. Study the scheme below and answer the questions that follow.



Explain the observations made in:

(i) Step 1 (1 mark)

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(ii) Step 2 (1 mark)

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(iii) Step 3 (1 mark)

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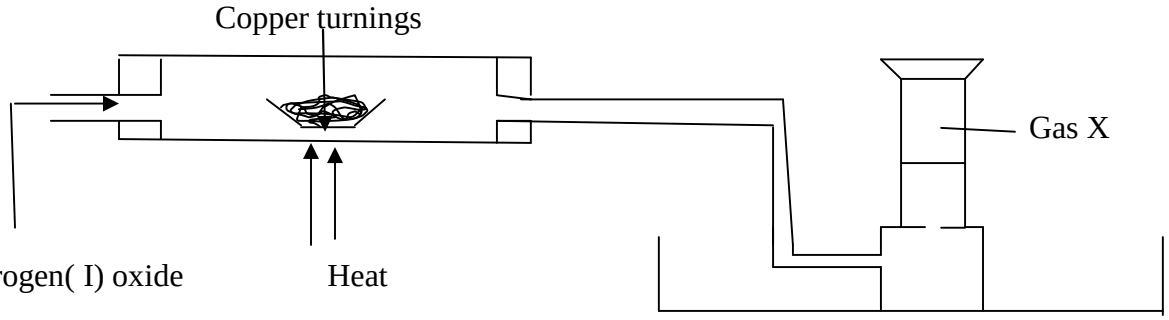
17. Study the set-up below and answer the questions that follow.



(a) Identify gas x. (1 mark)

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(b) State the observations made in the combustion tube. (1 mark)

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(c) Write an equation for the reaction in the combustion tube. (1 mark)

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18. 30cm^3 of 0.06M sodium hydroxide reacted with 25cm^3 of a dibasic acid $HOOC(CH_2)xCOOH$ containing 4 g/litre. Calculate the value of x. (3 marks)

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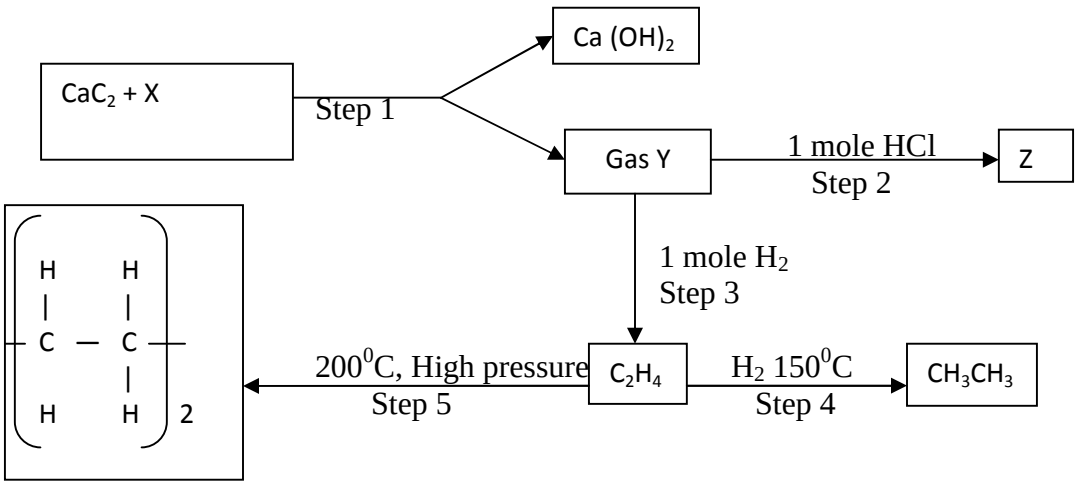
19. Study the diagram below and answer the questions that follow.



(i) Identify reagent X. (1 mark)

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(ii) Draw the structural formula of gas Y. (1 mark)

(iii) What name is given to the process that takes place in step 5? (1 mark)

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20. (a) Using equation(s) suggestion a way in which $^{200}_{80}Hg$ might change into $^{196}_{79}Au$. (1 mark)

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(b) The half-life of $^{131}_{53}I$ in milk was found to be 6 days. On 1st of March before boiling and freezing the mixture, the iodine in the milk had an activity of 1000 counts per second. On what date would you expect the activity to have reduced to 125 count per minute? (2 marks)

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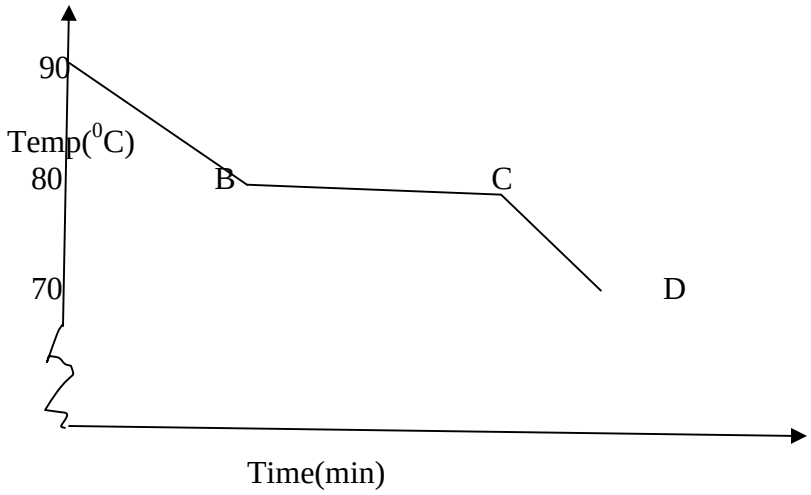
21. A student place a thermometer in molten napthalein at 90^0c, recorded the temperature and time until it solidified. Using the readings, the cooling curve below was obtained.



(a) What does parts B, C ad D-C signify? (2 marks)

B-C……

……

C-D……

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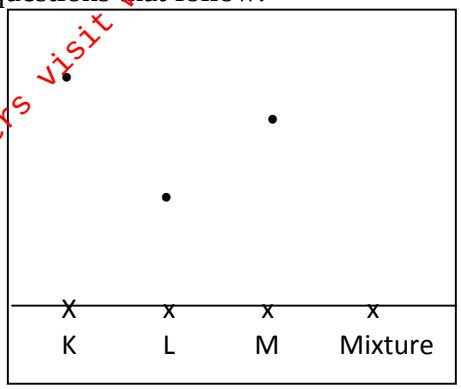
(b) Sketch on the same axis a curve that would be produced if common slat was added to Naphthalene. (1 mark)

(c)

22. The diagram below represents paper chromatogram of three sugars K, L and M. study it and answer the questions that follow.



(a) On the diagram, indicate the position of baseline. (½ mark)

(b) Show on the same chromatogram the plotting representing a mixture of the three sugars. (1 mark)

(c) Other than separating colours, sate one other use of chromatography. (1 mark)

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(d) State one major factor that chromatography relies on to achieve separation.(½ mark)

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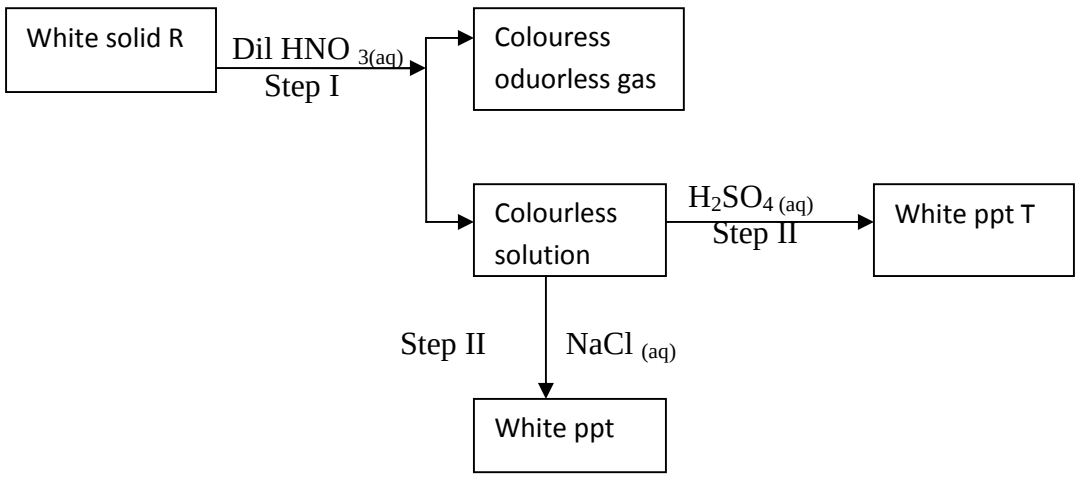
23. Study the flow chart below and answer the questions that follow.



(a) Identify solid R. (1 mark)

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(b) Write a balanced equation for step II and ionic equation for step III.

Step II ……(1 mark)

Step III……(1 mark)

24. In one of the dry practicals assignment to analyze cation a salt, the following observations were made:

	Test	Observation	Inference
(i)	NaOH dropwise till in excess	White ppt formed soluble in excess	
(ii)	NH_3 solution dropwise till in excess.		Presence of Zn^{2+} ions confirmed.

(a) Fill in the blanks in the table above. (2 marks)

(b) Give an ionic equation for the reaction that occurs in test (ii) when excess NH_3 solution is added. (1 mark)

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25. (a) State three roles of chemistry in our society today. (1 ½ marks)

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(b) State key words in the definition of chemistry as a branch of science. (1 ½ marks)

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26. (i) Distinguish between a weak acid and a strong acid giving an example of each. (2 marks)

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(ii) Identify an acid in the forward reaction given by the equation below: (1 mark)

$$HS^-_{4\,(aq)} + H_2O_{(l)} \leftrightharpoons H_2SO_{4\,(aq)} + OH^-_{(aq)}$$ (1 mark)

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27 (a) Metals are said to be Ductile **<u>Malleable</u>** and **<u>corrosive</u>** in air. Explain the meaning of underlined words.

(i) Malleable (1 mark)

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(ii) Corrosive in air (1 mark)

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(b) Give the names and formula of one ore used in production of Iron. (1 mark)

Iron:……..

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