NAME. ……..……..……..…… **ADM NO.** ……...……..

INDEX NO. ……...……..

SIGNATURE ……...……..

233/1
CHEMISTRY
(THEORY)
PAPER 1
JULY/AUGUST 2014
TIME: 2 HOURS.

MAKINDU DISTRICT INTER – SECONDARY SCHOOLS EXAMINATION

Kenya Certificate of Secondary Education.

233/1
CHEMISTRY
(THEORY)
PAPER 1
TIME: 2 HOURS.

INSTRUCTIONS TO CANDIDATES.

a) Write your **NAME** and **INDEX NUMBER** in the space provided above
b) Sign and write the date of examination in the spaces provided above
c) Answer **ALL** the questions in the spaces provided
d) **ALL** working must be clearly shown where necessary.
e) Mathematical tables and silent electronic calculators may be used.
f) This paper consists of 9 printed pages. Candidates should check to ensure that all pages are printed as indicated and no questions are missing

FOR EXAMINER'S USE ONLY.

Question	Maximum score	Candidate's score
1 J 28	80	
Total score	80	

1. Solutions can be classified as acids, bases or neutral. The table below shows solutions and their pH values

Solution	Ph – values
K	1.5
L	7.0
M	14.0

(a) Select any pair that would react to form a solution of pH 7 (1 Mark)

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(b) Identify two solutions that would react with aluminium hydroxide. Explain (2 Marks)

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2. 9.12g of a gaseous compound contain 8g of silicon while the rest is hydrogen. Determine the empirical formula of the compound. (H = 1, Si = 28) (3 Marks)

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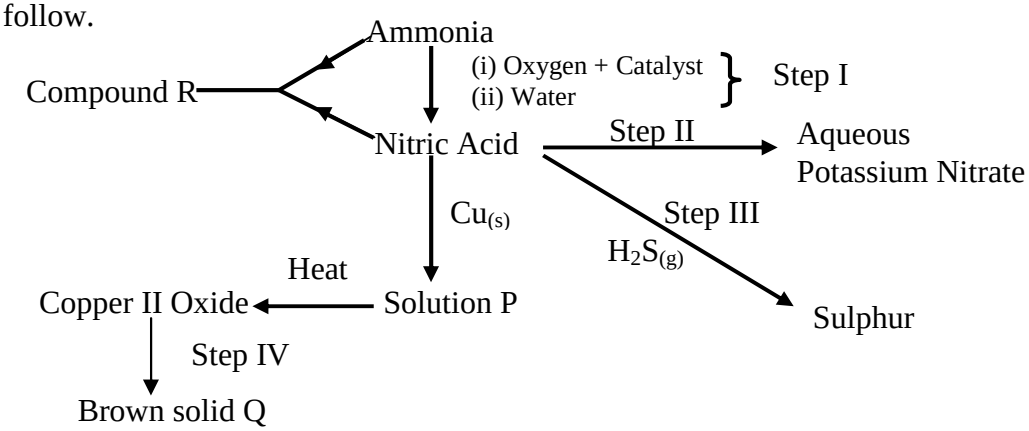
3. The scheme below shows various reactions starting with ammonia. Study it and answer the questions that follow.



(i) Name the catalyst used in step I (1 Mark)

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(ii) Explain how the reaction in step III takes place (1 Mark)

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(iii) Name the process that takes place in step II (1 Mark)

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(iv) Write the formula of compound R (1 Mark)

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(v) Calculate the percentage of nitrogen by mass in R. (1 Mark)
(N = 14 ; H = 1; O = 16)

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4. When iron metal is being axtracted from siderite ($FeCO_3$). What must be done first before extraction and why? Use equations to support your answer (3 Marks)

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5. Oxygen gas can be prepared in the laboratory by heating potassium nitrate.
(a) Write the equation of reaction to show the decomposition of potassium nitrate (1 Mark)

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(b) State two physical properties of oxygen gas (1 Mark)

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(c) Outline one industrial use of oxygen gas (1 Mark)

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6. $12.0cm^3$ of 0.05M hydrochloric acid reacted with calcium hydrogen carbonate to form calcium chloride, water and carbon (IV) oxide.
(a) Write the chemical equation for the reaction (1 Mark)

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(b) Calculate the number of moles of hydrochloric acid used (1 Mark)

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(c) Determine the number of moles of calcium hydrogen carbonate used (1 Mark)

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7. On complete combustion of a hydrocarbon 3.52g of carbon IV oxide gas and 1.44g of water were formed. Determine the molecular formula of the hydrocarbon
(RMM of hydrocarbon = 56.0, C = 12, O = 16, H = 1) (3 Marks)

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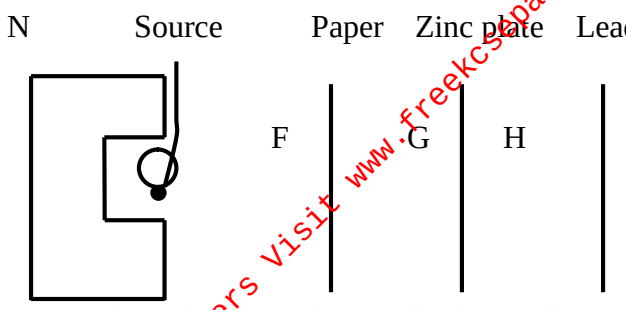
8. The arrangement below was used to compare the penetrating power of emissions in a radioactive decay.



(a) Name the radioactive that can be detected at F, G, H (1½ Marks)

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(b) Name the material N (½ Mark)

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(c) The half-life of $^{234}_{92}U$ is 4500 years. The isotope decays by alpha emission. Write a nuclear equation for its decay to form Thorium (Th) (1 Mark)

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9. (a) State two differences between a luminous flame and a non-luminous flame (2 Marks)

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(b) The apparatus below is commonly used in a chemistry laboratory. Give its name and state it use (1 Mark)

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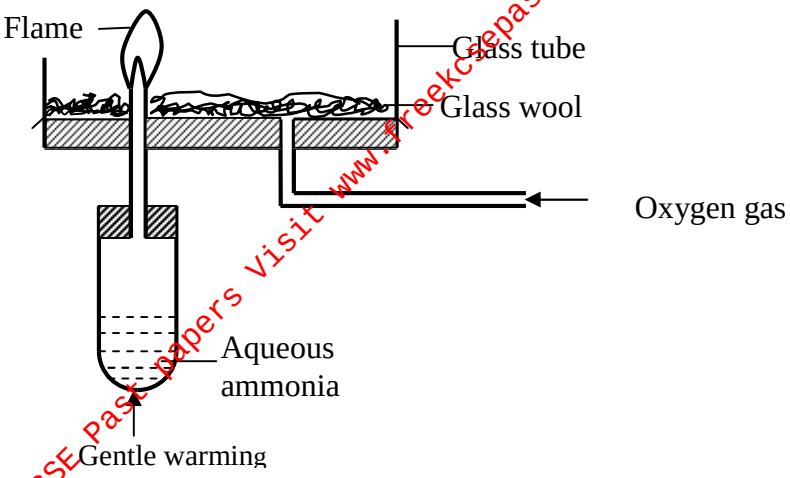
10. Study the set-up below and answer the questions that follow.



(a) Why is aqueous ammonia warmed gently? (1 Mark)

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(b) What is the colour of the flame? (1 Mark)

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(c) Write the chemical equation for the reaction that takes place (1Mark)

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11. (a) What is meant by solubility? (1 Mark)

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(b) In an experiment to determine the solubility of solid x in water at 30^0C the following results were obtained;

Mass of evaporating dish	=	26.2g
Mass of evaporating dish + saturated solution	=	42.4g
Mass of evaporating dish + dry solid x	=	30.4g

Using the information, determine the solubility of solid x at 30^0C in g/100g water. (2 Marks)

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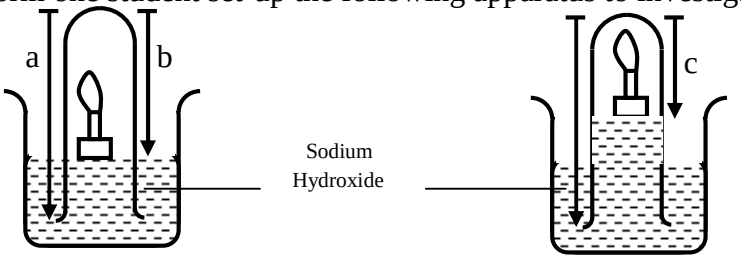
12. A form one student set-up the following apparatus to investigate the percentage of oxygen in air.



(a) (i) Why is sodium hydroxide preferred to water in the above experiment? (1 Mark)

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(ii) Write an equation to show how the percentage of oxygen can be calculated (1 Mark)

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13. A balloon contains 80cm^3 of gas at 30^{0}C and 4 atmospheres. Calculate the volume of the balloon at 50^{0}C and 2 atmospheres. (3 Marks)

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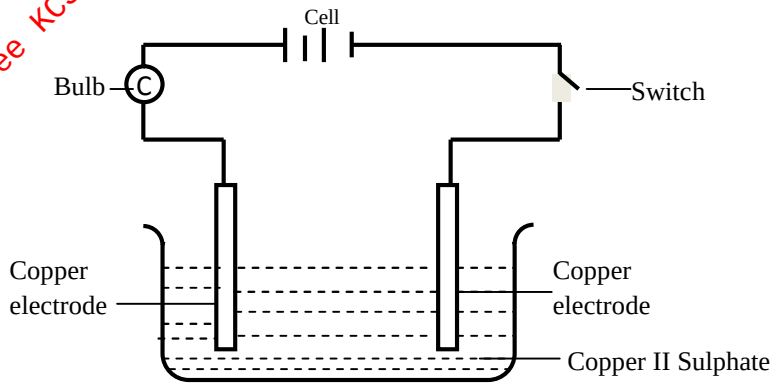
14. Study the set-up below for electrolysis of copper (II) sulphate using copper electrodes.



(a) Write ionic equations for reactions that took place at

I Anode (½ Mark)

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II. Cathode (½ Mark)

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(b) State the observation made at each electrode

I. Anode (½ Mark)

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II. Cathode (½ Mark)

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(c) State and explain the observations made on the electrolyte (1 Mark)

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15. If 25cm^3 of 0.1M H_2SO_4 solution neutralized a solution contain 1.06g of sodium carbonate in 250cm^3 of solution, calculate the morality and volume of sodium carbonate solution. (Na = 23, O = 16, C = 12) (3 Marks)

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16. 50cm^3 of oxygen gas diffused through a porous plug in 80 seconds. How long will it take 100cm^3 of sulphur (IV) oxide to diffuse through the same plug? (S = 32, o = 16) (3 Marks)

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17. (a) State the role of the following parts during fractional distillation of a mixture of water and ethanol

(i) Glass beads in the fractionating column (1 Mark)

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(ii) Fractionating column (1 Mark)

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(b) State any one application of fractional distillation (1 Mark)

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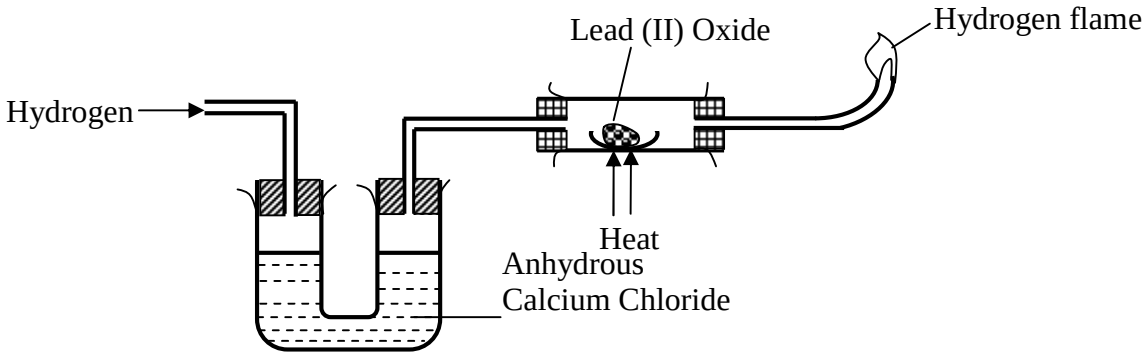
18.



(i) Write an equation for the reaction that takes place in the tube (1 Mark)

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(ii) What property of hydrogen makes this reaction possible? (1 Mark)

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(iii) What would you expect to happen, if sodium oxide (Na_2O) was used instead of Lead (II) oxide? (1 Mark)

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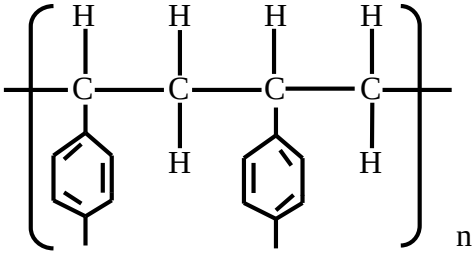
19. The formula given below represents a portion of a polymer.



(a) Give the name of the polymer (1 Mark)

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(b) State one disadvantage of continued use of this polymer (1 Mark)

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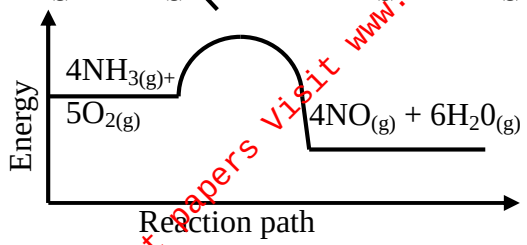
20. Ammonia can be converted to nitrogen II oxide as shown in the equation below.

$4NH_{3(g)} + 5O_{2\,(g)} \rightleftharpoons 4NO_{(g)} + 6H_20_{(g)}$



(a) Explain how an increase in temperature would affect the yield of nitrogen (II) oxide (2 Marks)

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(b) On the energy level diagram above sketch the energy level diagram that would be obtained if the reaction is carried out in the presence of a platinum catalyst. (1 Mark)

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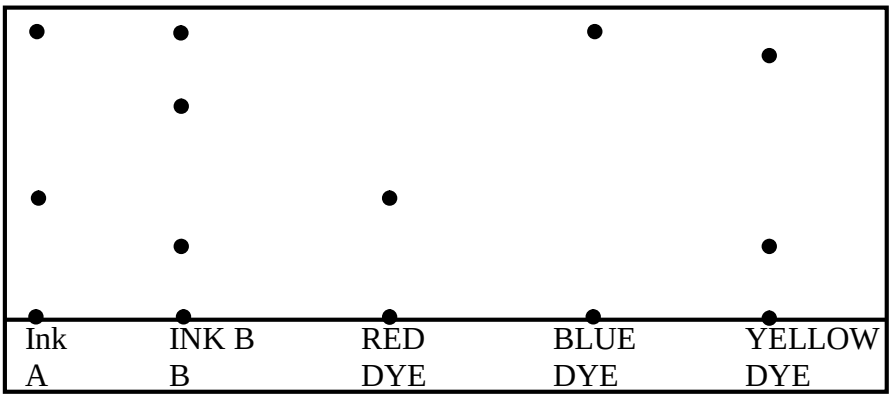
21. The chromatogram of two inks and three dyes is drawn below.



(a) Name the colours of ink A (1 Mark)

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(b) Suggest how separated components can be recovered (1 Mark)

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(c) Suggest two reasons why separations occur in this method (1 Mark)

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22. 16g of ethanol (C_2H_5OH) were completely burnt in air. The heat evolved the temperature of 600cm3 of water to change from 20^0 to 85^0C. Calculate the molar enthalpy of combustion of ethanol.
(H = 1, C = 12, O = 16. Specific heat capacity of water = $4.2KJKg^{-1}K^{-1}$) (3 marks)

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23. A gaseous compound consists of 86% carbon and 14% hydrogen by mass. At s.t.p 3.2dm^3 of the compound has a mass of 6g. (C = 12, H = 1, M.G.V at s.t.p = 22.4dm^3)

(a) Calculate its empirical formula. (2 Marks)

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(b) Calculate the molecular formula (1 Mark)

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24. (a) With a reason define the term alkaline earth metals (1 Mark)

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(b) In order, name the first two alkaline earth metals. (Give their chemical syllabus) and their electronic arrangement. (2 Marks)

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25. (a) Why is reaction between calcium and dilute sulphuric (VI) acid not used in preparation of hydrogen gas

(2 Marks)

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(b) Calcium is an element in period 2, what do members of the period have in common? (1 Mark)

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26. Given element W has atomic number 14 and consists of isotopes as shown below.

Isotope	A	B	C
Isotope mass	28	29	30
Percentage abundance	92.2	4.7	3.1

(a) What are isotopes? (1 Mark)

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(b) Determine the relative atomic mass of W (2 Marks)

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