NAME: ……INDEX NO: ……..

SCHOOL: ……CANDIDATE SIGN: ……

DATE: ……

233/2
CHEMISTRY
THEORY
JULY/ AUGUST-2014

TIME: 2 ½ HOURS

KISII SOUTH SUB DISTRICT JOINT EVALUATION TEST 2014

Kenya Certificate of Secondary Education (KCSE)

233/2
CHEMISTRY
THEORY
JULY/ AUGUST-2014

TIME: 2 ½ HOURS

INSTRUCTION

a) Write your name and index number in the spaces provided above.
b) Sign and write the date of the examination in the spaces provided above.
c) Answer all questions in the spaces provided.
d) Mathematical tables and electronic calculators may be used.
e) All working must be clearly shown where necessary.

FOR EXAMINER'S USE ONLY

Question	Maximum score	Candidate's score
1	13	
2	10	
3	13	
4	13	
5	13	
6	13	
7	8	
Total score	80	

This paper consist of 8 printed pages.
Candidate should check the question paper to ascertain all pages are printed as indicated
And no questions are missing.

1. a) Study the information in the table below and answer the questions that follow. (The letters do not represent the actual symbols of the elements)

Element	Electronic configuration	Ionisation energy kj moi^{-1}
P	2.1	519
Q	2.8.1	494
R	2.8.8.1	418

i) What is the general name given to the group in which elements P, Q and R belong? (1 mk)

ii) What is meant by ionisation energy? (1 mk)

iii) Explain why element P has the highest ionisation energy. (1 mk)

iv) When a piece of element Q is placed on water, it melts and a hissing sound is produced as it moves on the surface of the water. Explain these observations. (3 mks)

v) Write an equation for the reaction between element Q and water. (1 mk)

b) Distinguish between a strong and a weak base. Give an example in each. (2 mks)

c) Neutralisation is one of the methods of preparing salts.

i) What is meant by neutralisation? (1 mk)

ii) Describe how you would prepare crystals of sodium nitrate starting with $200cm^3$ of 2M sodium hydroxide. (2 mks)

iii) Write an equation for the reaction that takes place when a solid sample of sodium nitrate is heated. (1 mk)

2. a) State two factors that should be considered when choosing fuel for cooking. (2 mks)

b) The diagram below represents a set up that was used to determine the molar heat of combustion of ethanol.

During the experiment, the data given below was recorded

Volume of water	$450cm^3$
Initial temperature of water	25℃
Find temperature of water	46.5℃
Mass of ethanol + lamp before burning	125.5 g

Mass of ethanol + lamp after burning 124.0 g

Calculate the:

i) Heat evolved during the experiment(Density of water = 1 g/cm3, specific heat capacity of water = $4.25 g^{-1}k^{-1}$ (2 mks)

ii) Molar heat of combustion of ethanol(C=12.0, O=16.0,H= 1.0) (2 mks)

c) Write the equation for the complete combustion of ethanol (1 mk)

d) The value of the molar heat of combustion of ethanol obtained in (b) (ii) above is lower than the theoretical value. State one source of error in the experiment. (1 mk)

e) Draw an energy level diagram to show molar heat of combustion of ethanol. (2 mks)

3. The standard reduction potentials for five half cells are shown in the table below. Study it and answer the questions that follow. (The letter do not represent the actual symbols of the elements).

	Element					E^{-} (volts)
i)	$A_{2\,(aq)}$	+	$2e^{-}$	$\longrightarrow$	$2A^{-}_{(aq)}$	+1.09
ii)	$Q^{2+}_{(aq)}$	+	$2e^{-}$	$\longrightarrow$	$Q_{(s)}$	-0.13
iii)	$R^{2+}_{(aq)}$	+	$2e^{-}$	$\longrightarrow$	$R_{(s)}$	-2.37
iv)	$Y^{2+}_{(aq)}$)	+	$2e^{-}$	$\longrightarrow$	$Y_{(s)}$	+0.34
v)	$2S^{+}_{(aq)}$	+	$2e^{-}$	$\longrightarrow$	$S_{2(s)}$	0.00

I. a) With a reason, identify the strongest reducing agent. (1 mk)

b) Which half cell is likely to be hydrogen? (1 mk)

c) Write an equation for the reaction between two half cells in (ii) and (iv) (1 mk)

d) Calculate the e.m.f of the cell in © above. (1 mk)

e) Explain why use should not use concentrated sulphuric(vi)acid in lead accumulators. (1 mk)

II. The diagram below represents a mercury cell that can be used in the industry manufacture of sodium hydroxide. Study it and answer the questions that follow.

a) Name:

i) Raw material introduced at 2. (1 mk)

ii) Another substance that can be used in the cell instead of graphite. (1 mk)

b) Identify the by product that comes out at I. (1 mk

c) Write an equation for the reaction:

i) That occurred at the anode. (1 mk)

ii) In which sodium hydroxide was produced. (1 mk)

d) Give one reason why mercury is recycled. (1 mk)

e) Draw a diagram to show how an aluminium spoon can be electroplated with pure copper. (2 mks)

4. a) In which homologous series do the following compounds belong? (2 mks)

i) CH_3CCH

ii) CH_3CH_2COOH

b) Raw rubber is heated with sulphur in the manufacture of natural rubber.

i) What name is given to the process? (1 mk)

ii) Why is the process necessary? (1 mk)

c) Study the scheme given below and answer the questions that follow.

i) Write an equation for the reaction between propan-1-01 and potassium metal. (1 mk)

ii) Name process I and II. (2 mks)

iii) Identify the products A and B. (2 mks)

A _____

B_____

iv) Name one catalyst used in process II. (1 mk)

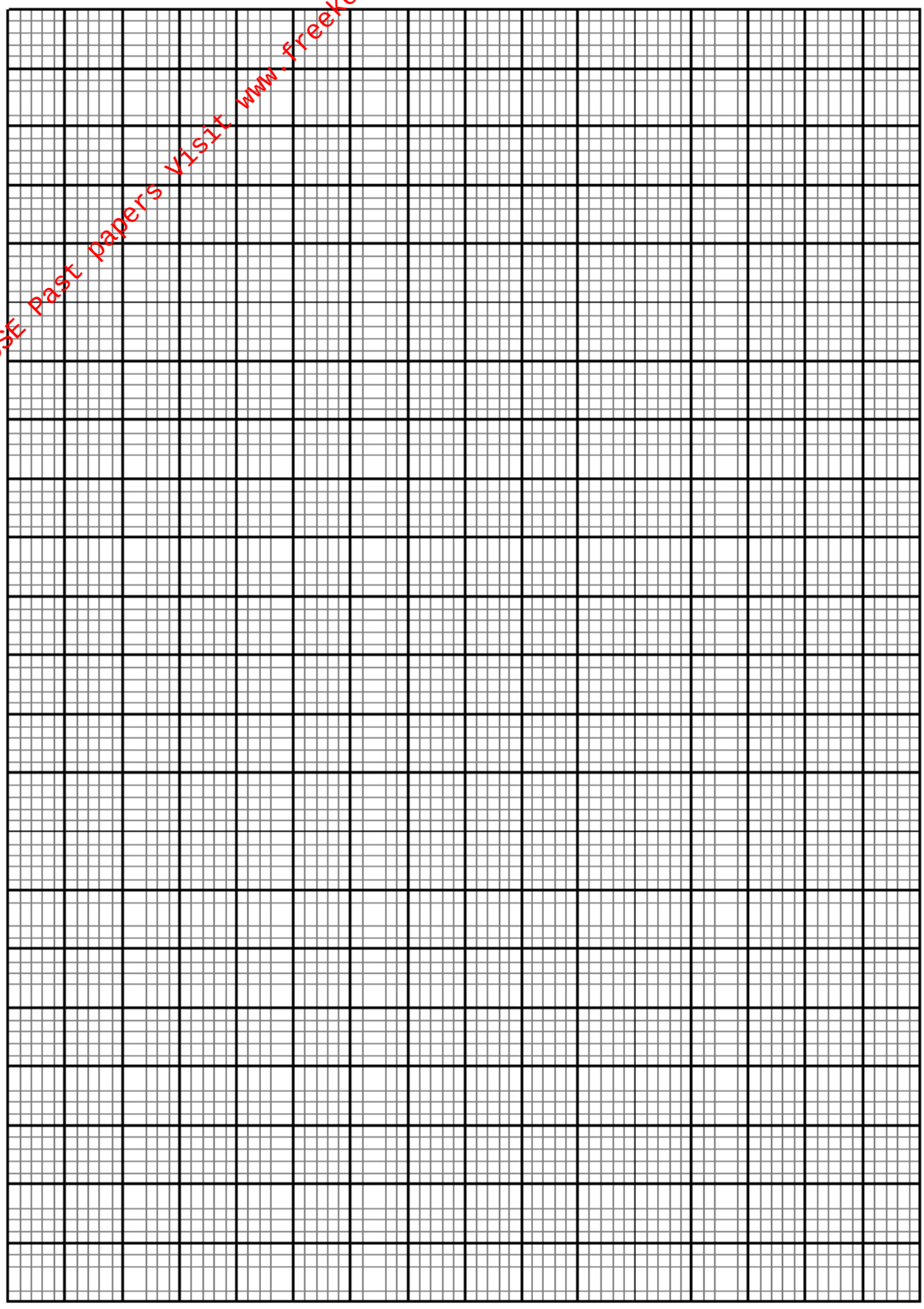
v) Draw the structure formula of the repeating unit in the polymer C. (1 mk)

d) State two industrial uses of methane. (2 mks)

5. a) Define the term solubility. (1 mk)

b) The table below shows the solubility of substances A and B against temperature.

Temperature	15	25	35	45	55	65	75
Solubility of A in 100g of H_2O	26	38	53	72	98	124	155
Solubility of B in 100g of H_2O	35.8	36.2	36.6	37	37.7	38	38



c) From the graph answer the following questions.

i) At what temperature are the solubilities of A and B the same? (1 mk)

ii) What mass of substance B is necessary to saturate 35g of water at 50℃

iii) By how many grams of solute does solubility of substance A exceed that of substance B at 50°C.

d) Name the method of separating mixture which would be used to obtain pure sample of A from a mixture of A and B. (1 mk)

6. a) DIAGRAM

During the experiment the rubber band was removed and a hot glass rod put through the opening to ignite the phosphorous by touching. It was then immediately removed and the rubber band replaced as the phosphorous burnt producing thick white fumes.

i) How is phosphorous stored in the laboratory? Explain. (2 mks)

ii) State reasons why the level of water in the bell jar first went down as phosphorous burned then rose after it got extinguished. (2 mks)

iii) The white fumes formed in the bell jar slowly disappeared until the bell jar finally became clear. Explain. (1 mk)

iv) Given that the initial reading was 80cm3 and the final volume was 64cm3 determine the percentage by volume of oxygen in air. (2 mks)

v) Write a chemical equation for the reaction that took place in the bell far.(1 mk)

vi) Both red and blue litmus papers were placed in the resulting solution. State and explain the observations that were made. (2 mks)

b) Painting, oiling, galvanizing or tin plating are of preventing rust.

i) Give the general formula of rust. (1 mk)

ii) How are these methods similar in the way they prevent rusting. (1 mk)

iii) Explain why galvanised objects are better protected even when scratched. (1 mk)

7. The diagram below shows the process of manufacturing sodium carbonate during the solvacy process. Study it and use it to answer the question that follow.

a) Name gases A and B. (1 mk)

b) Name liquid C and solid D. (1 mk)

c) Write equations of the reactions in:

i) Tower P.

ii) Chamber R.

d) Name the product T formed at chamber R and give one of its uses. (2 mks)

e) Explain using ionic equations how sodium carbonate is used to soften temporary hard water. (2 mks)