Name ..... **Index Number** ..... / .....

School ..... **Candidate's Signature** .....

233/3

CHEMISTRY

PAPER 3 (PRACTICAL)

JULY/AUGUST 2013

TIME: $2^1/_4$ HOURS

LENOCET EVALUATION TEST

KENYA CERTIFICATE OF SECONDARY EDUCATION

233/3

CHEMISTRY

PAPER 3 (PRACTICAL)

TIME: $2^1/_4$ HOURS

Instructions to candidates

(a) Write your Name and Index Number in the spaces provided

(b) Answer **ALL** questions in the spaces provided in the question paper.

(c) Mathematical table and calculators may be used.

(d) All working **must** be clearly shown where necessary.

(e) In the first 15 minutes, read through the questions and ensure that you have all the apparatus and other substances required.

For Examiner's use only

Questions	Maximum Score	Candidate's Score
1	12	
2	11	
3	17	
Total Score	40	

1. You are provided with;

- 2.0M sodium hydroxide. Solution P
- Sulphuric acid of unknown concentration, solution R

Your are required to:

(i) Standardise sulphuric acid using sodium hydroxide.

(ii) Determine the molar heat of neutralization.

(a) **Procedure I.**

Measure 25cm^3 of sodium hydroxide using a measuring cylinder. Transfer it into a 250cm^3. Volumetric flask and add about 200cm^3 of distilled water.

Add water to the volumetric flask and top up to the mark. Label this solution Q.

Fill the burette with solution R.

Pipette 25.0cm^3 of solution Q and transfer it to a conical flask.

Add 2 - 3 drops of phenophtalein indicator and titrate with solution R.

Record your results as in the table below.

Repeat the titration two more times. (3 marks)

	I	II	III
Final burette reading (cm^3)			
Initial burette reading (cm^3)			
Volume of solution used (cm^3)			

(i) Calculate the average volume of solution R used. (1 mark)

_____

_____

_____

_____

(ii) Calculate the number of moles of sodium hydroxide in 250cm^3 volumetric flask. (2 marks)

_____

_____

_____

_____

(iii) Determine the concentration of solution Q in moles per litre. (2 marks)

_____

_____

_____

_____

(iv) Write a well balanced chemical equation for the reaction involving solution Q and solution R. (1 mark)

(v) Determine the number of moles of solution R used. (2 marks)

(vi) Calculate the concentration of solution R in moles per litre. (1 mark)

(b) **Procedure II**

Measure 50cm^3 of solution R and transfer into 250cm^3 plastic beaker (lagged) note the temperature of the solution (T_1) and record in the table below.

Measure 62.5cm^3 of solution Q and transfer into a plastic beaker (lagged) and note its temperature (T_2) and record in the table below.

Transfer solution Q into solution R and stir with a thermometer record the final temperature of the mixture (T_3).

Table of results.

Temperature of solution R T_1 (^{0}C)	
Temperature of solution Q T_2 (^{0}C)	
Final temperature T_3(^{0}C)	

(i) Calculate the average temperature of solution R and Q. (1 mark)

(ii) Calculate the heat of reaction given that the specific heat capacity is $4.2KJkg^{-1}K^{-1}$ and density of the solution is 1g/cm³. (2 marks)

(iii) Calculate the number of moles of solution R used. (1 mark)

(iv) Calculate the molar heat of neutralization. (2 marks)

(v) Sketch energy level diagram to represent the enthalpy change. (Completely labelled). (3 marks)

2. (a) You are provided with solid S. Carry out the tests below. Record your observations and inferences in the spaces provided.

(i) Put solid S into a clean boiling tube. Add about 10mls of distilled water and shake well. Divide the sample into five portions.

Observations	Inferences
(1 mark)	(1 mark)

(ii) To the first portion add sodium hydroxide dropwise until in excess.

Observations	Inferences
(1 mark)	(1 mark)

(iii) To the second portion add 2M ammonia solution dropwise until in excess.

Observations	Inferences
(1 mark)	(1 mark)

(iv) To the third portion add 2.0cm^3 Barium Chloride.

Observations	Inferences
(1 mark)	(1 mark)

(v) To the forth portion add 3 drops of acidified $KMnO_4$.

Observations	Inferences
(1 mark)	(1 mark)

(vi) To the fifth portion add $2cm^3$ of barium chloride followed by about $5.0cm^3$ of 2M hydrochloric acid.

Observations	Inferences
(1 mark)	(1 mark)

(b) You are provided with solid T.

Carry out the tests below to identify the ions present.

Put the whole of solid T into a boiling tube and add about 10mls of distilled water shake well and divide the mixture into four portions.

(i) To the first portion, add 2 - 3 drops of universal indicator. (Note the PH)

Observations	Inferences
(1 mark)	($^1/_2$ mark)

(ii) To the second portion, add the sodium carbonate provided.

Observations	Inferences
(1 mark)	($^1/_2$ mark)

(iii) To the third portion, add 2 - 3 drops of acidified chromate (VI) solution.

Observations	Inferences
(1 mark)	($^1/_2$ mark)