Name: …………………………………………...……… Index No: ……………………

Candidate's signature…………………………

Date……………………………………………

Muungano KCSE Trial Exam

233/3
CHEMISTRY
PAPER 3 (Practical)
July 2017
2¼ Hours

INSTRUCTIONS:

Write your name and index Number in the spaces provided.
Answer *All* questions in the spaces provided in the question paper.
You are *NOT* allowed to start working with the apparatus for the first *15 minutes of the 2¼ hours* allowed for this paper. This time is to enable you to read the question paper and make sure you have all the chemicals and apparatus that you may need.
All working *MUST* be clearly shown where necessary.
Mathematical tables and electronic calculators may be used.

FORM EXAMINER'S USE ONLY

Question	Max. Score	Score
1	**22**	
2	**10**	
3	**8**	
Total Score	**40**	

This paper consists of 6 printed Pages

Candidates should check the question paper to ensure that all the pages are printed as indicated

and no questions are missing

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1. You are provided with:
- **Solid *P***
- 2.0M hydrochloric acid, **solution *Q***
- 0.1M sodium hydroxide, **solution *R***

You are required to determine the enthalpy change △H, for the reaction between solid P and one mole of hydrochloric acid.

Procedure I

Transfer 20.0cm³ of 2.0M hydrochloric acid, **solution *Q*** in a 100ml.beaker using a burette. Measure the temperature of the solution after every half-minute and record the values in Table 1. At exactly **2½ minutes**, add all of **solid *P*** to the acid carefully. Stir the mixture gently with the thermometer. Measure the temperature of the mixture after every half-minute and record the values in Table 1. (***Retain the mixture for use in procedure II***)
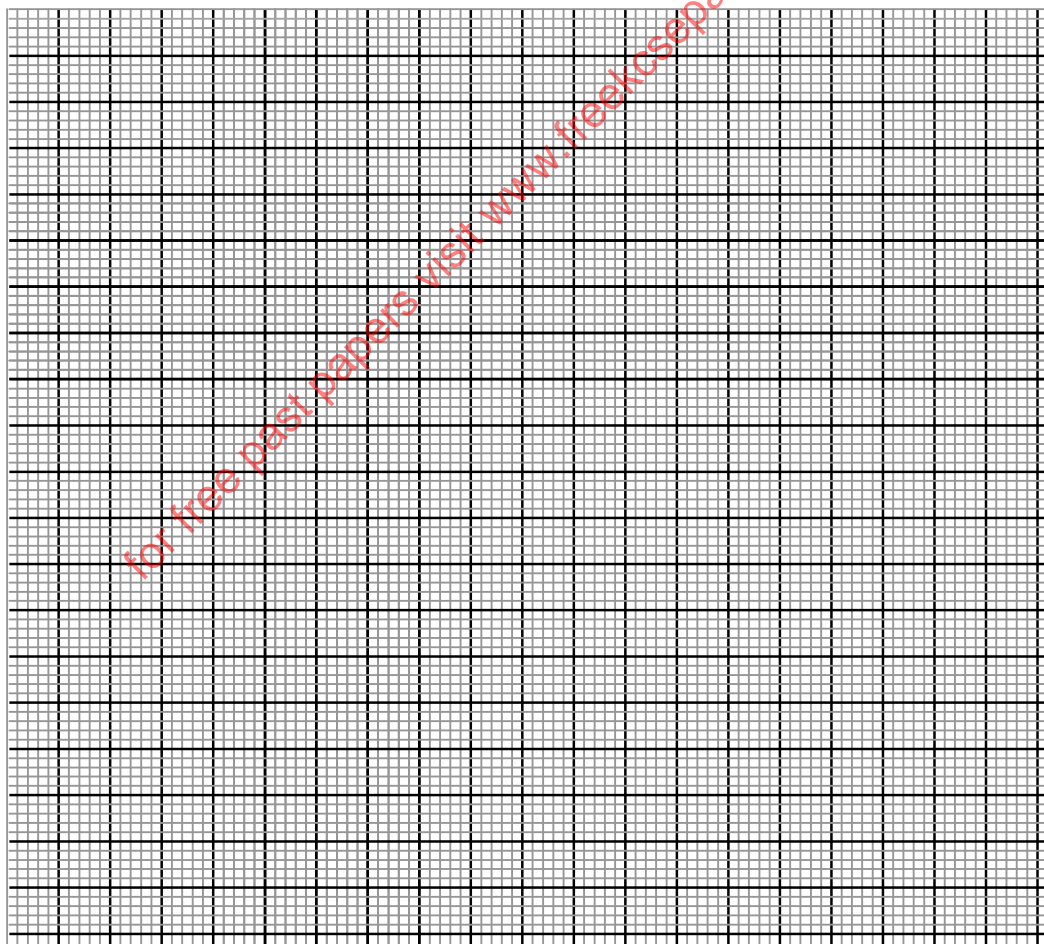
Table 1   (3mks)

Time (min)	0	½	1	1½	2	2½	3	3½	4	4½	5
Temperature (°C)						X					

(i) Plot a graph of temperature (y-axis) against time.   (3mks)

(ii) Using the graph, determine the change in temperature ΔT. (1mk)

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(iii) Calculate the heat change for the reaction (*Assume that the specific heat capacity of the mixture is 4.2 $Jg^{-1}K^{-1}$ and the density of the mixture is 1g/cm^3*). (1mk)

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Procedure II
Rinse the burette thoroughly and *fill* it with sodium hydroxide. *Transfer all* the contents of the 100ml beaker in procedure **I** into a 250ml volumetric flask. *Add* distilled water to make up to the mark; *label* this as solution *N*. Using a pipette **filler**, *place* 25.0cm³ of solution *N* into a 250ml conical flask. *Add two* or *three* drops of phenolphthalein indicator and *titrate* against solution *R* from the burette. Record your results in **table 2**. *Repeat* titration two more times and *complete* Table 2.

Table 2	*I*	*II*	*III*
Final burette reading(cm³)			
Initial burette reading(cm³)			
Volume of **solutionR** used (cm³)			

(4mks)
Calculate the:
   (i)   Average volume of sodium hydroxide solution *R*. (1mk)

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   (ii)   The number of moles of:
    I   Sodium hydroxide solution *R.* (1mk)

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    II   Hydrochloric acid in 25cm³ of solution *N*. (1mk)

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    III   Hydrochloric acid in 250cm³ the of solution *N* (1mk)

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    IV   Hydrochloric acid in 20.0cm³ of solution *Q* (1mk)

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    V   Hydrochloric acid that reacted with solid *P* (1mk)

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  (iii) Calculate the enthalpy of reaction between **solid P** and one mole of hydrochloric acid. (*Show the sign of* ΔH) (2mks)

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2. You are provided with substance *M* for this question. *Transfer* the substance into a clean boiling tube. *Add* about 10cm^3 of distilled water and *stir*. *Pour* the mixture into *four* clean test tubes of about 2cm^3 each.

Observations	Inferences
1mk	1mk

a) To the *first* portion of the solutions, *add* sodium hydroxide solution dropwise *until* in excess.

Observations	Inferences
1mk	1mk

b) *Dip* a clean stirring rod/glass rod/nichrome wire into the second portion and then *place* into the side of a blue bunsen flame.

Observations	Inferences
1mk	1mk

c) To the *third* portion, *add* 2-3 drops of barium nitrate solution *followed by excess* hydrochloric acid.

Observations	Inferences
1mk	1mk

d) To the *fourth* portion, *add* 2-3 drops of acidified potassium manganate (VII)

Observations	Inferences
1mk	1mk

3. You are provided with substance **W** for tests in this question.

a)   *Place* 3 drops of substance **W** on a clean dry watch glass ***then ignite*** it.

Observations	*Inferences*
1mk	1mk

b)   *Place* about 2cm^3 of substance **W** in a clean dry test tube, ***then add*** all the sodium hydrogen carbonate provided.

Observations	*Inferences*
1mk	1mk

c)   *Place* about 2cm^3 of substance **W** in a test tube then ***add*** about 1cm^3 of acidified potassium manganate (VII) and warm the mixture.

Observations	*Inferences*
1mk	1mk

d)   *Place* about 2cm^{3}of substance **W** in a test tube then add 2-3 drops of bromine water.

Observations	*Inferences*
1mk	1mk