Name……. **Index No**……/…….

School…… **Candidates Signature**……

Date ……..

Kenya Certificate of Secondary Education (K.C.S.E)

CHEMISTRY

Paper 3

PRACTICAL

2 ¼

Instructions to candidates

- Write your name and Index Number in the spaces provided above.
- Sign and write date of examination in the spaces provided above.
- 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 2 ¼ 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 workings **MUST** be clearly shown where necessary.
- Mathematical tables and silent electronic calculators may be used.

For Examiners use only.

Question	Maximum Score	Candidates Score
1	12	
2	12	
3	16	
TOTAL SCORE	40	

01

1. You are provided with
   - Magnesium ribbon, solid A.
   - 0.7M Hydrochloric acid, solution B.
   - 0.3M Sodium hydroxide, solution C.
   - Distilled water.

   You are required to determine the:

   i) Temperature change when Magnesium reacts with excess hydrochloric acid.

   ii) Number of moles of Hydrochloric acid that remain unreacted.

   iii) Number of moles of Magnesium that reacted .

   iv) Molar heat of reaction between Magnesium and Hydrochloric acid.

   Procedure 1

   - Using a burette, measure 50cm^3 of solution B and place it in a100ml beaker. Measure the temperature of the solution B in the 100ml beaker and record the value in the table I
   - Put the magnesium ribbon in the 50cm^3 of solution B in the 100ml beaker immediately and start the stop watch. Stir the mixture continuously with the thermometer making sure the magnesium ribbon remains inside solution as it reacts.
   - Measure the temperature after every 30 seconds and record the values in the table I. Continue stirring and measuring the temperature to complete table I
   - Keep the resulting solution for procedure 2

     Table 1

Time (sec)	0	30	60	90	120	150	180	210	240	270	300
Temp. (^{0}C)											

(5mks)

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

GRID

ii) On the graph show the maximum change in temperature ,ΔT,and determine its value, ΔT. (1mk)

Procedure 2

- Transfer all the solution obtained in procedure 1 into 250ml conical flask. Clean the burette and use it to place 50cm^3 of distilled water into the beaker used in the procedure 1.
- Transfer all the 50cm^3 of water into 250ml conical flask containing the solution from procedure 1. Label this solution as D.
- Empty the burette and fill it with solution C. Pipette 25cm^3 of solution D and place it into an empty 250ml conical flask .Add two drops of phenolphthalein indicator and titrate solution C against solution D.
- Record the results in table 2 and complete the table 2.

Table 2

	I	II	III
Final burette reading.			
Initial burette			

reading.			
Volume of solution used (cm^3)			

i) Calculate the average volume of solution C used. (1mk)

_____

_____

_____

_____

_____

_____

ii) Calculate the number of moles of:

I) 0.3M sodium hydroxide used. (1mk)

_____

_____

_____

_____

II) Hydrochloric acid in $25cm^3$ of solution D. (1mk)

_____

_____

_____

_____

III) Hydrochloric acid in $100cm^3$of solution D. (1mk)

_____

_____

_____

_____

_____

IV) Hydrochloric acid in $50cm^3$ of solution B. (1mk)

_____

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_____

V) hydrochloric acid that reacted with magnesium (1mrk)

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_____

_____

VI) Magnesium that reacted (2mks)

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_____

_____

_____

c) Using your answer in (VI) above , determine the molar heat of reaction between Magnesium and Hydrochloric acid (assume the heat capacity of the solution is $4.2Jg^{-1}K^{-1}$ and density is $1.0gcm^{-3}$. (4mks)

2. You are provided with solid E. Carry out the following tests and write your observations and inferences in the spaces provided.

a) Place about one half of solid E in a dry test-tube . Heat it strongly and test any gas produced using hydrochloric acid; solution B on a glass rod.

Observations	**Inferences**
(1mk)	(1mk)

b) Place the rest of solid E in a boiling tube. Add about $10cm^3$ of distilled water. Shake well and use $2cm^3$ portions for each of the test below.

i) To one portion, add aqueous ammonia drop wise until in excess.

Observations	**Inferences**
(½ mk)	(1mk)

ii) To the second portion, add about $1cm^3$ of hydrochloric acid solution B.

Observations	Inferences
(½ mk)	(1mk)

iii) To the third portion, add two drops of aqueous Lead (II) nitrate and heat the mixture to boiling.

Observations	Inferences
(1mk)	(1mk)

3. You are provided with solid P. Carry out the following test and record your observations and inferences in the spaces provided.

a) Place about one half of solid P in a dry test-tube . Retain the other half of solid P for use in (b). Add all the absolute ethanol provided to solid P in the test-tube . Shake the mixture.

b)

Observations	Inferences
(½ mk)	(1mk)

Divide the mixture into two portions

i) Determine the P^H of the first portion using universal indicator solution and P^H chart.

Observations	Inferences
(½ mk)	(1mk)

ii) To the second portion, add one half of the solid Sodium hydrogen carbonate.

Observations	Inferences

(½ mk) (1mk)

b) Place the remaining amount of solid P in a boiling tube. Add 10cm^3 of distilled water and shake. Boil the mixture and divide it into three portions while still warm.

i) To the first portion, add the remaining amount of solid Sodium Hydrogen carbonate.

Observations	Inferences

(½ mk) (1mk)

ii) To the second portion, add three drops of acidified potassium dichromate (VI) solution and warm.

Observations	Inferences

(1mk) (1mk)

iii) To the third portion, add three drops of Bromine water.

Observations	**Inferences**
(1mk)	(1mk)