KASSU JOINT EXAMINATIONS 2024

KENYA CERTIFICATE OF SECONDARY EDUCATION

CHEMISTRY

(PRACTICAL)

$2^1/_4$ HOURS

233/3- -Paper 3

NAME……ADM. NO……CLASS……..…

INDEX NUMBER…….. DATE……SIGNATURE…….

INSTRUCTIONS TO CANDIDATES:

- *Write your name, admission number, index number and class in the spaces provided above.*
- *Indicate the date of exam and sign off in the spaces provided above.*
- *Answer all the questions in the spaces provided below each question.*
- *KNEC Mathematical tables and silent electronic calculators may be used.*
- *All working must be clearly shown where necessary.*
- *Candidate should take the first 15 minutes to go through the instructions.*

FOR EXAMINER`S USE ONLY

QUESTIONS	MAXIMUM SCORE	CANDIDATE`S SCORE
1	22	
2(a)	10	
(b)	8	

Grand Total	40	

1. You are provided with
   - **Solid A**
   - **2.0M** hydrochloric acid solution **B**
   - **0.1M** Sodium hydroxide solution **D**

You are required to determine the enthalpy change ∆**H**. for the reaction between solid **A** and one mole of hydrochloric acid.

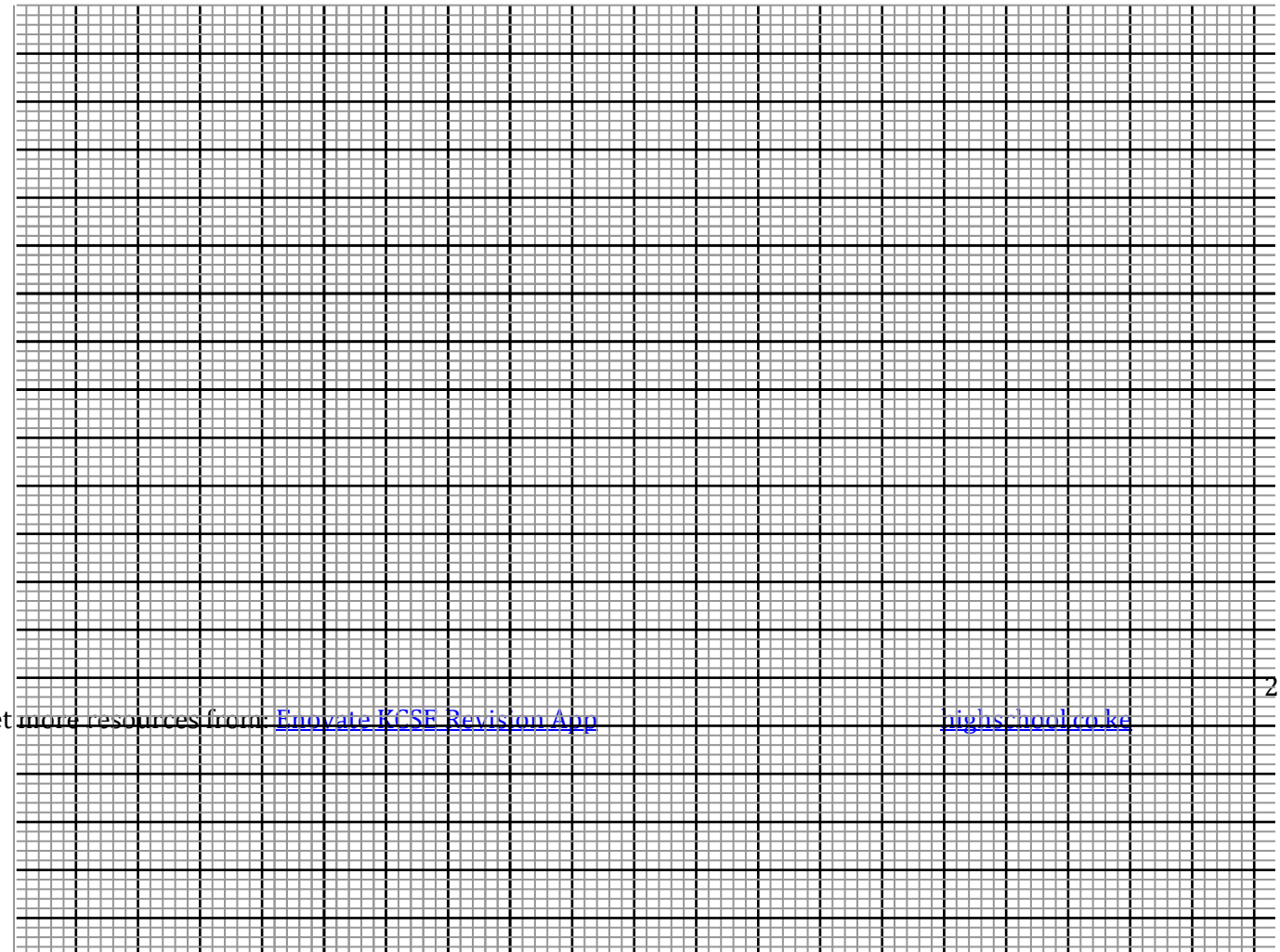
Procedure 1

Using a burette, place 20.0cm^3 of 2.0M hydrochloric acid, solution **B** in a 100ml beaker. Measure the temperature of the solution after every half-minute and record the values in **table 1**. At exactly **2 minutes**, add all of solid **A** to the acid. Stir the mixture gently with 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 **(5marks)**

Time (min)	0	$^1/_2$	1	$1^1/_2$	2	$2^1/_2$	3	$3^1/_2$	4	$4^1/_2$	5
Temperature (c)											

(a) Plot a graph of temperature (y-axis) against time. **(3marks)**



(b) Using the graph determine the change in temperature, ΔT **(1mark)**

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(c) Calculate the heat change for the reaction. (Assume that the specific heat capacity of the mixture of the mixture is $4.2Jg^{-1}K^{-1}$ and the density of the mixture is $1g/cm^3$). **(2marks)**

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Procedure II

Rinse the burette thoroughly and fill it with sodium hydroxide solution **D**. Transfer all the contents of the 100 ml beaker used in **procedure 1** into a 250ml volumetric flask. Add distilled water to make up to the mark. Label this **solution C**. Using pipette and a pipette filler, place **25.0 cm^3** of solution C into a 250ml conical flask. Add two or three drops of phenolphthalein indicator and titrate against sodium hydroxide until a permanent pink colour just appears. Record your results in table. Repeat titration **two more times** and complete table 2.

Table 2 **(4marks).**

	I	II	III
Final burette reading (cm^3)			
Initial burette reading (cm^3)			
Average volume **of D used** (cm^3)			

Calculate the:

(d) Average volume of sodium hydroxide **solution D** used. **(1mark)**

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(e) The number of mole of:

i. Sodium hydroxide **solution D used.** **(1mark)**

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ii. Hydrochloric acid in **25** cm^3 of solution **C**. **(1mark)**

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iii. Hydrochloric acid in **250** cm^3 of solution **C**. **(1mark)**

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iv. Hydrochloric acid in 20.0 cm^3 of solution **B**. **(1mark)**

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v. Hydrochloric acid that reacted with sold **A**. **(1mark)**

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(f) Calculate the **Molar enthalpy** of reaction between solid **A** and one mole of hydrochloric acid.

(**2marks)**

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2. (I) You are provided with **solid Q**. Carry out the tests below and record your observations and inferences in the spaces provided.

(a) Strongly heat a spatula-end full of **solid Q** in a dry test tube.

Observation	Inference
(1mark)	**($\frac{1}{2}$mark)**

(b) (i) Place the remaining **solid Q** in a boiling tube. Add 10 cm^3 of distilled water. Divide the solution into five portions.

Observation	Inference
($\frac{1}{2}$mark)	**(1mark)**

(ii) To the first portion, add universal indicator solution.

Observation	Inference
($\frac{1}{2}$mark)	**($\frac{1}{2}$mark)**

(iii) To the second portion, add aqueous lead (II) nitrate solution.

Observation	Inference

(½mark)	**(1mark)**

(iv) To the third portion, add dilute nitric (V) acid followed by barium nitrate solution..

Observation	Inference
(1mark)	**½mark)**

(v) To the forth portion, add few drops of sodium hydroxide until in excess.

Observation	Inference
(1mark)	**(1 mark)**

(vi) To the firth portion, add few drops of aqueous ammonia until in excess.

Observation	Inference
(1 mark)	**(1 mark)**

(II) You are provided with **solid R.** carry out the tests below and record your observations and inferences.

(a) Place a spatula-end full of **solid R** in dry boiling tube and add about 10 cm^3 of distilled water. Shake thoroughly and divide the solution into **five** portions.

Observation	Inference
(1 mark)	**(½ mark)**

(b) (i) Test the first portion with the universal indicator solution provided.

Observation	Inference
(½ mark)	**(½ mark**

(ii) to the second portion, add a few drops of acidified potassium manganate (VII) solution.

Observation	Inference
(½ mark)	**(1 mark)**

(iii) To the third portion, add few drops of bromine water.

Observation	Inference
(½ mark)	**(½ mark)**

(iv) To the fourth portion, add all the sodium hydrogen carbonate provided.

Observation	Inference
(1 mark)	**(1mark)**

(v) To the fifth portion in a boiling tube, add $5cm^3$ of ethanol followed by few drops of concentrated sulphuric (VI) acid. Warm the mixture.

Observation	Inference
(½ mark)	**(½ mark)**

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