MARANDA HIGH SCHOOL

Kenya Certificate of Secondary Education

POST MOCK 1 EXAMINATIONS 2021 __

233/3 CHEMISTRY Paper 3

January 2021 – TIME: 2¼ Hours

Name: ....MARKING GUIDE..... Adm No: .....

Class: .....Candidate's Signature: .....Date: 29/01/2021

CHEMISTRY (PRACTICALS)
TIME: 2 ¼ HOURS

INSTRUCTIONS TO CANDIDATES

(a) Write your Name, Adm. number and Class in the spaces provided in the question paper.
(b) Sign and write the date of examination in the spaces provided above.
(c) Answer ALL questions in the spaces provided on the question paper
(d) 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 apparatus and chemicals that you may need.
(e) All working **MUST** be clearly shown where necessary
(f) Mathematical tables and silent non-programmed electronic calculators may be used.

FOR EXAMINERS USE ONLY.

QUESTION	MAXIMUM SCORE	CANDIDATES SCORE
1	~~19½~~ 21	
2	09 ½ 07	
3	11 12	
Total Score	40 40	

This paper consists of 8 printed pages.

Candidates should check the question paper to ascertain that all pages are printed as indicated and that no questions are missing.

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1. You are provided with:
   - Solid **F**
   - 2.0M Hydrochloric acid, **Solution G**
   - 0.1M Sodium hydroxide, **Solution H**

You are required to:

- Determine the enthalpy change ΔH, for the reaction between solid **F** and **one** mole of hydrochloric acid.

Procedure A

Using a burette, place 20.0cm^3 of 2.0M Hydrochloric acid, **solution G** in a 100ml beaker provided. Measure the temperature of the solution after every half-minute and record the values in table 1 below. At exactly 2½ minute, add **all** of **solid F** to the acid. 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 B**).

ACCEPT BTN 22 – 27

Table 1 ~~1ST SHIFT SV~~ 1ST SHIFT SV – 22 2ND SHIFT S.V – = 27

Time (Min)	0	½	1	1½	2	2½	3	3½	4	4½	5
Temperature (^{0}C)	26	26	26	26	26	X	20	21	22	23	24

CT-1
D-1
A-1
TR-1
04

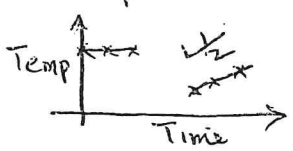
(4 marks)

i) Plot graph of temperature (Y-axis) against time. (3 marks)

MIRANDA MOCK

ANDANG'O

Accept



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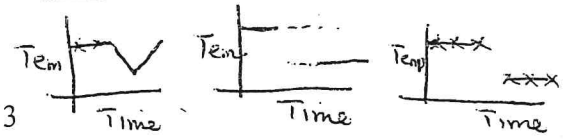

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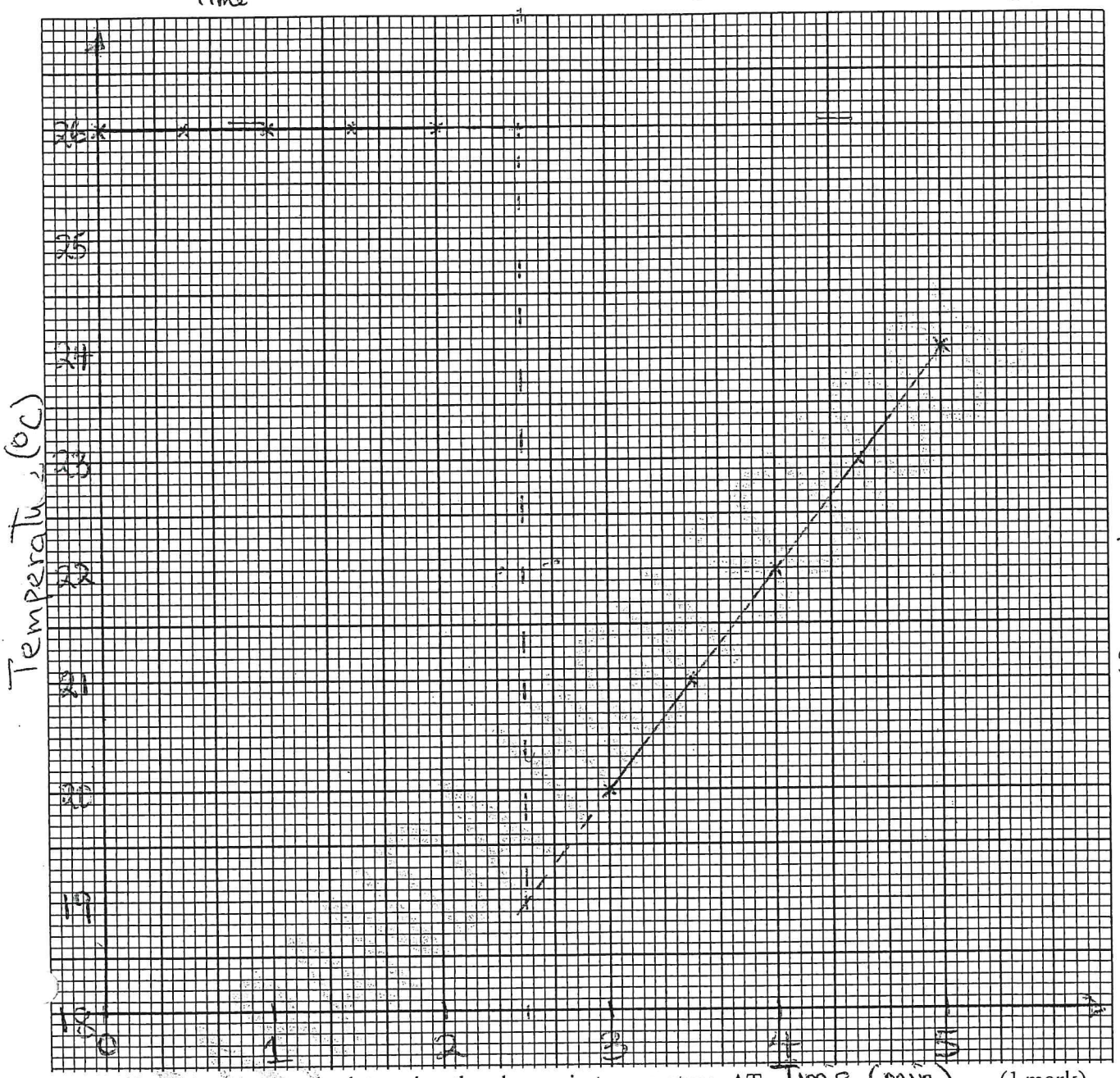

S-½
L-½
P-1
C-1
03

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

ΔT = 26 − 19 = 7°C ½

Showing on the graph ½

I

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 $1 gcm^{-3}$) (1 mark)

ΔH = MCΘ ½

= 20 × 4.2 × ans(ii)

= Correct ans ½

ΔH = mcΘ

= 20 × 4.2 × ans(ii) / 1000

= Correct ans

I

OBONYO

- Sign and units may not be given, but if given must be correct.

Procedure B

Rinse the burette thoroughly and fill it with sodium hydroxide, **Solution H**. Transfer all the contents of the 100ml beaker used in procedure A into a 250ml volumetric flask. Add distilled water to make up to the mark. Label this **solution C**. Using a pipette place 25.0cm³ of **solution C** into a 250ml conical flask. Add two or three drops of phenolphthalein indicator and titrate against sodium hydroxide. Record your results in table 2. Repeat titration two more times and complete table 2.

Table 2

S.V. = 12·5

Titre	1	2	3
Final burette reading (cm³)			
Initial burette reading (cm³)			
Volume of Solution C used (cm³)			

CT-1
D-1
A-1
PA-1
FA-1
05

(4 marks)

Calculate the:

(a) average volume of sodium hydroxide used. (1 mark)

= Titre 1 + titre 2 + titre 3 ½
3 PA
= Average titre ½

(b) the number of moles of:

(i) sodium hydroxide used. ½ (1 marks)

= 0·1 × average titre | = 0·1 × ans (a)
1000 | 1000 ½
= Correct ans | = Correct ans

I

(ii) hydrochloric acid in 25 cm³ of solution C. (1 mark)

Mole ratio NaOH : HCl is 1:1 ½
Moles of HCl = ans b(i) ½

I

(iii) hydrochloric acid in 250 cm³ of solution C. (1 mark)

= 250 × ans b(ii) ½ | = ans b(iii) × 10
25 |
= Correct ans ½ | = Correct ans

1

ODUNDO P,C,T MAKEDI B,W,G ONG'ECH O,R,M

(iv) hydrochloric acid in 20.0 cm^3 of solution G. (1 mark)

$= \frac{2 \times 20}{1000}$ ✓ ½

$= 0.04$ moles

(v) hydrochloric acid that reacted with solid F (1 mark)

= Ans (b)(iv) − Ans (b)(iii) || = 0.04 − ans (b)(iii)

= Correct Ans || = Correct ans

(c) Calculate the enthalpy of reaction between solid F and one mole of hydrochloric acid (1½ marks)

$= \frac{\text{Ans(b)(iii)}}{\text{Ans(b)(v)}}$ || $= \frac{\text{Ans(b)(iii)}}{\text{Ans(b)(v)} \times 1000}$

= Correct ans in J/mol || = Correct ans in $kJmol^{-1}$

NOTE: Sign must be included (+)

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2. You are provided with **substance R**. Carry out the tests below. Write your observations and inferences in the spaces provided.

(a) Describe the appearance of **substance R**. (1 mark)

White/colourless crystalline solid

OR white/colourless crystals

NB: Penalise fully for contradictory colour.

(b) Place the remaining amount of substance R in a boiling tube. Add about 10 cm^3 of distilled water and shake well. Use 2 cm^3 portions for each of the tests below.

(i) To one portion, add aqueous ammonia dropwise until in excess.

Observation	Inference
✓ No white ppt (1mark)	Zn^{2+}, Al^{3+}, Pb^{2+}, Mg^{2+} absent, − ½ mk each for ~~any~~ each ion mentioned. ⇒ Penalise ½ mk for each contradictory ion to a max of 2 mks. (2mark)

HOS
B, W, G

IMBUGA
P, C, Y

JESSE - O, R, M

(ii) Describe a test that can be used to confirm the ions inferred in (b) (i) above from the materials provided.

Test	Expected Observations
(1mark)	(2 marks)

(iii) To a second portion, carry out the test describe in (b) (ii) above and record the observation and inferences in the spaces provided.

Observation	Inference
(½ mark)	(1 mark)

(c) To a third portion, add two drops of lead (II) nitrate and warm.

Observation	Inference
White ppt soluble on warming. ½ ½	Cl^-, Br^- 1 1
(1mark)	(2 marks)

3

ROSE

07

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3. You are provided with **substance Z**. Carry out the following tests and record your observations and inferences in the spaces provided.

(a) Place about one third of **substance Z** on a metallic spatula and burn it with a non luminous Bunsen burner flame.

Observation	Inference
- Burns with a non sooty flame / blue non sooty flame (1mark)	$>C=C<$ / $-C\equiv C-$ absent. Ignore: Alkane/alkynes absent (1 mark)

2

(b) Dissolve all of the remaining **substance Z** in about 10 cm^3 of distilled water in a boiling tube. Use about 2 cm^3 portions of the solution of **substance Z** in a test tube for each of the tests (b) (i), (ii), (iii) and (iv).

(i) Add about 1 cm^3 of acidified potassium dichromate(VI).

Observation	Inference
- Orange colour of acidified potassium dichromate(VI) does not turn green (1mark)	R-OH absent. (1mark)

2

(ii) Add about 1 cm^3 of acidified potassium manganate(VII).

Observation	Inference
- Purple acidified potassium manganate(VII) does not decolourise / does not turn colourless. (1 mark)	$>C=C<$ / $-C\equiv C-$ OR R-OH absent. (1mark)

3

MALALA = B, W, G, P, C OKOTH - Y, O, R, M

(iii) Add the piece of magnesium ribbon provided.

Observation	Inference
Effervescence / bubbles of a colourless gas produced. Accept for ½ mk Colourless gas produced. (1 mark)	H^+, H_3O^+, R-COOH. Reject: An acid / solution is an acid Accept for ½ mk -Alkanoic acid / carboxylic acid (1mark)

(2)

(iv) Determine the pH of the solution of **substance Z**.

Method used	Inference
-To about $2cm^3$ of solution Z, add 2 drops of universal indicator solution -Match the colour of the solution obtained with the pH chart and note the pH. - pH = 1 or pH = 2 (2 marks)	-Strongly acidic Reject: -Strong acid. -Acid solution (1mark)

(3)

(12)

M.G - B, W, G, P,

JERRY - C, Y, O, R, M

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