NANDI NORTH DISTRICT MOCK 2013

233/3 – CHEMISTRY PRACTICALS

CONFIDENTIAL INSTRUCTIONS TO SCHOOLS

Each candidate will require the following in addition to the apparatus and fittings in a Chemistry Laboratory:-

1. $100cm^2$ of solution Q.
2. Accurately weighed 0.4g of hydrated euthanedioic acid – Solution T.
3. One burette – 50ml.
4. One pipette – 25ml.
5. One pipette filler.
6. One 250ml volumetric flask.
7. One thermometer – 10^0C – 110^0C.
8. One boiling tube.
9. Six test-tubes in a rack.
10. One metallic spatula.
11. $400cm^2$ of distilled water.
12. Means of labeling.
13. About 1g of $NaHCO_3$ – Solid A.
14. $5cm^3$ of solution D.
15. About 1g of solid R.
16. Bunsen burner.

Access to:-

- 2M aqueous ammonia solution supplied with a dropper.
- Phenolphthalein indicator supplied with a dropper.
- 0.5M KI solution.
- 2M HCL
- 2M NaOH
- Zinc granules.
- Acidified $KMnO_4$ supplied with a dropper.
- Acidified $K_2Cr_2O_7$ supplied with a dropper.
- Solution D is a mixture of $Pb(NO_3)_2$ and $Cu(NO_3)_2$
- Solid R is a maleic acid.

NAME: ……. INDEX NO: …….

SCHOOL: ……..…… DATE : ……..

CANDIDATE'S SIGNATURE:…….

233/3
CHEMISTRY
PAPER 3
PRACTICAL
JULY / AUGUST 2014
TIME: 2 ¼ HOURS

NANDI NORTH SUB-COUNTY JOINT EVALUATION 2014

Kenya Certificate of Secondary Education (K.C.S.E.)
CHEMISTRY
PAPER 3
TIME: 2 ¼ HOURS

INSTRUCTIONS TO CANDIDATES

- Write your **Name, Index Number** and **School** in the spaces provided above.
- Answer **ALL** the questions in the spaces provided.
- 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.
- **ALL** working must be clearly shown.
- Mathematical tables and electronic calculators **may be** used.
- **All** answers must be written in English.

FOR EXAMINER'S USE ONLY

QUESTIONS	MAX SCORE	CANDIDATE'S SCORE
1	10	
2	14	
3	16	
TOTAL	**40**	

1. You are provided with:-
   - Solid T, hydrated ethanedioic acid $H_2C_2O_4.nH_2O$.
   - Solution Q, a 0.2M solution of sodium hydroxide.

   You are required to determine:
   (i) Solubility of solid T.
   (ii) The value of n is the formula $H_2C_2O_4.nH_2O$.

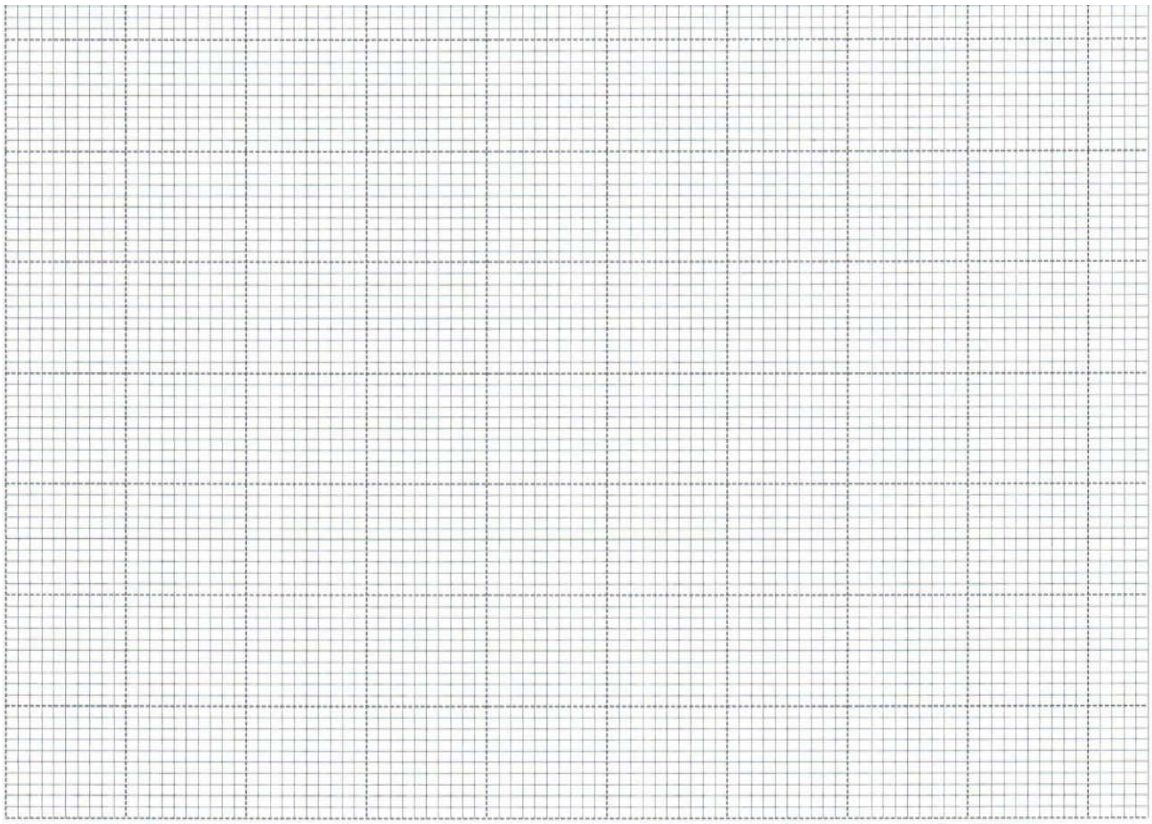
   Procedure I
   (i) Fill the burette with distilled water.
   (ii) Place solid T in the boiling tube.
   (iii) Transfer $4cm^3$ of distilled water from the burette into the boiling tube containing solid T. Heat the mixture while stirring with the thermometer to a temperature of 80^0.
   (iv) Allow the solution to cool while stirring with the thermometer. Record the temperature at which crystals start to form in the table 1 below.
   (v) Add a further $2cm^3$ of distilled water from the burette to the mixture. Repeat the procedure (iii) and (iv) above and record the crystallization temperature. Complete the table I below by adding the volumes of distilled water as indicated.
   (Preserve the contents of the boiling tube for procedure II)

   TABLE I

Volume of distilled water in boiling tube	**Crystallization temperature**	**Stability of solid T in 100g / water**
4		
6		
8		
12		

(6mks)

(a) On the grid provided, plot a graph of solubility of solid T (y-axis) against crystallization temperature. (3mks)



From the graph determine:

(i) Solubility of T at 55^0C (1mk)

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(ii) The temperature at which 80g of T dissolve in 100g of water. (2mks)

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Procedure II

- Transfer the contents of the boiling tube in procedure I to a clean 250ml volumetric flask. Add distilled water to the mark. Label the resulting solution T.
- Fill the burette with solution T. Pipette 25cm^3 of Q into a clean 250ml conical flask. Add 3 drops of phenolphthalein indicator.
- Titrate T against Q to an accurate end point. Record your results in the table II below.
- Repeat the experiment two more times and complete the table II below.

Table II

	I	II	III
Final burette reading cm^3			
Initial burette reading cm^3			
Volume of T used cm^3			

(4mks)

Calculate:

(a) Average volume of T used. (1mk)

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(b) (i) Moles of Q used. (1mk)

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(ii) Moles of T used. (1mk)

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(iii) Concentration of T in molar per dm^3. (1mk)

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(c) Determine the value of n in the formula $H_2C_2O_4.nH_2O$. (2mks)

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2. You are provided with solution D. You are required to carry out the tests on solution and record your observations and inferences in the space provided.

(i) To about $2cm^3$ of solution D, add 3 drops of potassium iodide solution.

Observations	Inference

(1mk) (1mk)

(ii) To the remaining portion in the boiling tube add $5cm^3$ of dilute hydrocholic acid and warm. Leave it to cool and filter.

Observation	Inference

(1mk) (1mk)

Divide the filtrate into two portions.

(iii) To one portion, add sodium hydroxide drop-wise until in excess.

Observation	Inference

(1mk) (1mk)

(iv) To 2nd portion, add aqueous ammonia drop-wise till in excess.

Observation	Inferences
(1mk)	(1mk)

(v) To 3rd portion, add zinc granules and warm.

Observation	Inferences
(1mk)	(1mk)

3. You are provided with solid R. Carry out the tests below and record your observations and inferences in the spaces provided.

(i) Place one third of solid R on a metallic spatula. Burn it in a non-luminous flame of the Bunsen Burner.

Observation	Inference
(1mk)	(1mk)

(ii) Place the remaining solid in a test-tube. Add about $6cm^3$ of distilled water and shake the mixture well.

Observation	Inference
(1mk)	(1mk)

Divide the solution into 3 portions.

(I) To about $2cm^3$ of the solution, add 1g of solid A; sodium hydrogen carbonate.

Observation	Inference
(1mk)	(1mk)

(II) To about $1cm^3$, add 3 drops of acidified chromate (vi) and warm.

Observation	Inferences
(1mk)	(1mk)

(III) In another $2cm^3$, add 2 drops of acidified potassium manganate (vii).

Observation	Inferences
(½mk)	(½mk)

NANDI NORTH SUB-COUNTY JOINT EVALUATION 2014
233/3 – CHEMISTRY PAPER 3 - MARKING SCHEME

1.

Experiment No.	**(i)**	**(ii)**	**(iii)**
Final burette reading (cm^3)	19.50	38.90	19.40
Initial burette reading (cm^3)	0.00	19.50	0.00
Volume of R used	19.50	19.40	19.40

Average = $\frac{19.50 + 19.40 + 19.40}{3}$

= $19.43cm^3$

Table
- Complete – 1mk
- Use decimal point – 1mk

Accuracy
- ± 0.1 (1mk)
- ± 0.2 (½)
- Beyond ± 0.2 (0mk)

Principles of average (1mk)
(average consistent value only)
Final accuracy (1mk)

- ± 0.1 of average litre (1mk)
- ± 0.2 of average litre (½ mk)
- Beyond ± 0.1 of average litre (0mk)

Calculations

(b) (i) Moles of R = $\frac{0.07 \times \text{average litre}}{1000}$

= Correct answer

(ii) $2HCl_{(aq)} + Ca(OH)_{2(aq)} \longrightarrow CaCl2_{(aq)} + H_2O(aq)$

Moles of $Ca(OH)_2$ = ½ x ans (i) above

= correct answer

(iii) 25cm3 …….. ans(ii) above.

Therefore $90cm^3$ = $\frac{90 \times \text{ans above (ii)}}{25cm}$

= correct ans

(iv) Mass of Ca(OH)2 = ans (iii) x 74

Correct ans.

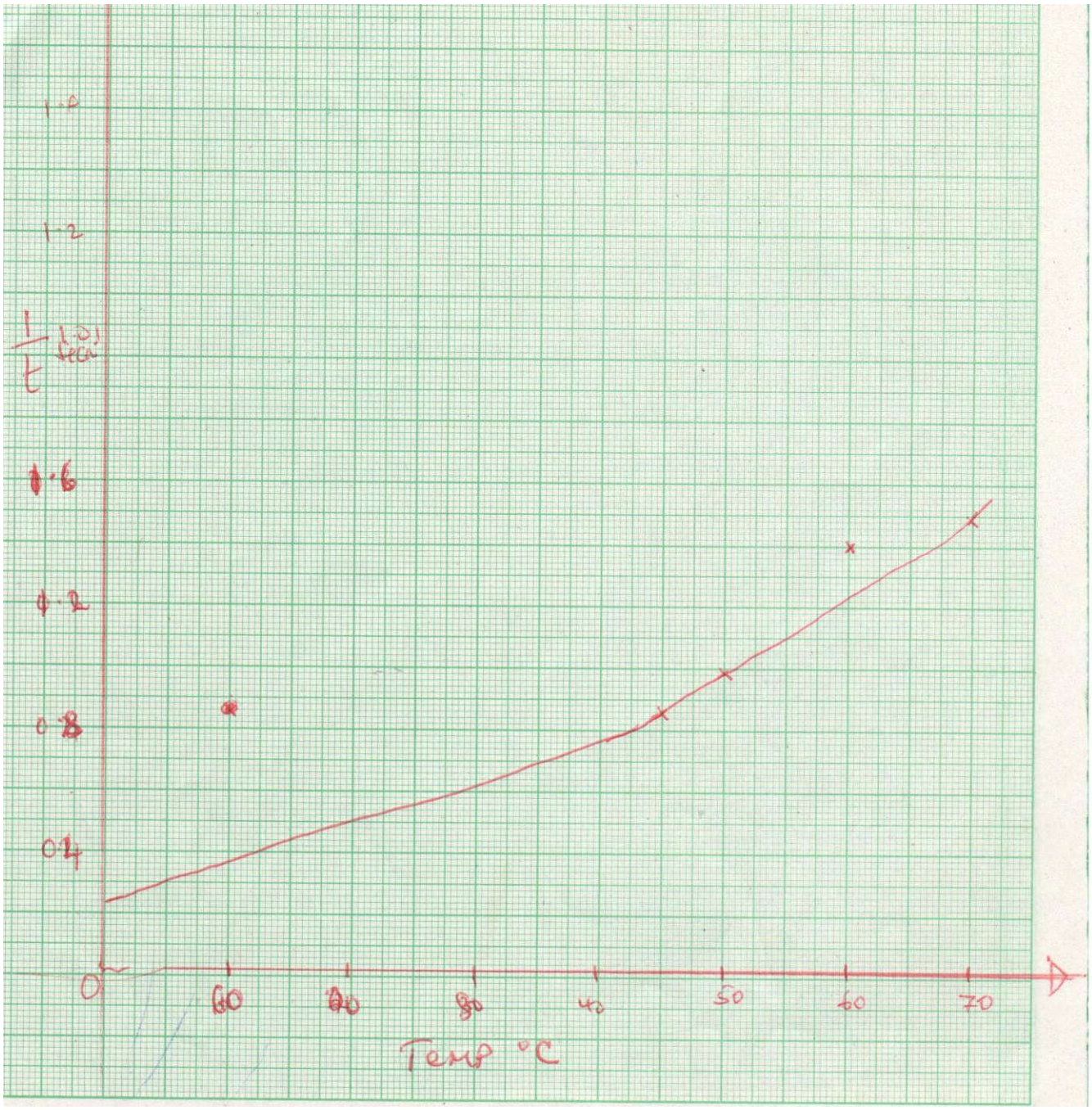
(c) Ans (iv) …… $90cm^3$

Therefore 100 ……. $\frac{100 \times \text{ans (iv)}}{90cm}$

= correct answer

2. (a)

Temperature before mixing	70	60	50	45
Temperature at which colour disappeared	54	50	47	43
Time at which colour disappeared	66	72	108	120
$^i/_t$ (s^{-1})	0.01515	0.01388	0.009259	0.00833
10^{-2}	1.515	1.388	0.9259	0.8333



Complete table – 4mks
Decimal place – ½mk
Accuracy – ½mk
Trends – 1mk

(6mks)

(i)

Observation	Inference
No white precipitate	Zn^{2+}, Pb^{2+}, Al^{3+} Ca^{2+} present. Accept Na^{+}, K^{+} present for ½ mk

(ii)

Observation	Inference
White precipitate	SO_4^{2-}, CO_3^{2-} or SO_4^{2-} Present NB: 3 mentioned – 1mk 2 mentioned – ½ mk 1 mentioned 0mk

(iii)

Observation	Inference
White precipitate dissolves	SO_3^{2-} or CO_3^{2-} SO_4^{2-} absent

(iv)

Observation	Inference
Acidified K_2Cr0_7 change from orange to green	SO_3^{2-} present

(b)

(i)

Observation	Inference
Bromine water is decoluorised. Accept Brown solution turns colourless	- C = C - I I - C=C-, C=C present penalize fully for any contradiction e.g. ROH, RCOOH. Accept Unsaturated organic cpds

(ii)

Observation	Inference
Purple acidified KMnO4 is decoloursied Reject: Colourless solution formed	I I - C = C - - C = C- ROH present

(iii)

Observation	Inference
Moist blue litmus paper turns red. Red litmus paper remained red.	H+/H_3O present Present or acidic substance Ignore: RCOOH / Carboxylic acid