

NANDI CENTRAL JOINT DISTRICT MOCK 2014
233/3 – CHEMISTRY PAPER 3

CONFIDENTIAL

Each candidate should have the following

1. Exactly 5.0g of solid A – Oxalic acid (supply in a stoppered boiling tube)/
2. Solution B – 0.3M Sodium Hydroxide solution (90cm³)
3. Burette 50ml
4. Pipette filler
5. Pipette 25ml
6. Thermometer (-10 – 110)⁰C
7. 10cm³ measuring cylinder.
8. 2 conical flasks.
9. 250ml volumetric flask.
10. Means of labeling.
11. Solid P – mixture BaCl₂ and CaO in the ratio of 3:1 (measure about 0.5g)
12. Solid Q – about 0.5g of maleic acid.
13. Source of heat
14. Metallic spatula
15. Test tube holder
16. Filter paper
17. Filter funnel
18. 6 test tubes
19. Boiling tube.

Accessible to the following:

- 2M Sodium hydroxide solution with dropper.
- 2M Hydrochloric acid with dropper.
- Methyl orange indicator with dropper.
- 4M sodium sulphate solution.
- Acidified potassium dichromate (VI) with a dropper.
- Acidified potassium manganate (VII) with a dropper.
- Bromine water – with a dropper.
- Phenolphthalein indicator.
- Distilled water.

NAME: INDEX NO:

SCHOOL: DATE :

CANDIDATE'S SIGNATURE:.....

233/3

CHEMISTRY

PAPER 3

PRACTICAL

JULY / AUGUST 2014

TIME: 2 ¼ HOURS

NANDI CENTRAL 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 and Index Number in the spaces provided above.
- Answer all the questions in the spaces provided.
- You are not allowed to start with 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.

FOR EXAMINER'S USE ONLY

QUESTIONS	MAX SCORE	CANDIDATE'S SCORE
1	22	
2	12	
3	06	
TOTAL	40	

Procedure II

- (a) (i) Transfer the contents of the boiling tube into a 250ml volumetric flask. Rinse both the boiling tube and the thermometer with distilled water and add the water to the volumetric flask. Add more distilled water to make up to the mark. Label this solution A. Fill a burette with solution A. Using a pipette and a pipette filler, place 25.0cm³ of solution B into a conical flask. Add three (3) drops of phenolphthalein indicator. Titrate the solution A with solution B until the pink colour fades. Record your readings in Table 2. Repeat the titration two more times and complete Table 2.

Table 2

	I	II	III
Final burette reading			
Initial burette reading			
Volume of solution A used (cm ³)			

- (ii) Calculate the:-

(a) Average volume of solution A used. (1mk)

(b) Number of moles of sodium hydroxide in 24cm³ solution pipette. (1mk)

(c) Number of moles of A in the average volume of solution given that solid a is a dibasic acid. (1mk)

(d) Relative formula mass of A. (3mks)

1 ONLY

1. You are provided with:-

- Solid T, hydrated ethanedioic acid $\text{H}_2\text{C}_2\text{O}_4 \cdot n\text{H}_2\text{O}$.
- Solution Q, a 0.2m solution of sodium hydroxide.

You are required to determine:

- (i) Solubility of solid T.
- (ii) The value of n in the formula $\text{H}_2\text{C}_2\text{O}_4 \cdot n\text{H}_2\text{O}$.

Procedure I

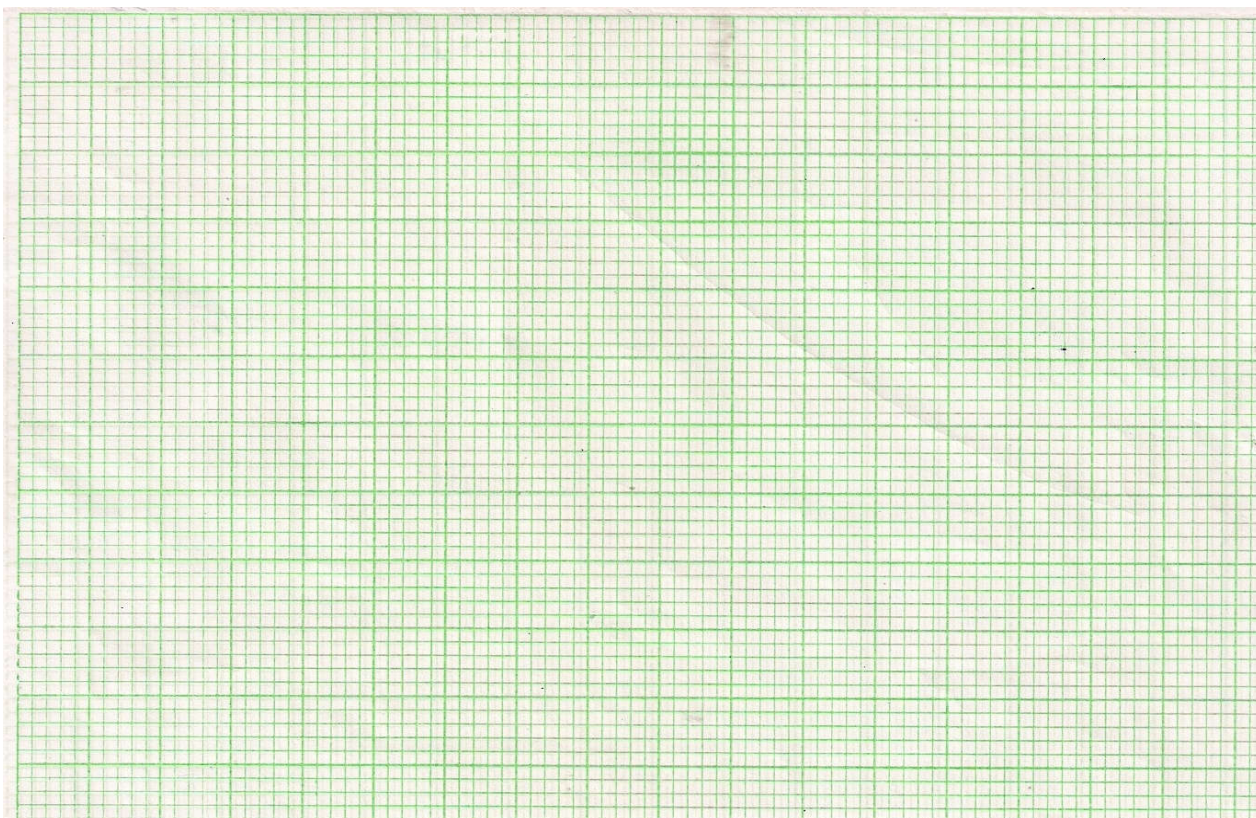
- (i) Fill the burette with distilled water.
- (ii) Place solid T in the boiling tube.
- (iii) Transfer 4cm^3 of distilled water from the burette into the boiling tube containing solid T. Heat the mixture while stirring with the thermometer to a temperature at which crystals start to form in the table 1 below.
- (iv) Add a further 2cm^3 of distilled water from the burette to the mixture. Repeat the procedure (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		

- (a) On the grid provided, plot a graph of solubility of solid T (y-axis) against crystallization temperature. (6mks)

(3mks)



From the graph determine:

(i) Solubility of T at 55°C (1mk)

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

Procedure II

- Transfer the contents of the boiling tube in procedure I to a clean 200ml 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 200ml 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)

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

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

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

(c) Determine the value of n in the formula $\text{H}_2\text{C}_2\text{O}_4 \cdot n\text{H}_2\text{O}$. (2mks)

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 hydrochloric 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 ammoniac drop-wise till in excess.

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 6cm³ of distilled water and shake the mixture well.

Observation	Inference
(1mk)	(1mk)

Divide the solution into 2 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).

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233/3 – CHEMISTRY PAPER 3 - MARKING SCHEME

Table I

(6 marks)

Volume of water in the boiling tube (cm ³)	4	6	8	10
Temperature at which crystals of solid A first appear (°C)	73	62	55	49
Solubility of solid A	125.0	83.3	62.5	50.0

Row II

(a) Complete table.

(2 marks)

- Complete table with four readings (2 marks)
- Incomplete table with 3 readings (1 ½ marks)
- Incomplete table with 2 readings (1 mark)
- Incomplete table with one reading (0 mark)

Conditions

- Penalize ½ mark @ for temperature reading above 76.5°C or below 10°C to a maximum of (1 mark)
- (b) Use of decimals. (1 mark)
- Accept only if ALL readings are recorded consistently to either as whole numbers to 1 d.p of '0' or 5 otherwise penalize fully.
- (c) Accuracy (½ mark)
- * Compare the candidates 1st temperature reading (at 4cm³) to the S.V if within $\pm 2^\circ\text{C}$ award ½ mark otherwise penalize fully
- (d) Trend (½ mark)
- * Award ½ mark for continuous drop in temperature readings otherwise penalize fully.

ROW III

- Award ½ mark for @ value of solubility correctly calculated, otherwise penalize fully.
- Indicate each entry by ticking (✓) or crossing (X).
- Ignore units (g) if attached to correct answer otherwise penalize if wrong units are used to a maximum of ½ mark.

