

THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL
CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

032/2A

CHEMISTRY 2A
ALTERNATIVE A PRACTICAL
(For Both School and Private Candidates)

TIME: 2:30 Hours

Tuesday, 13th October 2009 a.m.

Instructions

1. This paper consists of **three (3)** questions.
2. Answer **two (2)** questions including question **number 1**.
3. Qualitative Analysis Guidance Pamphlets may be used after a thorough check by the Supervisor.
4. Electronic calculators and cellular phones are **not** allowed in the examination room.
5. Write your **Examination Number** on every page of your answer booklet(s).
6. The following constants may be used:

Atomic masses : H = 1, C = 12, O = 16, Na = 23, Cl = 35.5

1 litre = 1 dm³ = 1000 cm³.

This paper consists of 3 printed pages.

1. You are provided with the following solutions:

Solution WW containing 4.38 g of pure hydrochloric acid per dm^3 of solution.

Solution ZZ containing 14.30 g of hydrated sodium carbonate $[\text{Na}_2\text{CO}_3 \cdot x \text{H}_2\text{O}]$ per dm^3 .

Methyl orange indicator.

Procedure:

Put solution WW in the burette. Pipette 20 cm^3 (or 25 cm^3) of solution ZZ, into a titration flask. Add about three to four drops of methyl orange indicator into the titration flask. Titrate solution WW against solution ZZ until the end point is reached. Note the burette reading. Repeat the procedure to obtain three more readings. Record your results as shown in the following Table.

(a) Table of results

(i) Burette readings

Titration	Pilot	1	2	3
Final reading (cm^3)			26	
Initial reading (cm^3)				
Volume used (cm^3)				

(ii) The volume of pipette used was _____ cm^3 .

(iii) The volume solution WW needed for complete neutralization was _____.

(iv) The colour change at the end point was from _____ to _____.

(b) Write down a balanced chemical equation for the reaction between solution ZZ and WW.

(c) Calculate the molarity of

(i) solution WW

(ii) solution ZZ.

(d) Calculate the value of x in the formula $(\text{Na}_2\text{CO}_3 \cdot x \text{H}_2\text{O})$. (25 marks)

2. Sample M is a simple salt containing **one** cation and **one** anion. Carry out carefully the experiments described in the following table. Record all your observations and appropriate inferences to identify the ions present in M.

S/ N	Experiment	Observation	Inference
(a)	Appearance of sample M		
(b)	Place a spatulaful of sample M in a test-tube and heat while rotating the tube. Test for any gas(es) evolved.		
(c)	Place a spatulaful of sample M in a test tube and add dilute hydrochloric acid. Test for any gas(es) evolved. Add more of the acid until the test tube is half full. Divide the solution into three portions and then do the following:		
	(i) add sodium hydroxide solution dropwise and then in excess to the first portion.		
	(ii) add a few drops of potassium iodide solution to the second portion.		
	(iii) add ammonium hydroxide solution dropwise till excess to the third portion		

Conclusion

The cation in sample M is _____ and the anion is _____. (25 marks)

3. Substance V is a simple salt containing **one** cation and **one** anion. Using systematic qualitative analysis procedures carry out tests on V and make appropriate observations and inferences to identify cation and anion in V. Record your experiments, observations and inferences as shown in the following table:

Experiment	Observation	Inference

Conclusion

The cation in sample V is _____ and the anion is _____. (25 marks)