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

032/2B

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

TIME: 2 Hours 30 Minutes *Thursday November 13, 2003 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 are **not** allowed in the examination room.
5. Cellular phones are **not** allowed in the examination room.
6. Write your Examination Number on every page of your answer booklet(s).
7. You may use the following constants.

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

   Volume: 1 litre = 1 dm^3 = 1000 cm^3.

1. You are provided with the following solutions:

1.1 Solution P containing 28.60 g per litre of impure sodium carbonate.

1.2 Solution Q containing 0.20 mole of hydrochloric acid in a litre of solution.

1.3 Methyl orange as an indicator.

PROCEDURE

Put the acid solution in a burette. Pipette 25 cm^3 (or 20 cm^3) of P into a titrating flask.
Add a few drops of methyl orange indicator in the titrating flask containing solution P. Titrate solution P against the acid solution, until the end point is reached. Repeat this procedure until three titre values are obtained and record your titration results in a tabular form as shown below.

(a) Table of results:

TITRATION	PILOT	1	2	3
FINAL READING (cm^3)				
INITIAL READING (cm^3)				
VOLUME USED (cm^3)				

(i) Volume of pipette used ..... cm^3.

(ii) The mean titre is ....cm^3.

(iii) Summary:

..... cm^3 of solution P required ..... cm^3 of solution Q for complete reaction.

(b) Write balanced equation for the above neutralization reaction.

(c) Calculate the molarity of P

(i) in moles per litre

(ii) in grams per litre.

(d) (i) Calculate the amount of impurity in g per litre.

(ii) If this impurity was due to water of crystallization in the salt, calculate the number of moles of water in one mole of sodium carbonate crystals.

(25 marks)

2. Sample R is a simple salt containing ONE cation and ONE anion. Carry out carefully the experiments described below and record all your observations and inferences in the table. Identify the cation and anion present in the sample.

	EXPERIMENT	OBSERVATION	INFERENCE
2.1	Appearance of R.		
2.2	Heat some of sample R in a hard glass test tube gently and then strongly.		
2.3	Add concentrated sulphuric acid on sample R.		
2.4	Dissolve some of R in water		
2.5	To some of the solution of R in water add sodium hydroxide dropwise until excess.		
2.6	To another portion of the solution of R add ammonium hydroxide dropwise until excess.		
2.7	To a third portion of the solution of R add potassium ferrocyanide solution until excess.		
2.8	To the fourth portion of the solution of R add freshly prepared solution of iron (II) sulphate. Then carefully add concentrated sulphuric acid down the sides of the test tube.		

Conclusion

Cation in R is .....

Anion in R is .....

R is ..... **(25 marks)**

3. Sample X contains ONE anion and ONE cation. Using systematic qualitative analysis procedures, carry out tests on X and make observations and inferences, hence identify the anion and cation present in sample X..Record your experiments, observations and inferences in a tabular form as shown below.

EXPERIMENT	OBSERVATION	INFERENCE

Conclusion

The cation present in X is ..... and the anion present in X is .....

(25 marks)