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 Hours 30 Minutes *Wednesday November 12, 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. The following constants may be used:

   Atomic masses:

   Cl = 35.5, H = 1, S = 32, O = 16, Na = 23, N = 14

   1 litre = 1 dm^3 = 1000 cm^3

1. You are provided with

1.1 solution K containing 8.94 g/dm^2 of HQ acid solution

1.2 solution M containing 2.0 g of sodium hydroxide in 0.5 dm^3 of the solution

1.3 methyl orange indicator.

Procedure

Put solution K into the burette. Pipette 20 cm^3 (or 25 cm^3) of solution M in a titration flask. Add two drops of methyl orange indicator. Titrate solution M against solution K until a colour change is observed. Repeat the procedure to obtain three more readings and record your results in a tabular form as shown below:

(a) Table of results

Titration number	Pilot	1	2	3
Initial reading (cm^3)				
Final reading (cm^3)				
Titre volume (cm^3)				

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

(ii) Summary: ..... cm^3 of solution M required ..... cm^3 of K for complete reaction.

(b) Write a balanced chemical equation of the reaction between solution M and K.

(c) Calculate the
(i) molarity of solution M
(ii) molarity of solution K
(iii) molar mass of HQ
(iv) atomic mass of Q
(v) what is element Q in the acid HQ? (25 marks)

2. Sample S is a simple salt containing ONE cation and ONE anion. Carry out the experiments described below carefully and record ALL observations and appropriate inferences. Identify the CATION and ANION present in the salt sample S.

	EXPERIMENT	OBSERVATION	INFERENCE
(a)	Appearance		
(b)	Place a spatulaful of sample S in a test tube and heat while rotating the test tube. Test for any gas(es) evolved.		
(c)	(i) Place a spatulaful of sample S in a test tube and add dilute HCl.acid		
	(ii) Heat the contents of the above test tube and then allow them to cool to room temperature		
	(iii) To the sample add concentrated hydrochloric acid in a test tube.		
(d)	Place a spatulaful of sample S in a test tube and add dil nitric acid. Test for any gas(es) evolved.		
(e)	Divide the resulting solution in (d) above into two parts and (i) to one part add potassium dichromate solution.		
	(ii) to the second part add potassium iodide solution.		
(f)	Warm the contents of (e)(ii) above in a test tube and then allow them to cool.		

Conclusion

3. Substance P is a simple salt containing ONE cation and ONE anion. Using systematic qualitative analysis procedures, carry out tests on P and make appropriate observations and inferences to identify the CATION and ANION in the sample P.

EXPERIMENT	OBSERVATION	INFERENCE

Conclusion

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

(25 marks)