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

032/2

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

TIME: 2 Hours 30 Minutes **2006/10/18 a.m.**

Instructions

1. This paper consists of five (5) questions.
2. Answer all questions.
3. All questions carry equal marks.
4. Qualitative Analysis Guidance Pamphlets may be used after a thorough check by the supervisor.
5. Electronic calculators are **not** allowed in the examination room.
6. Cellular phones are **not** allowed in the examination room.
7. Write your **Examination Number** on every page of your answer booklet(s).
8. The following constants may be used:
   Atomic masses: H = 1, O = 16, Cl = 35.5 , K = 39.
   1 litre = 1 dm^3 = 1000 cm^3.

This paper consists of 4 printed pages.

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1. The diagram in figure 1 below represents the apparatus used in demonstrating fractional distillation of miscible liquids, which are ethanol and water.

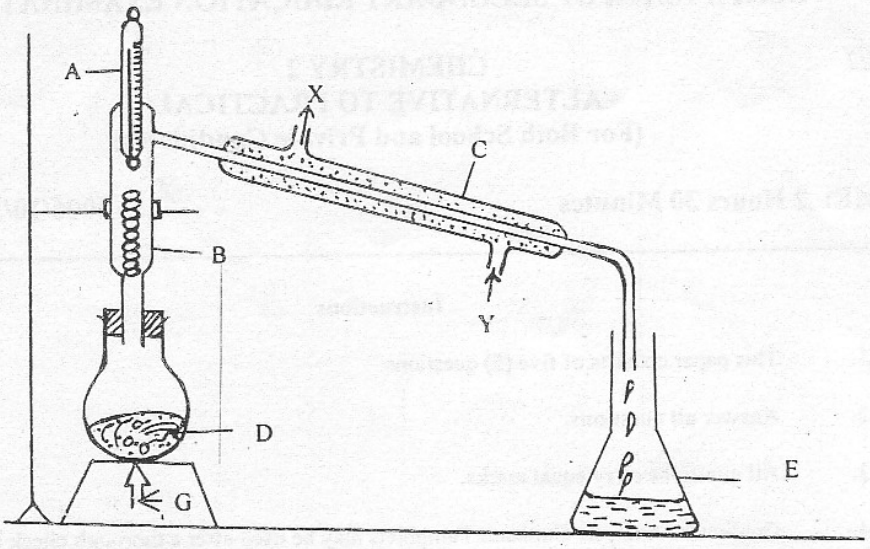

Fig. 1

(a) What do the letters A, B, C, D, E, G, X and Y in the diagram represent?
(b) What is the function of C in the experiment?
(c) Differentiate between fractional distillation and distillation.
(d) Which liquid from the ethanol-water mixture will be present in the first drop of the distillate collected in E?

2. 20 cm^3 portions of POH solution were titrated against 0.10 M HCl using methyl orange indicator. The burette readings obtained were recorded in the table as shown below.

Experiment	Pilot	1	2	3
Final burette reading $(cm)^3$	25.10	49.10	27.00	25.30
Initial burette reading $(cm)^3$	0.00	24.10	2.00	0.20
Volume used $(cm)^3$				

(a) (i) Complete the table by filling in the values of the titre volume in each column.
(ii) Calculate the mean titre volume in cm^3.

(b) Write a balanced chemical equation for the reaction between POH and HCl.

(c) If POH solution was made by dissolving 1.75g of POH in water to make 250 cm^3 of the solution, what is the
(i) molar mass of POH?
(ii) atomic mass of P?

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3. The following table shows the investigation of the amount of substance liberated in electrolysis by different quantities of electricity when a constant current was passed. The electrolysis was done by using copper sulphate solution and platinum electrodes.

Current/A	Times/s	Quantity of electricity/C	Mass of copper deposited/g
0.21		189	
0.21		378	
0.21		576	
0.21		756	

(a) Complete the table by filling in the columns of time and mass of copper deposited.

(b) Plot the graph of mass of copper deposited against quantity of electricity.

(c) From the graph, explain how the amount of copper deposited varies with the quantity of electricity passed.

4. (a) State Le-Chatelier's principle.

(b) The equation for the dissociation of calcium carbonate is

$$CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g) \quad \Delta H = +175.5 \text{ k Jmol}^{-1}.$$

What will be the effect on the proportion of $CaCO_3$ in the equilibrium mixture if
(i) the temperature is increased?
(ii) the pressure is increased?
(iii) carbon dioxide is removed?

5. A series of qualitative analysis experiments were carried out on sample Z in order to identify one cation and one anion. Complete the table below by filling in the inference column.

	Experiment	Observation	Inference
(a)	Appearance of sample Z.	White amorphous powder.	
(b)	To solid sample Z in a test tube distilled water was added and stirred.	Insoluble in water even after stirring.	
(c)	Solid sample Z in a dry test tube was heated first gently and then strongly. The gas evolved was tested.	Colourless gas which turned lime water milky was evolved. Solid residue which was yellow when hot and white when cold remained.	

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(d)	To a little amount of sample Z in a test tube dilute nitric acid was added , the gas evolved tested and the solution obtained was divided into three portions. To the	Vigorous effervescence, solid sample Z dissolved in dilute nitric acid. The colourless gas evolved turned lime water milky.	
	(i) first portion of the solution, sodium hydroxide solution was added drop wise then in excess.	White gelatinous precipitate soluble in excess NaOH.	
	(ii) second portion of the solution, ammonia solution was added drop wise then in excess.	White precipitate soluble in excess ammonia solution.	
	(iii) third portion of the solution, potassium ferrocyanide solution was added.	White precipitate was formed.	

Conclusion

The cation in Z is _____ and the anion is_____.

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