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

032/2C   **CHEMISTRY 2C**

(ACTUAL PRACTICAL C)

(For Both School and Private Candidates)

Time : 2:3 Hours   **ANSWERS**   **Year : 2020**

Instructions

1. This paper consists of **two (2)** questions. Answer all questions.

2. Each question carries **twenty five (25)** marks.

3. Communication devices and any unauthorised materials are **not** allowed in the examination room.

4. Write your **Examination Number** on every page of your answer booklet(s).

Prepared by Maria Marco for TETEA

1. Determine an unknown univalent element in a carbonate…

(a) Calculate the average titre volume.

Suppose three titre readings obtained were 24.6, 24.5 and 24.7 cm³.

Average titre = (24.6 + 24.5 + 24.7) ÷ 3 = 24.6 cm³.

(b) Find the volume of the acid which was required to complete neutralization.

The average titre volume (24.6 cm³) of nitric acid was required to neutralize 25 cm³ of carbonate solution.

(c) Write balanced chemical equation for the reaction.

$X_2CO_3(aq) + 2HNO_3(aq) \rightarrow 2XNO_3(aq) + H_2O(l) + CO_2(g)$.
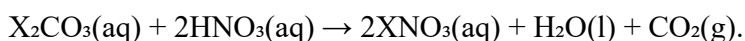
(d) Calculate the molarities of the acid and base.

For HNO_3:

Mass given = 12.6 g in 1 dm³.

Molar mass = 63 g/mol.

Moles = 12.6 ÷ 63 = 0.2 mol/dm³.

For X_2CO_3:

Mass = 2.65 g in 250 cm³ = 10.6 g in 1 dm³.

Molar mass = unknown (M).

Molarity = 10.6 ÷ M mol/dm³.

From titration:

Moles HNO_3 in 24.6 cm³ = 0.2 × 24.6 ÷ 1000 = 0.00492 mol.

Mole ratio HNO_3:X_2CO_3 = 2:1.

So moles of X_2CO_3 in 25 cm³ = 0.00492 ÷ 2 = 0.00246 mol.

Molarity of base = 0.00246 × (1000 ÷ 25) = 0.0984 mol/dm³.

(e) Determine the molar mass of the univalent element carbonate and name of the univalent element.

Molar mass = 10.6 ÷ 0.0984 = 107.7 g/mol ≈ 108 g/mol.

X_2CO_3 = (2M + 60).

So 2M + 60 = 108.

2M = 48.

Find this and other free resources at: https://maktaba.tetea.org

Prepared by Maria Marco for TETEA

M = 24.

Univalent element = Sodium (Na).

(f) Write the chemical formula of the univalent element carbonate.

The carbonate is Na_2CO_3.

2. Study the reaction between sodium thiosulphate and hydrochloric acid at different temperatures…

(a) Complete filling the table.

Volume of A_1 (cm³)	Volume of A_2 (cm³)	Temperature of A_1 (°C)	Time (s)
30	30	40	140
30	30	50	110
30	30	60	80
30	30	70	60
30	30	80	45

(ii) State what does the shape of the graph indicate.

It indicates that the volume of A_1 was kept constant while time varied with temperature.

(c) Give reason why did the letter X disappear.

It disappeared because sulphur precipitate formed during the reaction made the solution cloudy.

(d) Write the electronic configuration of the product which causes the solution to be cloudy (sulphur).

Sulphur atomic number = 16.

Electronic configuration = $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^4$.

(e) Write the ionic equation for the reaction between N_1 and N_2.

$S_2O_3^{2-}(aq) + 2H^+(aq) \rightarrow SO_2(g) + S(s) + H_2O(l)$.
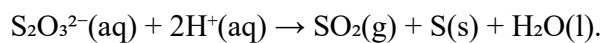
(f) Plot a graph of volume of A_1 against the rate of the reaction.

Since volume is constant, graph is a horizontal line.

(g) State why N_3 was added to N_1.

N_3 (distilled water) was added to dilute sodium thiosulphate solution to vary its concentration while keeping the total volume constant.

Prepared by Maria Marco for TETEA