THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

032/2B **CHEMISTRY 2C**

(ACTUAL PRACTICAL B)

(For Both School and Private Candidates)

Time : 2:3 Hours **ANSWERS** **Year : 2021**

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).

1. You are given two unlabeled beakers containing solution of an acid and an alkali…

(a) What was the colour of phenolphthalein indicator (POP) in solution A and C, respectively?
In solution A (alkali), POP was pink.
In solution C (acid), POP was colourless.

(b) Titrate the acid in a burette against the alkali in a conical flask using two drops of phenolphthalein as an indicator. Repeat the process and obtain three titre values. Record the results in a tabular form.
[Expected titre values around 24.5 cm^3, 24.6 cm^3, and 24.4 cm^3 with average 24.5 cm^3].

(c) What was the volume of the pipette used?
The volume of the pipette used was 25 cm^3.

(d) What was the colour change at the end point?
The colour changed from pink to colourless.

(e) Calculate the average volume of the acid used.
Average volume of acid used = (24.5 + 24.6 + 24.4) ÷ 3 = 24.5 cm^3.

(f) Showing your procedures clearly, determine the percentage purity of the sulphuric acid.
Moles of KOH in 25 cm^3 solution:
Molar mass of KOH = 56 g/mol.
Concentration = 5.6 g/dm^3 ÷ 56 = 0.1 mol/dm^3.
Moles = 0.1 × (25 ÷ 1000) = 0.0025 mol.

Reaction: $H_2SO_4 + 2KOH \rightarrow K_2SO_4 + 2H_2O$.
From the equation, moles of H_2SO_4 = 0.0025 ÷ 2 = 0.00125 mol.

Concentration of H_2SO_4 = moles ÷ volume = 0.00125 ÷ (24.5 ÷ 1000) = 0.051 mol/dm^3.
Mass = mol × molar mass = 0.051 × 98 = 5.0 g/dm^3.

Given concentration was 6.0 g/dm^3.
Percentage purity = (5.0 ÷ 6.0) × 100 = 83.3%.

2. Determine the effect of concentration on the rate of chemical reaction…

(a) Complete the table by filling the empty column.

Conc. of QQ (g/dm^3)	Volume of QQ (cm^3)	Volume of distilled water (cm^3)	Volume of TT (cm^3)	Time for mark X to disappear (sec)
20.066	50	0	10	30
16.432	40	10	10	35
12.324	30	20	10	45
8.216	20	30	10	55
4.108	10	40	10	70

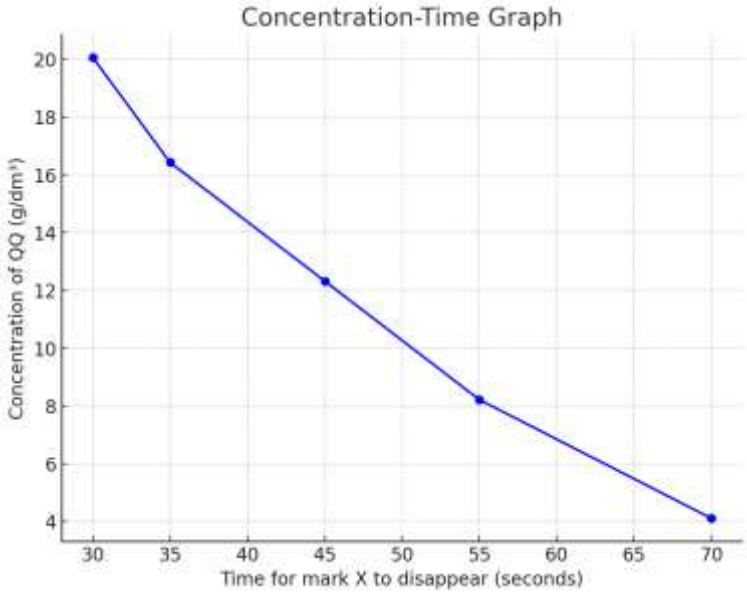
(b) Write a balanced chemical equation for the reaction between sodium thiosulphate and hydrochloric acid.

$Na_2S_2O_3(aq) + 2HCl(aq) \rightarrow 2NaCl(aq) + SO_2(g) + S(s) + H_2O(l)$

(c) Which substance from the chemical reaction in part (b) produced obscured the mark X?

The precipitate of sulphur (S) obscured the mark X.

(d) Use the data in the experiment table to draw a concentration-time graph, by allocating time on x-axis and concentration on y-axis.



(e) What conclusion can you draw from the concentration-time graph and regarding the disappearance of mark X?

The higher the concentration of sodium thiosulphate solution, the faster the reaction occurs, meaning the mark X disappears more quickly. This shows that concentration increases the rate of reaction.