THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL

CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

032/2B **CHEMISTRY 2B**

(ACTUAL PRACTICAL B)

(For Both School and Private Candidates)

Time: 2:30 Hours **ANSWERS** **Year: 2017**

Instructions

1. This paper consists of two questions.

2. Answer all questions.

1. You are provided with the following:
S: 0.125 M sulphuric acid
T: A solution made by dissolving 15 g of impure sodium hydroxide (NaOH) in 1 dm^3 of solution

(a)
(i) Titrated 25 cm^3 of T against S.
(ii) Assume the average volume of acid used was 20.00 cm^3
(iii) 25 cm^3 of T required 20.00 cm^3 of S
(iv) Colour change at endpoint: Yellow to orange-red

(b) Write a balanced chemical equation for the reaction taking place between S and T.

$H_2SO_4(aq) + 2NaOH(aq) \longrightarrow Na_2SO_4(aq) + 2H_2O(l)$

(c) Calculate the percentage purity and percentage impurity of sodium hydroxide.

Moles of acid = 0.125 × 0.020 = 0.0025 mol
Mole ratio = 1:2, so NaOH = 0.0025 × 2 = 0.005 mol
Volume of NaOH = 25 cm^3 = 0.025 dm^3
Molarity of NaOH = 0.005 ÷ 0.025 = 0.2 mol/dm^3
In 1 dm^3: moles = 0.2 mol
Mass = 0.2 × 40 = 8.0 g
Percentage purity = (8.0 ÷ 15.0) × 100 = 53.33 percent
Percentage impurity = 100 - 53.33 = 46.67 percent

2. (a) Complete filling Table 1.

Volume of M (cm^3)	Volume of water (cm^3)	Volume of N (cm^3)	Conc. of M (mol/dm^3)	Time (s)	Rate (1/t) (s^{-1})
50	0	10	0.2	20	0.0500
40	10	10	0.16	25	0.0400
30	20	10	0.12	33	0.0303
20	30	10	0.08	45	0.0222
10	40	10	0.04	68	0.0147

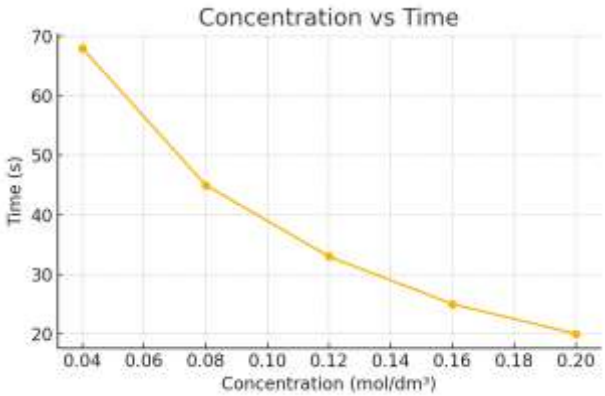
(b) Write a balanced chemical equation for the reaction between M and N.

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

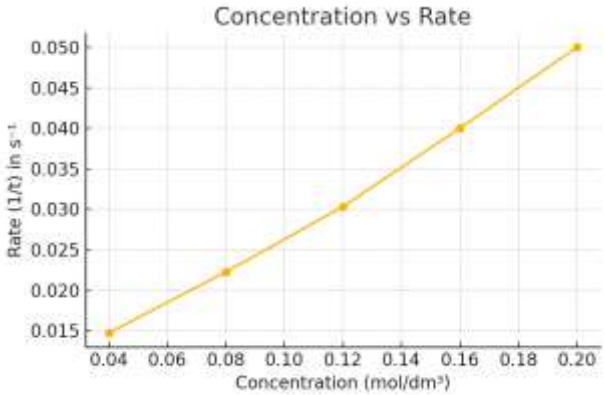
(c) What substance was produced during the reaction which obscured the cross?

Sulphur (S) was the substance that made the solution cloudy and obscured the cross.

(d) Use the data in the Table 1 to draw the following graphs:
(i) Concentration-time graph



(ii) Concentration-rate graph



(e) What conclusion can you draw from the results of the experiment?

As the concentration of sodium thiosulphate (M) increased, the reaction rate increased. This demonstrated that higher concentration leads to more frequent collisions and faster reactions.

3. Sample H qualitative analysis

S/n	Experiment	Observation	Inference
a	Observe sample H	White crystalline solid	Ionic compound
b	Add water and heat	Dissolved completely	Soluble salt
c	Add dilute HCl	Effervescence	Presence of CO_3^{2-}
d	Add concentrated H_2SO_4	More effervescence	CO_3^{2-} confirmed
e(i)	Add NaOH	White precipitate	Zn^{2+} or Al^{3+}

e(ii)	Add ammonia solution	White precipitate soluble	Zn^{2+} present
e(iii)	Add $K_4Fe(CN)_6$	No significant change	No Fe^{2+} present
e(iv)	Add $Pb(CH_3COO)_2$	White precipitate	CO_3^{2-} confirmed

Conclusion:
(i) The cation in sample H is Zn^{2+}
(ii) The anion in sample H is CO_3^{2-}