

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.

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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 dm³ of solution

(a)

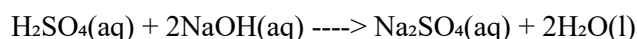
(i) Titrated 25 cm³ of T against S.

(ii) Assume the average volume of acid used was 20.00 cm³

(iii) 25 cm³ of T required 20.00 cm³ 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.



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

Moles of acid = $0.125 \times 0.020 = 0.0025 \text{ mol}$

Mole ratio = 1:2, so NaOH = $0.0025 \times 2 = 0.005 \text{ mol}$

Volume of NaOH = 25 cm³ = 0.025 dm³

Molarity of NaOH = $0.005 \div 0.025 = 0.2 \text{ mol/dm}^3$

In 1 dm³: moles = 0.2 mol

Mass = $0.2 \times 40 = 8.0 \text{ g}$

Percentage purity = $(8.0 \div 15.0) \times 100 = 53.33 \text{ percent}$

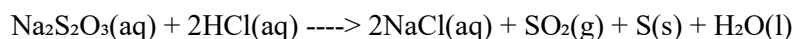
Percentage impurity = $100 - 53.33 = 46.67 \text{ percent}$

2. (a) Complete filling Table 1.

| Volume of M (cm³) | Volume of water (cm³) | Volume of N (cm³) | Conc. of M (mol/dm³) | 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.

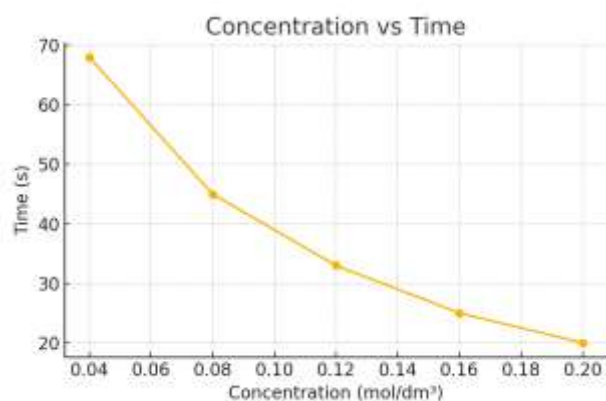


(c) What substance was produced during the reaction which obscured the cross?

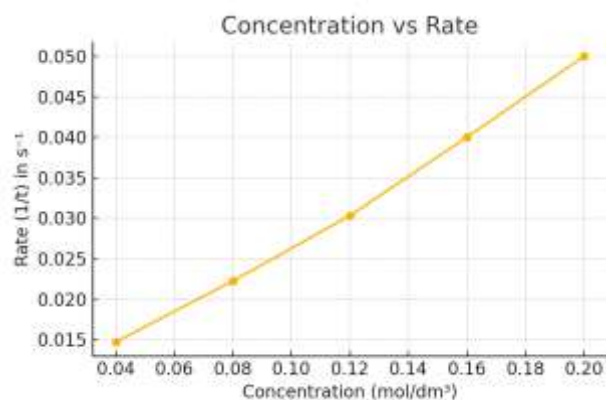
Sulphur (S) was the substance that made the solution cloudy and obscured the cross.

(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 ₂ SO 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 $\text{K}_4\text{Fe}(\text{CN})_6$	No significant change	No Fe^{2+} present	
e(iv) Add $\text{Pb}(\text{CH}_3\text{COO})_2$	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-}