

**THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL OF TANZANIA
DIPLOMA IN SECONDARY EDUCATION EXAMINATION**

732/2B

**CHEMISTRY 2B
(ACTUAL PRACTICAL B)**

Time: 3 Hours

ANSWERS

Year: 2017

Instructions.

1. This paper consists of **three (3)** questions.
2. Answer **all** questions
3. Question number 1 carries 20 marks and the rest carry 30 marks.
4. Cellular phones are **not** allowed in the examination room.
5. Write your **examination Number** on every page of your answer booklet(s).

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1. You are provided with:

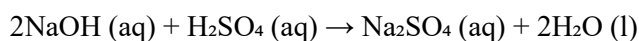
Q1: Sulfuric acid, 0.05 mol/dm³

Q2: Sodium hydroxide, 2.00 g in 500 cm³

Phenolphthalein indicator

(a) The colour change observed during titration is **pink to colourless**. Phenolphthalein is pink in basic solution and becomes colourless when the acid neutralizes the base.

(b) Balanced chemical equation:



(c) Molar mass of NaOH = 40 g/mol

Moles of NaOH in 2.00 g = $2.00 \div 40 = 0.05 \text{ mol}$

Volume of solution = 500 cm³ = 0.5 dm³

Concentration = $0.05 \div 0.5 = \mathbf{0.1 \text{ mol/dm}^3}$

Moles in 25.0 cm³ = $0.1 \times 25 \div 1000 = \mathbf{0.0025 \text{ mol}}$

(d) From the balanced equation:

2 mol NaOH react with 1 mol H₂SO₄

So, moles of H₂SO₄ = $0.0025 \div 2 = 0.00125 \text{ mol}$

Volume of Q1 = $0.00125 \text{ mol} \div 0.05 \text{ mol/dm}^3 = \mathbf{0.025 \text{ dm}^3} = \mathbf{25.0 \text{ cm}^3}$

(e) Average titre = **25.0 cm³** (as assumed)

(f) The calculated titre is consistent with the molar ratio and known concentrations, confirming that the solution **Q1** has a concentration of **0.05 mol/dm³**. The results are **valid and consistent**.

2. You are given:

R1: sodium thiosulphate

R2: hydrochloric acid

(a) The mark "X" disappears because the reaction produces **sulfur**, which forms a **cloudy precipitate** that obscures the mark.

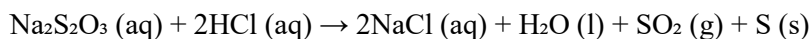
(b) Completed table:

Exp	R1 (cm ³)	Water (cm ³)	R2 (cm ³)	Time (s)
1	10	0	10	20
2	8	2	10	27

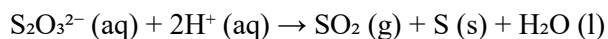
3	6	4	10	36
4	4	6	10	52
5	2	8	10	74

(c)

Balanced chemical equation:



Ionic equation:



(d) As the concentration of R1 decreases (more water is added), the **rate of reaction decreases**. This is evident from the **increased time** it takes for the mark to disappear. A more concentrated solution leads to more frequent and effective collisions.

(e) Apart from increasing concentration, **increasing temperature** can also speed up the reaction by giving particles more kinetic energy and increasing the frequency of collisions.

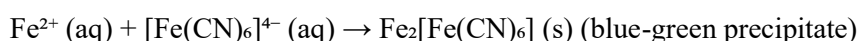
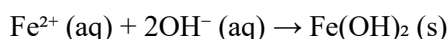
3. You are given salt **M**, suspected to be an iron compound.

(i) Table of observations and inferences:

Test	Observation	Inference
Appearance	Green crystalline solid	Likely Fe^{2+} salt
Heating	Turns brown, gas evolved	Oxidation to Fe^{3+} , possible water loss
NaOH (few drops)	Green precipitate	Fe^{2+} present
NaOH (excess)	No change	$\text{Fe}(\text{OH})_2$ is insoluble
Ammonia (few drops)	Green precipitate	Confirms Fe^{2+}
Ammonia (excess)	No change	Confirms Fe^{2+}
$\text{K}_4[\text{Fe}(\text{CN})_6]$ after acidifying	Blue-green precipitate	Confirms Fe^{2+}
$\text{AgNO}_3 + \text{HNO}_3$	No precipitate	No halide present

(ii) The cation is Fe^{2+} , and since there's no white precipitate with BaCl_2 and HCl or AgNO_3 , the anion is likely SO_4^{2-} . Therefore, salt **M** is **iron(II) sulfate (FeSO_4)**.

(iii)



(iv) To distinguish Fe^{2+} from Fe^{3+} :

- Fe^{2+} forms a **green precipitate** with NaOH
- Fe^{3+} forms a **reddish-brown precipitate** with NaOH

- Fe^{2+} gives a **blue-green** colour with potassium hexacyanoferrate(II), while Fe^{3+} gives a **deep blue (Prussian blue)** with potassium hexacyanoferrate(III)