

**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: 2012**

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**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:

Solution coded **K1**: sulfuric acid of unknown concentration

Solution **K2**: sodium hydroxide, 4.00 g NaOH in 1 dm<sup>3</sup>

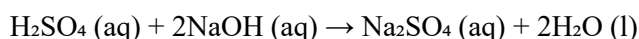
Phenolphthalein indicator

(i) The colour change observed is **pink to colourless**. This occurs because phenolphthalein is pink in basic solution and turns colourless when neutralized by the acid.

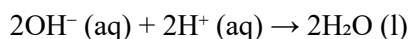
(ii) The volume of the pipette used is **25.0 cm<sup>3</sup>**, which is standard in titration to transfer a known volume of base (K2).

(iii) If the average titre is 25.0 cm<sup>3</sup>, then the average volume of K1 used to neutralize K2 is **25.0 cm<sup>3</sup>**.

(iv) Balanced chemical equation:



(v) Ionic equation:



(vi) Molar mass of NaOH = 23 + 16 + 1 = 40 g/mol

Concentration of K2 = 4.00 g/dm<sup>3</sup> ÷ 40 g/mol = 0.1 mol/dm<sup>3</sup>

Moles of NaOH in 25.0 cm<sup>3</sup> = 0.1 × 25.0 ÷ 1000 = 0.0025 mol

From the balanced equation, 2 mol NaOH reacts with 1 mol H<sub>2</sub>SO<sub>4</sub>

So moles of H<sub>2</sub>SO<sub>4</sub> = 0.0025 ÷ 2 = 0.00125 mol

Volume of acid used = 25.0 cm<sup>3</sup> = 0.025 dm<sup>3</sup>

Concentration of H<sub>2</sub>SO<sub>4</sub> = 0.00125 mol ÷ 0.025 dm<sup>3</sup> = **0.05 mol/dm<sup>3</sup>**

2. You are provided with:

- Y1: 0.1 M hydrochloric acid
- Y2: magnesium ribbon
- Stopwatch and thermometer

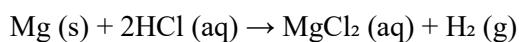
(i) Room temperature is approximately **298 K**.

(ii) Effervescence is caused by the release of **hydrogen gas (H<sub>2</sub>)** during the reaction between magnesium and hydrochloric acid.

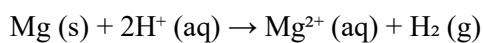
(iii) Sample data table:

Experiment	Temperature (°C)	Temperature (K)	Time (s)
1	30	303	60
2	40	313	40
3	50	323	27
4	60	333	18
5	70	343	10

(iv) Balanced chemical equation:



(v) Ionic equation:



(vi) The graph of temperature (K) against time (s) would show that as temperature increases, reaction time decreases. This indicates a faster reaction rate.

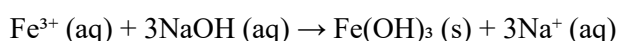
(vii) Conclusion: Higher temperature increases the kinetic energy of particles, leading to faster collisions and a faster reaction.

3. You are given a salt coded **W**.

(i) Sample table of results:

Test	Observation	Inference
Appearance	White crystalline solid	Likely ionic salt
Heating	Brown fumes evolved	Suggests nitrate ( $\text{NO}_3^-$ )
Solubility in water	Soluble	Soluble ionic compound
NaOH (few drops)	Brown precipitate formed	$\text{Fe}^{3+}$ likely
NaOH (excess)	Precipitate remains	Confirms $\text{Fe}^{3+}$
Aqueous ammonia (few drops)	Brown precipitate	Confirms $\text{Fe}^{3+}$
Aqueous ammonia (excess)	No further change	$\text{Fe}^{3+}$ confirmed
$\text{Ba}(\text{NO}_3)_2$ + dilute $\text{HNO}_3$	No precipitate	No $\text{SO}_4^{2-}$ or $\text{CO}_3^{2-}$
$\text{AgNO}_3$ + $\text{HNO}_3$	No precipitate	No $\text{Cl}^-$ , $\text{Br}^-$ or $\text{I}^-$

(ii) Balanced equation for NaOH test:



(iii) The cation is  $\text{Fe}^{3+}$  and the anion is  $\text{NO}_3^-$ , so salt **W** is **iron(III) nitrate ( $\text{Fe}(\text{NO}_3)_3$ )**.

(iv) Reaction with sodium carbonate:

