

**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: 2010

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 the following:

Solution coded **H1**, which is a solution of sodium hydroxide of unknown concentration

Solution **H2**, a standard hydrochloric acid solution containing 3.65 g of HCl per dm³

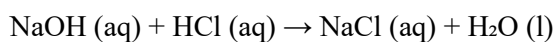
Phenolphthalein indicator

(i) The colour change observed is **pink to colourless**. Phenolphthalein is pink in basic solution (NaOH), and turns colourless when the solution becomes neutral or acidic after HCl is added.

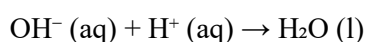
(ii) The pipette used in this titration is **25.0 cm³**, which is standard for most acid-base titrations.

(iii) Assuming accurate titres were around 25.0 cm³, the average volume of solution H2 used to neutralize H1 is **25.0 cm³**.

(iv) Balanced chemical equation:



(v) Ionic equation:



(vi) Molar mass of HCl = 1 + 35.5 = 36.5 g/mol

Concentration of H2 = 3.65 g/dm³ ÷ 36.5 g/mol = 0.1 mol/dm³

Moles of HCl in 25.0 cm³ = 0.1 × 25.0 ÷ 1000 = 0.0025 mol

From the equation, 1 mol of NaOH reacts with 1 mol of HCl

So, moles of NaOH in 25.0 cm³ = 0.0025 mol

Therefore, concentration of NaOH (H1) = 0.0025 mol ÷ 25.0 cm³ × 1000 = **0.1 mol/dm³**

2. You are provided with:

- 0.1 M potassium iodide solution labeled **M1**
- 0.1 M hydrogen peroxide solution labeled **M2**
- Dilute sulfuric acid labeled **M3**
- A starch indicator solution

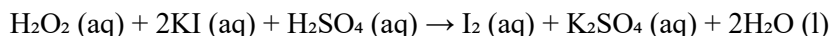
(i) Room temperature is approximately **298 K**.

(ii) The blue-black colour appeared due to the formation of iodine (I₂) from the reaction between iodide ions and hydrogen peroxide. Iodine then reacts with starch to give a blue-black complex.

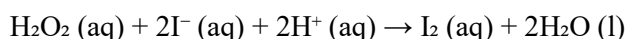
(iii) Example of completed table:

Experiment	Temperature (°C)	Temperature (K)	Time (s)
1	30	303	65
2	40	313	45
3	50	323	28
4	60	333	18
5	70	343	12

(iv) Balanced chemical equation:



(v) Ionic equation:



(vi) The graph of temperature (K) against time (s) will show a downward curve, as temperature increases, reaction time decreases.

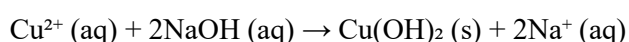
(vii) Conclusion: The rate of reaction increases with increase in temperature due to greater kinetic energy of particles leading to faster collisions and quicker product formation.

3. You are given a salt coded R.

(i) Sample table:

Test	Observation	Inference
Appearance	White crystalline solid	Ionic compound
Action of heat	Gas with pungent smell evolved	Possible nitrate/nitrite
Solubility in water	Soluble	Soluble ionic salt
NaOH (few drops)	Light blue precipitate forms	May contain Cu^{2+}
NaOH (excess)	Precipitate remains insoluble	Confirms Cu^{2+}
Aqueous ammonia (few drops)	Blue precipitate forms	Cu^{2+} likely
Aqueous ammonia (excess)	Deep blue solution forms	Confirms Cu^{2+}
$\text{BaCl}_2 + \text{HNO}_3$	No precipitate	No SO_4^{2-} or CO_3^{2-}
$\text{AgNO}_3 + \text{HNO}_3$	White precipitate	Presence of Cl^-

(ii) Balanced chemical equation:



(iii) The cation is Cu^{2+} and the anion is Cl^- . So salt **R** is **copper(II) chloride (CuCl_2)**.

(iv) Reaction with sodium carbonate:

