

**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: 2016

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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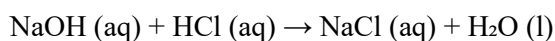


1. You are provided with:

- **S1:** Sodium hydroxide (unknown concentration)
- **S2:** 3.65 g of HCl dissolved in 1 dm³
- Methyl orange indicator

(a) The colour change is **yellow to orange-pink**, indicating the neutralization point between a strong acid and strong base.

(b) Balanced chemical equation:



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

Concentration of S2 = $3.65 \div 36.5 = 0.1 \text{ mol/dm}^3$

(d) Moles of HCl in 25.0 cm³ = $0.1 \times 25 \div 1000 = 0.0025 \text{ mol}$

(e) From the equation, mole ratio is 1:1

So, moles of NaOH = 0.0025 mol

(f) Volume of NaOH used = 25.0 cm³ = 0.025 dm³

Concentration in mol/dm³ = $0.0025 \div 0.025 = 0.1 \text{ mol/dm}^3$

Concentration in g/dm³ = $0.1 \times 40 = 4.0 \text{ g/dm}^3$

(g) Reasons for using NaOH pellets:

NaOH pellets are **more stable and easier to store** than aqueous NaOH which absorbs CO₂ from air.

Using pellets allows the technician to **prepare a fresh, accurate concentration** of base as needed.

2. You are given:

W1: potassium iodide

W2: hydrogen peroxide

W3: sulfuric acid

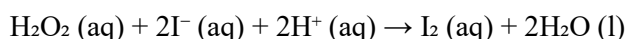
Starch indicator

(a) The blue-black colour appears due to the formation of **iodine (I₂)**, which reacts with starch to form a blue-black complex.

(b) Completed table:

Temperature (°C)	Temperature (K)	Time (s)
25	298	72
35	308	52
45	318	36
55	328	24
65	338	14

(c) Net ionic equation:



(d) Graph: Plot temperature (K) on the x-axis and time (s) on the y-axis. The graph will show a **decreasing curve**, indicating that time decreases as temperature increases.

(e) Temperature increases the **rate of reaction**. This is because higher temperature gives particles more kinetic energy, increasing the number of effective collisions per second.

(f) At 15°C, the time would increase further beyond 72 seconds, possibly above 90 seconds, because **lower temperatures slow down reaction rates** by reducing the frequency and energy of collisions.

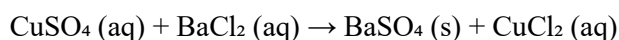
3. You are given salt Y.

(i) Table of observations and inferences:

Test	Observation	Inference
Appearance	Blue crystalline solid	Likely copper salt
Heating	Water droplets on tube walls	Hydrated salt present
NaOH (few drops)	Pale blue precipitate	Cu^{2+} present
NaOH (excess)	Precipitate remains	Confirms Cu^{2+}
Ammonia (few drops)	Light blue precipitate	Cu^{2+} confirmed
Ammonia (excess)	Deep blue solution forms	Strong confirmation of Cu^{2+}
$\text{BaCl}_2 + \text{HCl}$	White precipitate forms	SO_4^{2-} present
$\text{AgNO}_3 + \text{HNO}_3$	No precipitate	No halides present

(ii) The cation is Cu^{2+} , the anion is SO_4^{2-} . Salt Y is **copper(II) sulfate pentahydrate ($\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$)**.

(iii) Reaction with barium chloride:



(iv) Distinguishing property:

The deep blue complex formed with excess ammonia is characteristic of transition metal (Cu^{2+}) coordination chemistry.