

**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: 2018

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 given:

U1: Sodium carbonate, 2.12 g in 250 cm³ solution

U2: Hydrochloric acid (unknown concentration)

Methyl orange indicator

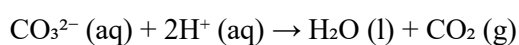
(a) The colour change observed is **yellow to pinkish-orange**, indicating that all carbonate has reacted with the acid.

(b)

Balanced chemical equation:



Ionic equation:



(c)

Molar mass of Na₂CO₃ = 23×2 + 12 + 16×3 = 106 g/mol

Moles in 2.12 g = 2.12 ÷ 106 = **0.02 mol**

Volume of solution = 250 cm³ = 0.25 dm³

Concentration = 0.02 ÷ 0.25 = **0.08 mol/dm³**

(d) Moles of Na₂CO₃ in 25.0 cm³ = 0.08 × 25 ÷ 1000 = 0.002 mol

From the equation, 1 mol Na₂CO₃ reacts with 2 mol HCl

So moles of HCl = 0.002 × 2 = **0.004 mol**

(e) Volume of HCl used = 25.0 cm³ = 0.025 dm³

Concentration = 0.004 ÷ 0.025 = **0.16 mol/dm³**

(f) Concentration in g/dm³ = 0.16 × 36.5 = **5.84 g/dm³**

2. You are given:

- V1: potassium iodide
- V2: hydrogen peroxide
- V3: sulfuric acid
- Starch indicator

(a) The blue-black colour appears because **iodine (I₂)** is formed during the reaction. Iodine reacts with starch to form the blue-black complex.

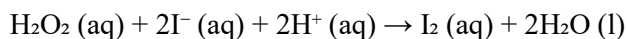
(b) Completed table:

Temp (°C)	Temp (K)	Time (s)
30	303	68
40	313	48
50	323	32

60	333	21
70	343	13

(c)

Net ionic equation:



(d) As temperature increases, **reaction time decreases**, meaning the **reaction rate increases**. This is due to greater particle energy and more frequent effective collisions.

(e) Precaution:

- Start timing **immediately** after mixing all reactants
- Maintain **consistent volumes and concentrations**
- Use the **same observer** to judge colour change for consistency

3. You are given salt **Z**, suspected to be ammonium chloride.

(i) Table of observations and inferences:

Test	Observation	Inference
Appearance	White crystalline solid	Ammonium salt possible
Heating dry salt	Gas evolved turns red litmus blue	Ammonia gas present $\rightarrow \text{NH}_4^+$ confirmed
NaOH + warm	Pungent gas evolved turns red litmus blue	NH_4^+ confirmed
AgNO_3 + HNO_3	White precipitate forms	Cl^- present

(ii) Cation = NH_4^+ , Anion = Cl^-

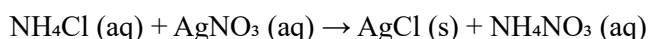
Therefore, salt Z = **ammonium chloride (NH_4Cl)**

(iii)

Reaction with NaOH (on warming):



Reaction with AgNO_3 :



(iv) Two physical properties:

- **Sharp pungent smell** of ammonia when heated
- **Soluble white crystals** that dissolve easily in water