**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** **Wednesday, 09th May 2018 a.m.**

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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 **note** allowed in the examination room.
5. Write your **examination Number** on every page of your answer booklet(s).

**1.** Two solutions were prepared as follows:

Solution **U1**: Prepared by dissolving 2.12 g of sodium carbonate ($Na_2CO_3$) in 250 $cm^3$ of water

Solution **U2**: Contains hydrochloric acid of unknown concentration

You are to determine the concentration of **U2** using titration with methyl orange as indicator.

**Instructions:**

- Fill the burette with **U2**
- Pipette 25.0 $cm^3$ of **U1** into a conical flask
- Add 2–3 drops of methyl orange and titrate with **U2**
- Repeat until three concordant titres are obtained and calculate the average

**Questions**

(a) What was the colour change observed during the titration?

(b) Write a balanced chemical equation and ionic equation for the reaction.

(c) Calculate the concentration of solution **U1** in mol/$dm^3$.

(d) If the average titre is 25.0 $cm^3$, calculate the number of moles of HCl used.

(e) Determine the concentration of HCl in mol/$dm^3$.

(f) Convert your answer in (e) to g/$dm^3$. (Molar mass of HCl = 36.5 g/mol)

**2.** In a study of the effect of temperature on reaction rate, a student was given:

Solution **V1**: 0.1 M potassium iodide

Solution **V2**: 0.1 M hydrogen peroxide

Solution **V3**: 1 M sulfuric acid

**Starch solution**

The student was instructed to mix 5 $cm^3$ of each solution in a test tube, add two drops of starch and record the time taken for a blue-black colour to appear. This was repeated at temperatures 30°C to 70°C.

**Questions**

(a) What causes the blue-black colour in this experiment?

(b) Complete the table below:

| Temp (°C) | Temp (K) | Time (s) |
|---|---|---|
| 30 | | 68 |
| 40 | | 48 |
| 50 | | 32 |
| 60 | | 21 |
| 70 | | 13 |

(c) Write the ionic equation for the reaction between hydrogen peroxide and iodide in acidic medium.

(d) What effect does increasing temperature have on the rate of this reaction?

(e) What precaution must be taken when measuring time during this experiment?

**3.** A salt labeled **Z** is suspected to be ammonium chloride. Carry out the following tests to confirm the ions:

(a) Describe the appearance of salt **Z**.

(b) Heat a small amount in a dry test tube and test the gas evolved with damp red and blue litmus.

(c) Add a portion to water and test with sodium hydroxide. Warm gently and test the gas evolved.

(d) Add silver nitrate solution followed by nitric acid to a fresh portion.

**Questions**

(i) Record your observations and inferences in a clear table.

(ii) Identify the cation and anion in salt **Z**.

(iii) Write balanced equations for:

– The reaction with NaOH

– The reaction with $AgNO_3$

(iv) Suggest two physical properties of salt **Z** that help identify it before any chemical test.