**THE UNITED REPUBLIC OF TANZANIA**

**NATIONAL EXAMINATIONS COUNCIL OF TANZANIA**

**DIPLOMA IN SECONDARY EDUCATION EXAMINATION**

**732/2B** **CHEMISTRY 2B**

**(ACTUAL PRACTICAL 2B)**

**Time: 3 Hours** **Year: 2021**

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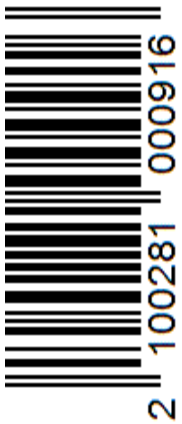
**Instructions**

1. This paper consists of **three (3)** questions.
2. Answer **all** questions.
3. Question number **one (1)** carries **twenty (20)** marks and the rest carry **fifteen (15)** marks each.
4. Cellular phones and any unauthorized materials are not allowed in the examination room.
5. Write your **Examination Number** on every page of your answer booklet (s)



**1.** You are provided with the following solution coded **E1** with unknown concentration; solution **E2** containing 2.92 g of hydrochloric acid (HCl) in 1 dm3 and MO methyl orange indicator. The instruction are: Titrate **E2** (from the burette), against **E1** (in the titration flask) using MO until the end point. Record the results including one rough and three accurate titrations in a tabular form.

Questions

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

(ii) What was the volume of the pipette used?

(iii) Calculate the average volume of solution E2 that was used to neutralize solution E1.

(b) Write a balanced chemical equation (include state symbols) between E2 and E1 and the corresponding ionic equation.

(c) Calculate the concentration in moles/dm3 of solution E1.

**2.** You are provided with 0.1 M sodium thiosulphate, 0.1 M hydrochloric acid, distilled water, stop watch and a white sheet of paper marked M. Perform the experiment by following the procedure that follow:

(i) Place a 50 cm3 beaker on top of a letter M marked on the sheet of paper provided.

(ii) Prepare a water bath using a 250 cm3 or 300 cm3 beaker.

(iii) Measure 10 cm3 of EE and 10 cm3 of FF, and then put them into two different test tubes.

(iv) Place a thermometer in one of the test tubes, then place both test tubes into the water bath prepared in step (ii) and warm the test tube contents to 400C. \

(v) Immediately pour the hot solutions EE and FF into the 50 cm3 beaker in step (i) and simultaneously start the stop watch/clock. Record the time

taken in seconds, for the mark to disappear completely.

(vi) Repeat procedure (i) to (v) at different temperatures as shown in the following table.

**Experimental Data**

| **Experiment** | **Temperature °( C)** | **Time (s)** | **Temperature (K)** |
|---|---|---|---|
| 1 | 40 | | |
| 2 | 50 | | |
| 3 | 60 | | |
| 4 | 70 | | |
| 5 | 80 | | |

**Questions**

(a) Record the room temperature in Kelvin (K).

(b) Why did the mark M disappear?

(c) Complete the table by filling the blank columns.

(d) (i) Write a balanced chemical equation for the reaction taking place between **EE** and **FF**. Show all the state symbols.

(ii) Write the ionic equation for the reaction between **EE** and **FF**.

(e) Plot a graph of time(s) against temperature (K).

(f) What conclusion can be drawn from the graph that you plotted in (e)?

**3.** Sample **O** is a simple salt containing one cation and one anion. Carefully, carry out qualitative analysis experiment to identify the ions present in the salt based on the following tests:

(a) Appearance of the sample.

(b) Action of heat on the sample.

(c) Action of concentrated sulphuric acid on the sample then warm.

(d) The sample dissolved in the water.

(e) Action of aqueous sodium hydroxide on the solution of the sample.

(f) Action of potassium hexacyanoferrate(II) solution on the solution of the sample followed by dilute HCl.

(g) Action of ferrous sulphate solution on the solution of the sample followed by concentrated $H_2SO_4$ along the side of test tube.

**Questions**

(i) Prepare a relevant Table showing the qualitative analysis results.

**(ii)** Write a balanced chemical equation for the test at experimental test (b).

**(iii)** Write a balanced chemical equation between the sample and sodium carbonate.