# THE UNITED REPUBLIC OF TANZANIA
# NATIONAL EXAMINATIONS COUNCIL
# CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

**032/2B**

## CHEMISTRY 2B
## ACTUAL PRACTICAL B
(For Both School and Private Candidates)

**Time: 2:30 Hours** **Monday, 13th November 2017 a.m.**

CS17PREP

### Instructions

1. This paper consists of **three (3)** questions. Answer **all** the questions.
2. Question 1 carries **twenty (20)** marks and the rest carry **fifteen (15)** marks each.
3. Qualitative Analysis Guidance Pamphlets may be used after a thorough check by the supervisor.
4. Cellular phones, calculators and any unauthorized materials are **not** allowed in the examination room.
5. Write your **Examination Number** on every page of your answer booklet(s).
6. You may use the following constants:
   Atomic masses:
   H = 1, O = 16, Na = 23, S = 32.
   1 litre = 1 $dm^3$ = 1000 $cm^3$.

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1. You are provided with the following:
   **S**: A solution containing 0.125 M sulphuric acid ($H_2SO_4$);
   **T**: A solution made by dissolving 15 g of impure sodium hydroxide (NaOH) in distilled water making up to 1000 $cm^3$ of the solution;
   **M.O**:Methyl orange indicator.

**Questions**

(a) (i) Titrate **S** (from the burette) against **T** (in the titration flask) using **MO** up to the end point. Repeat the procedure to obtain three accurate readings and record your results in a tabular form.
(ii) Calculate average volume of **S** used.
(iii) ____ $cm^3$ of **T** required ___ $cm^3$ of **S** for complete reaction.
(iv) The colour changed at the neutralization point was from ____ to ____.

(b) Write a balanced chemical equation for the reaction taking place between **S** and **T**.

(c) Calculate the percentage purity and percentage impurity of sodium hydroxide.

2. You are provided with the following:
   - Solution **M**: 0.2 M sodium thiosulphate ($Na_2S_2O_3$);
   - Solution **N**: 2 M hydrochloric acid (HCl);
   - Distilled water labeled **W**;
   - A sheet of white paper marked **X**;
   - Stop watch.

**Procedure**

(i) Put a small beaker (100 $cm^3$) on top of the mark **X** on a sheet of paper in such a way that the mark is clearly seen through the top of the beaker.
(ii) Measure 50 $cm^3$ of solution **M** and pour into a small beaker.
(iii) Using different measuring cylinder measure 10 $cm^3$ of solution **N**.
(iv) Start a stop watch simultaneously as you pour solution **N** in the beaker containing solution **M**.
(v) Stir the mixture with glass rod until the cross disappears.
(vi) Stop the watch when the cross is out of sight. Record the time taken.
(vii) Repeat the whole process using 40 $cm^3$, 30 $cm^3$, 20 $cm^3$ and finally 10 $cm^3$ of solution **M** as shown in the Table 1. Top up solution **M** with **W** to make 50 $cm^3$ in each experiment before adding solution **N**.

Table 1

| Volume of M ($cm^3$) | Volume of water ($cm^3$) | Volume of N ($cm^3$) | Conc. of M after adding water ($moldm^{-3}$) | Time for cross to disappear (sec.) | Rate ($sec^{-1}$) |
|---|---|---|---|---|---|
| 50 | 00 | 10 | | | |
| 40 | 10 | 10 | | | |
| 30 | 20 | 10 | | | |
| 20 | 30 | 10 | | | |
| 10 | 40 | 10 | | | |

**Questions**

(a) Complete filling the Table 1.

(b) Write down a balanced chemical equation for the reaction between **M** and **N**.

(c) What substance was produced during the reaction which obscured the cross?

(d) Use the data in the Table 1 to draw the following graphs:
(i) Concentration-time graph; concentration on the y-axis and time on the x-axis.
(ii) Concentration-rate graph, concentration on the y-axis and rate on the x-axis.

(e) What conclusion can you draw from the results of the experiment?

3. Sample **H** contains one cation and one anion. Using systematic qualitative analysis procedures record carefully your experiments, observations and inferences as Table 2 shows. Finally, identify the anion and cation present in sample **H**.

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Table 2

| S/n | Experiment | Observation | Inference |
|---|---|---|---|
| | | | |

**Conclusion:**
(i) The cation in sample **H** is _____.
(ii) The anion in sample **H** is _____.