

CHRISTIAN SOCIAL SERVICES COMMISSION (CSSC)  
NORTHERN ZONE JOINT EXAMINATIONS SYNDICATE (NZ-JES)



FORM SIX PRE – NATIONAL EXAMINATIONS 2026

132/3A

CHEMISTRY 3A  
ACTUAL PRACTICAL A

Time: 3:20 Hours

Tuesday, 3<sup>rd</sup> March, 2026 a.m

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Instructions

1. This paper consists of **three (3)** questions.
2. Answer **all** questions.
3. Question **one (1)** carries **20 marks** while questions **2** and **3** carries **15marks** each.
4. All answers must be written in the answer booklet(s) provided.
5. NECTA Mathematical tables and non-programmable calculators may be used.
6. NECTA Qualitative analysis guide sheet may be used.
7. Cellular phones are **not allowed** in the examination room.
8. Write your **Examination Number** on every page of your answer booklet(s).
9. You may use the following constants:-

Gas constant,  $R = 8.314 \text{ J mol}^{-1} \text{ K}^{-1}$  or  $0.082 \text{ atm dm}^{-3} \text{ mol}^{-1} \text{ K}^{-1}$

H=1, C=12, N=14, O=16, Cl=35.5, S=32, Na=23, Mg=24, K=39, Mn=55.

1. You provided the following;

**AA:** A mixture solution containing NaOH and Na<sub>2</sub>CO<sub>3</sub>

**BB:** 0.2M hydrochloric acid solution

**CC:** Methyl orange indicator

**DD:** Phenolphthalein indicator

### Procedures

- (i) Pipette 25cm<sup>3</sup> or 20cm<sup>3</sup> of solution **AA** into a clean conical flask.
- (ii) Add to it 4 drops of **DD** and titrate the resulting solution with **BB** until colour change
- (iii) Record the first titre volume
- (iv) Add 4 drops of **CC** in the mixture solution and continue titrating until the colour change to just red
- (v) Record the second titre volume.
- (vi) Repeat the procedures (i) to (v) three times.
- (vii) Record your result in tabular form.

### Summary

\_\_\_\_cm<sup>3</sup> of **AA** required \_\_\_\_\_ cm<sup>3</sup> of **BB** in the presence of **DD** and \_\_\_\_\_ cm<sup>3</sup> of **BB** in the presence of **CC** for complete reaction

### Questions

- (a) Write the ionic equation taking place in
    - (i) Procedure **(ii)**
    - (ii) Procedure **(iv)**
  - (b) (i) Explain why solution **DD** is added first followed by **CC** solution.  
(ii) Write the balanced chemical equation when **CC** solution was added first.
  - (c) Calculate the
    - (i) Molarity of NaOH and Na<sub>2</sub>CO<sub>3</sub> in solution **AA**
    - (ii) Concentration of NaOH and Na<sub>2</sub>CO<sub>3</sub> in g/dm<sup>3</sup>
    - (iii) Percentage composition by mass of NaOH in the mixture solution **AA**
2. You are provided with the following:
- NN:** A solution of 0.20M sodium thiosulphate
- PP:** A solution of 0.30M nitric acid
- A stopwatch/clock A thermometer
- (0°-100°C) 100cm<sup>3</sup> beaker

### Procedure:

- (i) Using a blue / black pen, draw letter “**X**” on a white piece of paper and place a small beaker provided on top of the letter, **X** such that the letter is visible through the solution.

- (ii) Pour about 200cm<sup>3</sup> of distilled water into the clean beaker. (Use this as your water bath.)
- (iii) Measure out exactly 10cm<sup>3</sup> of **NN** and 10cm<sup>3</sup> of **PP** into separate boiling test tubes
- (iv) Put the two boiling test tubes containing **NN** and **PP** into the water bath in (ii) above and warm the contents to about 50°C
- (v) Immediately pour the hot solutions of **NN** and **PP** in (iv) above in the small beaker (i) above and record the temperature of the reaction mixture.
- (vi) Using a glass rod, stir the reaction mixture in (v) and record the time taken, in seconds, for the letter “**X**” to disappear completely.
- (vii) Repeat the whole procedure (iii) to (vi) using temperatures, 60°C, 70°C, and 80°C and record your results in a tabular form as shown below

**Table of results**

| Temperature of reaction mixture |      | Time of reaction<br>t (sec) | $\frac{1}{T} (K^{-1})$ |
|---------------------------------|------|-----------------------------|------------------------|
| (°C)                            | T(K) |                             |                        |
| 50                              |      |                             |                        |
| 60                              |      |                             |                        |
| 70                              |      |                             |                        |
| 80                              |      |                             |                        |

**Questions:**

- (a) Plot a graph of  $\log_{10} \frac{1}{t}$  against  $\frac{1}{T} (K^{-1})$
  - (b) Determine the slope of the graph obtained in (a) above
  - (c) Using equation,  $K = Ae^{-E/RT}$  which gives the relation describing the dependence of the rate constant on temperature, determine the value of **A**, and **E** for the given equation, using data obtained from (b) above.
3. Sample **M** is a sample 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
- (b) Appearance of the sample
  - (c) Action of heat on the sample.
  - (d) Solubility.
  - (e) Action of a few drops of NaOH on solution **M**.
  - (f) Action of freshly prepared FeSO<sub>4</sub> solution in solution of **M** followed by concentrated H<sub>2</sub>SO<sub>4</sub> through a side of the test tube.
  - (g) Action of lead ethanoate and then boil.
  - (h) Perform a confirmatory test for the Cation and anion.

**Questions:**

- (i) Prepare a relevant table showing the qualitative analysis results.
- (ii) Write a balanced chemical equation for reaction in experiment (b).
- (iii) Write the chemical formula of the sample **M**.

