

091405T4S LT

SCIENCE LABORATORY TECHNOLOGY LEVEL 5

SLT/OS/SL/CR/03/5

Apply Chemistry Techniques

November/December 2025.



**TVET CURRICULUM DEVELOPMENT, ASSESSMENT AND CERTIFICATION
COUNCIL (TVET CDACC)**

WRITTEN

Time: 3 HOURS

INSTRUCTIONS TO CANDIDATE

1. This paper consists of **TWO** sections: **A** and **B**.
2. Attempt **ALL** questions in section A and **ANY THREE** (3) questions in section B.
3. Marks for each question are indicated in the brackets.
4. Candidates are provided with a separate answer booklet.
5. Do not write on the question paper.

This paper consists of FIVE (5) printed pages

**Candidates should check the question paper to ascertain that all
pages are printed as indicated and that no questions are missing.**

SECTION A (40 MARKS)

Attempt ALL questions in this section.

1. During preparation of water treatment, you need to separate mixtures. Using examples from water treatment or daily lab practices, Highlight TWO physical methods of separation. (4Marks)
2. List the steps to show how you would assemble the apparatus to collect and test gas produced when hydrochloric acid is added to sodium carbonate (4Marks)
3. State FOUR steps you will follow when obtaining a pure dry sample of sodium chloride from a mixture of sodium chloride and sand. (4Marks)
4. During a practical session to determine the chemical composition of rock salt the students were advised to grind the rock
 - i. Name the apparatus typically used to grind a solid chemical sample into a fine powder in the laboratory (1Mark)
 - ii. State TWO reasons why grinding a solid sample is often a necessary step before dissolving it (2Marks)
 - iii. State ONE important safety t must be taken during this process (1Mark)
5. A Technician wanted to prepare 100 for titration in the lab from one Liter stock solution. Highlight the steps the technician will use to obtain the representative sample. (4Marks)
6. As a trainee you have been given acetone that has been procured. State FOUR precaution you will observe when storing this chemical (4Marks)
7. While weighing reagents for a soap-making practical, you can use direct weighing or weighing by difference. State TWO differences between the methods (4 Marks)
8. A scientist in a certain research institution had the following mixtures that needed separation

Mixture A: A hot saturated solution of Copper Sulphate with un dissolved impurities

Mixture B: A very fine, gelatinous precipitate of Aluminium Hydroxide

 - a) Name the most suitable type of filtration apparatus for Mixture A (1Mark)
 - b) Give ONE reason for your choice in 8(a) above (1Marks)

- c) State the most suitable type of filtration apparatus for Mixture B (1Mark)
- d) Give ONE reason for choice in 8(c) above (1Mark)
9. A 0.800g sample Potassium Chloride (KCl) was dissolved in water and the chloride ion precipitated as silver chloride. The resulting precipitate was filtered, washed, dried and weighed. Its mass was found to be 1.250g. Calculate the percentage of chlorine (Cl) in the original impure sample (Molar masses: $\text{AgCl} = 143.3\text{g/mol}$, $\text{Cl} = 35.5\text{g/mol}$) (4 Marks)
10. A certain neutralization reaction required solution whose concentration was 0.25mol dm^{-3} but only 250cm^3 of a solution was used. Calculate the mass of Sodium Hydroxide in 250cm^3 (4 Marks)

SECTION B (60 MARKS)***Attempt ANY THREE (3) questions in this section.***

11. Science Laboratory trainees were doing a Redox titration where 8.5g of $(\text{NH}_4)_2\text{SO}_4 \cdot \text{FeSO}_4 \cdot n \text{H}_2\text{O}$ was dissolved in 50cm^3 of dilute H_2SO_4 and made up to 250cm^3 of the solution with distilled water. During titration 25cm^3 of this solution was pipetted and put in a conical flask and titrated against 0.0192 M Potassium Manganate (VII) until the solution became colorless. The results were tabulated in a table as follows

	1 st	2 nd	3 rd
Final Burette Reading	22.50		22.50
Initial Burette Reading	0.00	22.50	0.00
Volume of solution Used		22.40	

- a) Complete the table above (3Marks)
- b) Calculate
- Average volume of KMnO_4 used (2Marks)
 - Number of moles of KMnO_4 used (3Marks)
 - Explain why dilute H_2SO_4 was initially added to the solution being prepared (2Marks)
- c) Using the following ionic equation determine the number of moles of iron (II) salt in 25cm^3 of solution used



- Determine the Molarity of the iron (II) salt solution (6Marks)
- Determine the value of n in the formula $(\text{NH}_4)_2 \text{SO}_4 \cdot \text{FeSO}_4 \cdot n \text{H}_2\text{O}$ (4Marks)

12. A student was determining the copper content in a brass sample.

- Describe the key steps to be followed after the electrolysis is completed (8Marks)
- Given that E^0 of Cu/Cu^{2+} is 0.48V and that of $\text{Zn}_{(\text{s})}/\text{Zn}^{2+}$ is -0.87V.

- i. Draw a diagram of zinc and copper electrochemical cell (6Marks)
 - ii. Calculate the EMF of the cell (6Marks)
13. A public health officer wanted to determine the water content of groundnuts sold in supermarket in a certain Town.
 - a) Describe the step by step laboratory procedure for determining the moisture content in sample of groundnut obtained in those supermarket (9Marks)
 - b) State THREE precaution that must be observed during moisture content determination (3Marks)
 - c) Describe the step by step laboratory procedure for determining the Ash content(inorganic component) in the sample of groundnut obtained in those supermarket (6Marks)
 - d) State two precautions that must be observed during Ashing (2Marks)
14. Titration apparatus are key in analysis of liquid samples and doing analysis, the apparatus needs to be appropriately
 - a) Draw a labeled diagram titration setup (8Marks)
 - b) Explain ONE indicators that can be used in acid base titration (2Marks)
 - c) A sample of 1.5 g of limestone was dissolved in 50cm³ of 1M HCL. The resulting solution was made up to 250cm³ with water. 25cm³ of this solution required 22.05cm³ of 0.1M NaOH. Calculate the percentage of Calcium carbonate in the limestone. (10Marks)