

P525/1
CHEMISTRY
Theory
Paper 1
April 2025
2 $\frac{1}{2}$ hours



ASK INTEGRATED TEACHER'S EXAMINATIONS BUREAU LTD

Uganda Advanced Certificate of Education

END OF TERM 1 ASSESSMENTS 2025

S.5 CHEMISTRY

PAPER 1

(Theory)

2 Hours 30 Mins

INSTRUCTIONS;

1. Attempt all items in section A and section B.
2. Answers in section A should be written in spaces provided.
3. Answers to section B should be written on answer sheets provided.

ITEM 1

Villagers living near an old mining site have recently reported unusual changes in their drinking water. Some residents mentioned a strange metallic taste, while others experienced mild health symptoms like dizziness and stomach discomfort. Concerned local health officials suspected contamination from the abandoned mine, where heavy metals such as mercury (Hg), arsenic (As), and zinc (Zn) were previously used in processing minerals.

To identify potential contaminants, water samples were sent to a laboratory for analysis using Mass Spectrometry, a technique that detects trace amounts of metal ions in water. The following data was collected for one of the metallic elements found:

Isotope	Relative Isotopic Mass	Relative Abundance (%)
X ₁	23.985	78.99
X ₂	23.985	10.00
X ₃	25.983	11.01

Task:

- a) Help someone interpret the data above and identify the element found in the contaminated water.

- b) Suggest reasons why the analytical technique used is suitable for analyzing environmental samples like groundwater.

- c) Why the analytical technique is used a valuable tool in fields like forensics and archaeology when analyzing unknown samples?

ITEM 2

A construction company relies on calcium metal to produce calcium oxide, a crucial component in cement used for building strong and durable structures. The company has a target of producing at least 10 kg of calcium oxide daily. However, their supplier can only provide 6 kg of calcium metal per day. Calcium reacts with oxygen in the air to form calcium oxide.

The production supervisor is unfamiliar with chemical equations and mole calculations and seeks guidance on whether the available calcium supply is sufficient to meet their daily target.

Task:

Guide the production supervisor to determine if the daily target is achievable, assuming a complete reaction with no loss of material

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

SECTION B

Attempt the two questions on answer sheets provided

ITEM 3:

In a university chemistry research facility, a new delivery of elemental samples arrives, but some of the labels are faded or missing. The only visible information includes atomic numbers: 19, 25, 17, and 10. The head researcher is responsible for ensuring proper chemical storage and safety measures to prevent any mishandling.

Task:

The head researcher has asked you to determine the electronic configurations of the elements and/or their ions, clarify their position in the Periodic Table (Group, Period, and Block), and predict and analyze their reactivity. Write a brief message in response to the researcher's request.

ITEM 4:

A company specializing in manufacturing aviation fuel additives is researching a new compound with a molecular formula C_5H_{12} suitable for improving fuel efficiency. After conducting further studies, they discovered that the compound exists in different isomeric forms, all having similar chemical properties but differing in physical characteristics.

Since the ideal fuel additive should have the lowest boiling point to optimize combustion efficiency, the company seeks expert advice on which isomer would be most suitable for their formulation.

Task:

Write a message:

- Enlightening the company on the different isomers and any similar chemical properties they exhibit.
- Advising and explaining which isomer would be best suited for their fuel additive formulation.

END