

# ADVANCED LEVEL CHEMISTRY

## Assessment Guidelines • Advanced Secondary Curriculum (ASC)

### Session Outcomes

1. Appreciate the nature of Test Items used to assess learner achievement under the Adapted Competency-based Curriculum.
2. Develop appropriate assessment items for A-Level Chemistry and score them.

### What Presentation covers

1. Introduction
2. Constructs, AOs and Related Topics
3. Structure of Assessment papers
4. Sample Assessment Items
5. Scoring Learner's responses

### Why Assess Chemistry?

- To determine how well a learner understands chemical principles and can apply them to explain, analyse, and solve novel problems using accurate practical, mathematical, and scientific reasoning, supported by sound experimental knowledge and clear communication

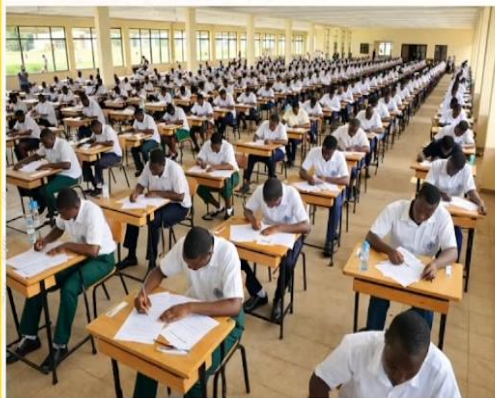


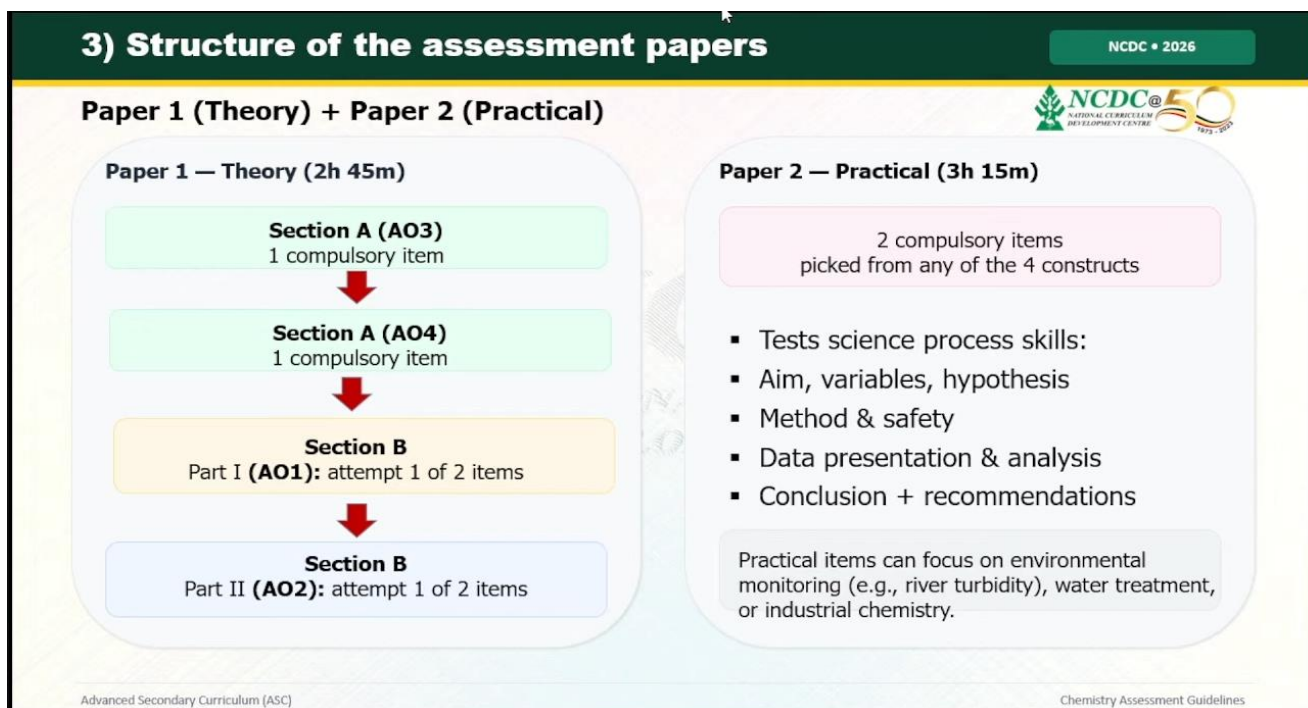
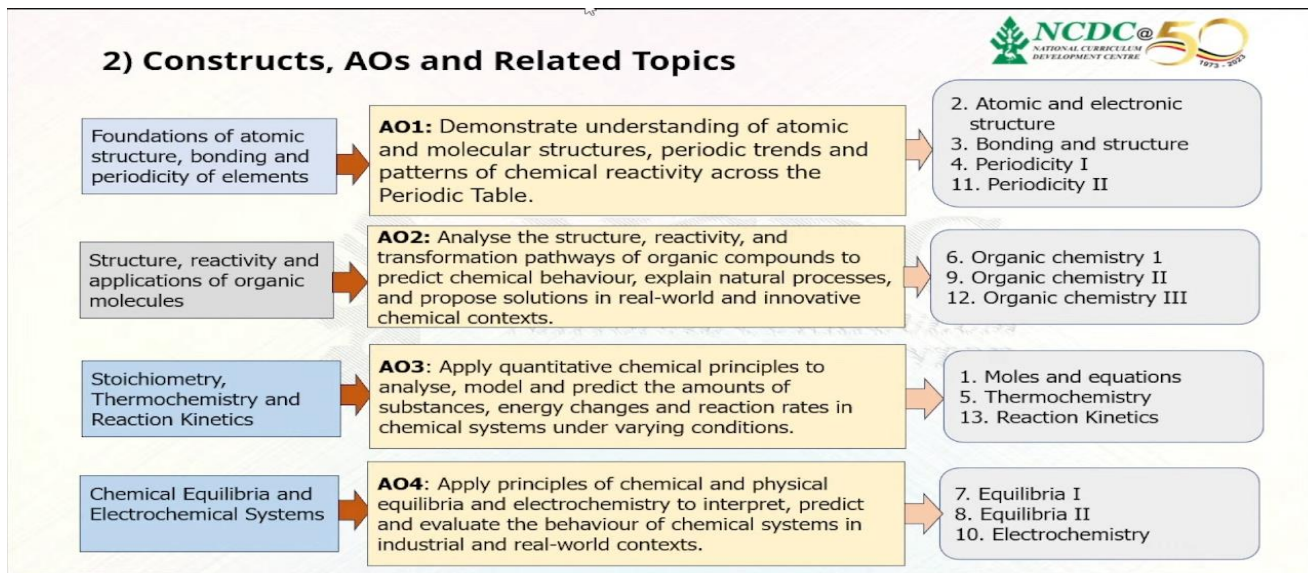
## 1) Introduction

NCDC • 2026



- At the end of the L.S. Education cycle, Chemistry shall be assessed by UNEB.
- The teacher needs to know how the teaching and learning process is going to be assessed.
- Learners should be adequately prepared to demonstrate their levels of competency in the subject.





#### 4) Sample Assessment Item (Theory)

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Your chemistry class has been invited by a chemical plant management near Lake Victoria to assist in identifying ways of optimising the production of key industrial compounds including sodium oxide, magnesium oxide and silicon dioxide used in glassmaking and ceramics. The plant management has observed inconsistencies in melting points and reactivity, which are affecting product quality and safety. You are tasked with conducting a scientific investigation to analyse periodic trends of the elements, compound properties, and molecular structures to recommend improvements. Important chemical data of the findings about the elements and their compounds is provided in the table below to assist in the analysis.

Element	Atomic Number	Atomic Radius (pm)	Ionisation Energy (kJ/mol)	Melting Point (°C)	Oxide Melting Point (°C)
Sodium (Na)	11	186	496	98	1275
Magnesium (Mg)	12	160	738	650	2800
Aluminium (Al)	13	143	578	660	2072
Silicon (Si)	14	118	786	1410	1710
Phosphorus (P)	15	110	1012	44	580
Sulphur (S)	16	104	1000	115	Gas/Sublimates
Chlorine (Cl)	17	99	1251	-101	Gas/Gas

#### Task

As a chemistry learner, write a report about the periodic trends of the elements and their oxides, and recommend improvements to the plant's production processes.

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#### 4) Sample Assessment Item (Practical)



#### ITEM

In an industrial town, a number of small-scale factories near a river have been reported to discharge wastewater containing various chemicals, including hydrochloric acid, into nearby drainage channels. Recently, the environmental supervisory body observed milky cloudiness and poor visibility in parts of the river, believed to exist due to chemical reactions.

The supervisory body suspects that the cloudiness could be a result of a reaction between sodium thiosulphate ( $\text{Na}_2\text{S}_2\text{O}_3$ ), commonly used in some textile industries and hydrochloric acid (HCl). The reaction produces elemental sulphur, which appears as a white precipitate and causes turbidity. To understand how this reaction contributes to pollution, it is important to study how varying concentrations of sodium thiosulphate affect the rate of reaction, and thus, the extent of pollution. You have been contacted to give recommendations based on your investigations.

You are provided with the following reagents:

- FA1 which is 0.1M Sodium thiosulphate solution
- FA2 which is 2M hydrochloric acid
- Distilled water
- A variety of laboratory apparatus and materials

#### Task

Design an experiment to determine the order of reaction with respect to the concentration of sodium thiosulphate in the reaction and write a report of your findings.

## 5) Scoring Learner's Response (Theory)

Output	Basis of evaluation	Score 4	Score 3	Score 2	Score 1
A structured technical report that explains key periodic trends and oxide properties, applies them to the plant's production context, and presents 3-5 evidence-based process improvement recommendations (with brief scientific justification for each).	<b>Interpretation of the scenario/Task:</b> <i>Understanding of Periodic Trends</i>	Accurately explains the trend in atomic radius and ionisation energy and connects it to reactivity.	Accurately explains both trends clearly with relevant connections to reactivity for one of the properties.	Explains both trends, but does not clearly link them to reactivity.	Misinterprets trends or states the trends with vague or inadequate explanations lacking understanding of reactivity implications.
	<b>Analysing the situation:</b> <i>Analysis of Compound Properties</i>	Thorough comparison of melting points and bonding types with accurate chemical reasoning.	Good comparison with mostly accurate explanations of bonding and melting points.	Basic comparison; some inaccuracies in bonding or melting point analysis.	Limited or inaccurate comparison; explanations are vague or partially incorrect.
	<b>Logical flow of ideas:</b> <i>Explanation of Molecular Structure</i>	Detailed and accurate description of silicon dioxide's structure, bonding, and industrial relevance.	Clear explanation of structure and bonding with relevant industrial links.	Basic description; some relevant points about structure and use.	Limited understanding of molecular structure or missing explanation of structure and industrial relevance/application.
	<i>Recommendations for Optimisation</i>	Innovative, feasible, and well-justified recommendations based on chemical evidence.	Practical and justified recommendations with some chemical reasoning.	Basic recommendations; justification is present, but limited.	Few recommendations; weak or unclear or no justification provided.
	<i>Scientific Communication</i>	Report is exceptionally well-organised, uses precise terminology, and includes diagrams or data effectively.	Report is well-structured, uses appropriate terminology, and includes some visuals.	Report is organised; terminology is mostly correct; visuals may be limited.	Report lacks clear structure; terminology is inconsistent or incorrect; visuals are minimal or no visuals used.

## 5) Scoring Learner's Response (Practical)

Output	Basis of evaluation	Score 4	Score 3	Score 2	Score 1
<i>A designed experiment that determines the reaction order with respect to the concentration of sodium thiosulphate, together with a written report presenting the method, results, analysis, and conclusions from the investigation.</i>	<b>Interpretation of task:</b> Aim, Variables and Hypothesis	i) Aim is precise, linked to theory; ii) Correctly Variables iii) Hypothesis is testable	i) Aim is precise, linked to theory; ii) Identifies all variables with minor gaps. iii) Hypothesis is testable with sound rationale and qualitative prediction.	i) General aim understandable but broad; ii) Incomplete identification of variables iii) Hypothesis is plausible but generic with limited rationale.	i) Vague/ambiguous/incorrect/missing aim with important elements missing; ii) Partial or misclassified or not identified variables with controls largely unspecified; iii) Hypothesis vague/missing.
	<b>Analysing the situation:</b> Materials and Reagents	Complete, accurate list with correct spelling and relevance to all planned tests; no unnecessary items.	Mostly complete list; minor omissions or small inaccuracies.	List contains most essential items, but with notable omissions.	List incomplete or inaccurate or irrelevant (important reagents missing).
	<b>Logical flow of ideas:</b>	i) Detailed, logical sequence of tests; ii) Steps clear, replicable, and systematic; iii) Safety/accuracy.	i) Detailed, logical sequence of tests; ii) Steps clear, replicable, and systematic iii) Safety/accuracy not catered for.	i) Detailed, logical sequence of tests; ii) Steps provided but some incomplete, disorganized, or lacking clarity. iii) Safety/accuracy not catered for.	i) No logical sequence of tests; ii) Steps provided but some incomplete, disorganized, or lacking clarity. iii) No safety/accuracy catered for.
	<b>Risks and Mitigations</b>	Identifies chemical/physical/biological hazards; cites GHS where relevant; specifies PPE, controls, spill/first aid and disposal steps compliant with policy.	Major hazards and PPE listed; reasonable mitigations; minor gaps.	Basic hazards acknowledged; generic PPE; limited mitigation detail.	Few hazards noted or hazards not addressed; mitigations insufficient or inappropriate.
	<b>Presentation of Data</b>	Tables/graphs are well formatted with titles, labels, units, correct significant figures; appropriate graph type; error bars/uncertainty shown where relevant.	Mostly correct formatting; minor unit/sig fig issues; graph type appropriate.	Basic table/graph with titles/units; no error representation; formatting inconsistent.	Disorganised layout; missing labels/units; inappropriate or confusing display.
	<b>Data Analysis and Interpretation</b>	Correct calculations; shows working; includes uncertainty/percent yield/error; accounts for anomalies with theoretical reasoning; interprets against hypothesis.	Calculations correct; basic error/percentages; sound interpretation; minor slips.	Essential calculations done; limited error treatment; interpretation reasonable but superficial.	Calculation errors and/or misinterpretation/or no analysis; ignores anomalies; weak linkage to theory.
	<b>Conclusion and Recommendation</b>	Conclusion directly supported by data; addresses hypothesis; acknowledges limitations; gives feasible improvements and real-world applications/implications.	Supported conclusion; notes some limitations; offers sensible improvements.	States conclusion; loosely tied to data; generic improvement notes.	Conclusion weak or contradicted by data or missing or incorrect; no limitations or next steps.