

ADVANCED LEVEL SECONDARY CURRICULUM

CHEMISTRY SYLLABUS

2025

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Foreword

The Ministry of Education and Sports, through the National Curriculum Development Centre (NCDC), has adapted the Advanced Level Curriculum by aligning it to the Lower Secondary Curriculum (LSC). This Chemistry syllabus is part of the adapted A level curriculum that is designed to prepare learners for skills development, career, livelihood and enable them make a positive contribution to the development of our motherland Uganda and the world at large.

The adapted A level curriculum is intended to offer continuity to the learners who have graduated from the Lower Secondary Curriculum (LSC) in terms of teaching, learning and assessment approaches. This curriculum, therefore, is competency-based, and provides for continuity from the Lower Secondary. The curriculum allows the learners to enhance the development of the 21st Century skills and generic skills acquired at Lower Secondary. It prepares the learners to advance in the application of what has been learnt to address the social-economic challenges. That is why the curriculum emphasises community participation as integral to learning.

This Chemistry syllabus promotes the learners' application of scientific knowledge to what happens in their communities in terms of energy resources, conservation of the environment, communication and other areas of application. It promotes the acquisition of Higher-order Thinking Skills (HOTS) such as inquiry, creativity and innovation, decision-making, critical thinking and problem-solving. It calls for learner-centred pedagogies with hands-on experience by the learners in real-life situations, while acknowledging different learner abilities and learning styles.

I therefore endorse this syllabus as the official document for teaching and learning Chemistry at the Advanced Level of Secondary education in Uganda.

Janet Kataaha Museveni

First Lady and Minister of Education & Sports

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Our gratitude goes to the Ministry of Education and Sports for overseeing the adaptation of the curriculum. The Curriculum Task Force of the Ministry of Education and Sports is particularly appreciated for overseeing and making timely decisions whenever necessary.

Special thanks go to the members of the public who made helpful contributions towards shaping this curriculum. Their efforts are invaluable towards having this curriculum implemented in schools and for improved quality of education in Uganda.

NCDC is also grateful to stakeholders including but limited to members of parliament, schools, universities and other tertiary institutions, who made inputs in the design and development of the adapted A level Curriculum. Additionally, NCDC appreciates the writing panels and professional bodies for their contributions to this task.

Lastly, NCDC acknowledges all those who worked behind the scenes and were part of the team that worked hard to finalise the adaptation process of this teaching syllabus.

NCDC takes responsibility for any shortcomings that might be identified in this publication and welcomes suggestions for effectively addressing the inadequacies. Such comments and suggestions may be communicated to NCDC through P. O. Box 7002, Kampala or Email: admin@ncdc.go.ug or on the Website: www.ncdc.go.ug

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SECTION ONE

1.0 INTRODUCTION

The Advanced Level Secondary Curriculum has been re-organised to align with the Lower Secondary Competency based model for ease of progression of learners from the Lower to Advanced Secondary Level. The alignment is as a result of the analysis of the existing Advanced Level curriculum published in 2013, to determine whether the content is:

- appropriate
- high pitched or overload
- covered at lower secondary
- obsolete
- repeated in different topics and redundant

The results from the curriculum analysis revealed that there were overlap of concepts with what was covered at the Lower Secondary as well as concepts within different topics of the same subject. In addition, a number of syllabuses had content that is no longer necessary for today's contemporary society and the 21st century. This led to content overloads in those syllabuses.

Learners with Special Educational Needs

The Adapted A-Level Curriculum is designed to empower all learners, including those with Special Educational Needs (SEN), to reach their full potential and contribute meaningfully to the nation. By incorporating inclusive strategies, the curriculum ensures equitable access to high-quality learning opportunities while maintaining high academic standards. It emphasizes creating an inclusive learning environment that supports the diverse needs of learners with SEN, enabling them to succeed alongside their peers.

Generic Skills

The generic skills are not separate subjects but lie at the heart of every Subject. They are the skills that enable the learner to access and deepen learning across the whole curriculum. They are embedded within the learning outcomes and learning activities of the different subjects.

The details of the Generic Skills and their indicators are:

Critical thinking and problem-solving

- Plan and carry out investigations
- Sort and analyse information
- Identify problems and ways forward
- Predict outcomes and make reasoned decisions
- Evaluate different solutions

Co-operation and self-directed Learning

- Work effectively in diverse teams

- Interact effectively with others
- Take responsibility for own learning
- Work independently with persistence
- Manage goals and time

Creativity and innovation

- Use imaginations to explore possibilities
- Work with others to generate ideas
- Suggest and develop new solutions
- Try out innovative alternatives
- Look for patterns and make generalisation

Communication

- Listen attentively and with comprehension
- Talk confidently and explain ideas/opinions clearly
- Read accurately and fluently
- Write and present coherently
- Use a range of media to communicate ideas

Mathematical computations

- Use numbers and measurements accurately
- Interpret and interrogate mathematical data
- Use mathematics to justify and support decisions

Information and Communication Technology (ICT) proficiency

- Use technology to create, manipulate and process information
- Use technology to collaborate, communicate and refine work

Diversity and Multicultural Skills

- Appreciate cultural diversity
- Appreciate other ethnic groups
- Share cultural values
- Respect for cultural practices

These skills enable an individual to adapt to change in order to cope with the challenges of life in the 21st Century.

Cross-cutting issues

These are issues which young people need to learn about, and are not confined to a particular subject but are studied across subjects. They help learners to develop an understanding of the connections between the subjects and the complexities of life as a whole. They are;

- i) Environmental awareness
- ii) Health awareness
- iii) Life skills
- iv) Mixed abilities and involvement
- v) Socio-economic challenges

vi) Citizenship and patriotism

These are a concern to all mankind irrespective of their areas of speciality. They are infused in the different learning outcomes of the different subjects.

Values

The curriculum is based on a clear set of values. These values underpin the whole curriculum and the work of schools. Learners need to base themselves on these values as citizens of Uganda. These values are derived from Uganda's National Ethical Values Policy (2013). They are;

- i) Respect for humanity and environment
- ii) Honesty, uphold and defend the truth at all times
- iii) Justice and fairness in dealing with others
- iv) Hard work for self-reliance
- v) Integrity; moral uprightness and sound character
- vi) Creativity and innovation
- vii) Social responsibility
- viii) Social harmony
- ix) National unity
- x) National consciousness and patriotism

These are not taught directly in lessons, nor are they assessed by pen and paper. However, they are incorporated in some learning outcomes and are developed as learners progress.

ICT integration

The use of Information and communication technologies (ICT) tools in teaching and learning while implementing this adapted curriculum is highly encouraged. Use of technology in teaching and learning is essential for the implementation of any competency-based curriculum because they encourage high levels of learner engagement, creativity, and lifelong learning. Teachers are encouraged to use ICT tools to generate interactive content, such as digital simulations and videos, that will bring abstract topics to life. Blended learning methodologies can be used with ICT platforms such as Google Classroom, Zoom, Microsoft Teams, or Google Docs to enhance collaboration and deliver customised feedback. Using ICT for teaching and learning will not only enhance the learning experience, but will also provide students with critical digital skills for the 21st century.

Changes in the Curriculum

The alignment of the existing A level Curriculum to that of the Lower Secondary was in the pedagogies of learning from a knowledge and objective-based approach to an integrated and learner-centred competency-based approach. The adapted syllabus, therefore, is a result of rationalising, integrating and merging content with overlaps and similar skills, dropping topics that had been studied at Lower Secondary, or, are no longer critical and relevant for the current learning needs while upgrading those that were of low competencies to match with the advanced level. The learning process as stipulated in the scope and sequence chart recognises the learning progression derived from the learning outcomes with corresponding assessment strategies. The

detailed syllabus page unfolds the learning experiences and achievement expectations as a process rather than an event.

This Chemistry syllabus is part of the Adapted A level Curriculum published for S5 intake for the learners who have studied under the Revised Lower Secondary Curriculum. It is important to read the whole syllabus before planning a teaching programme since some topics have been upgraded. While aligning this syllabus, efforts were made to ensure a smooth progression of concepts from Lower Secondary level, adapting topics and content with familiar features that are of value to the learner and the society. In addition, in the process of developing this syllabus content considered obsolete, high-pitched, as well as overlaps and overloads was removed.

Content Overview

The areas of study have been re-organised within the syllabus to come up with the adapted version. The subject areas of study are; theoretical understanding, practical skills, and real-world applications.

1. Theoretical Understanding

Chemistry theory provides the foundation for understanding the behavior of matter at the atomic, molecular, and macroscopic levels. Key areas include:

- i) Atomic structure and bonding, which explain the interactions and properties of substances.
- ii) Thermodynamics and kinetics, which elucidate energy changes and reaction speeds.
- iii) Organic chemistry, focusing on the structure, reactivity, and applications of carbon-based compounds.

This theoretical component builds critical analytical skills, enabling students to predict chemical behaviours, solve problems, and understand complex processes in both pure and applied chemistry.

2. Practical Skills and Laboratory Work

Practical work is at the heart of A-Level Chemistry, emphasizing hands-on experimentation and scientific inquiry. Students learn to:

- i) Design and conduct experiments safely and systematically.
- ii) Measure and analyze data accurately.
- iii) Use laboratory equipment effectively, from titrations and calorimetry to spectroscopic techniques.

Practical activities reinforce theoretical concepts by offering real-time observations and tangible results. They also develop critical thinking and troubleshooting skills essential for scientific and industrial research.

3. Real-World Applications

The syllabus bridges the gap between classroom chemistry and its applications in the real world. Students explore how chemistry is pivotal in:

- i) **Healthcare:** Developing pharmaceuticals, diagnostic tools, and medical devices.
- ii) **Energy:** Advancing renewable energy sources, batteries, and fuel technologies.
- iii) **Environment:** Managing pollution, recycling, and sustainable chemical practices.
- iv) **Industry:** Improving manufacturing processes, from materials development to food chemistry.

By connecting chemistry to real-world scenarios, students gain an appreciation for the subject's relevance and its role in addressing global challenges.

Time Allocation

The learners shall be engaged for nine (9) periods per week from senior five to senior six.

Suggested Approaches to Teaching Chemistry

The suggested approaches enhance learning and empower teachers to support the learners as they prepare for assessments. This will necessitate teachers to work alongside the learners to guide, direct, support, and supervise them as they progress through the research process. These approaches include:

- i) **Inquiry-based learning:** The learners are encouraged to investigate through research aided by ICT tools and solve problems through a series of questions and scenarios enhancing critical thinking, communication, and research skills.
- ii) **Experiential learning:** The learners actively participate in hands-on experiences during research, and learn through reflecting upon what they are doing which leads to the development of reflective skills.
- iii) **Problem and project-based learning:** The learners find solutions to problems through their experience in research and projects. This leads to the development of critical thinking, social, and research skills.
- iv) **Case-based learning:** The learners refer to real-world scenarios to discuss and analyse them, to develop critical thinking, analytical, and research skills.
- v) **Discovery learning:** The learners construct their own knowledge through active participation, exploration, and inquiry which encourages them to critically think, ask questions, and hypothesise through research.

Programme Planner

Class/ Term	Topic	Sub-topic		Periods
Senior Five Term 1	1. Moles and Equations	1.1	Masses of atoms and molecules, accurate relative atomic masses	09
		1.2	Amount of substance, mole calculations	12
		1.3	Chemical formulae and chemical equations	09
		1.4	Solutions and concentration, calculations involving gas volumes	21
	2. Atomic and Electronic Structure	2.1	Electron configurations of atoms and ions	12
		2.2	Radioactivity and its applications	15
	3. Bonding and Structure	3.1	Formation of ionic and metallic bonds	12
		3.2	Covalent bonds and molecular structures	18
Total				108

Class/ Term	Topic	Sub-topic		Periods
Senior Five Term 2	4. Periodicity I	4.1	The Periodic Table	06
		4.2	Variation in trends of properties across periods and the diagonal relationships	18
		4.3	Trends in properties of Group 2 elements	09
	5. Thermochemistry	5.1	Enthalpy changes and energy profiles	15
		5.2	Types of enthalpy changes and Hess's law	15
		5.3	Born-Haber cycles and lattice energy	15
	6. Organic Chemistry I	6.1	Introduction to organic compounds	15

Class/ Term	Topic	Sub-topic		Periods
		6.2	Alkanes, alkenes, alkynes	15
TOTAL				108

Class/ Term	Topic	Sub-topic		Periods
senior Five Term 3		6.3	Halogen compounds (Alkyl halides)	12
		6.4	Benzene and methyl benzene	15
	7. Equilibria I	7.1	The concept of Chemical Equilibrium	18
		7.2	Equilibria and the Chemical Industry	15
		7.3	Ionic Equilibrium, Hydrolysis of Salts and Buffer Solutions	30
		7.4	Solubility Equilibria	18
Total				108

Class/ Term	Topic	Sub-Topic		Periods
Senior Six Term 1	8. Equilibria II	8.1	Physical Equilibria	27
		8.2	Colligative Properties	18
	9. Organic Chemistry II	9.1	Alcohols and phenols	24
		9.2	Carbonyl compounds (aldehydes and ketones)	24
		9.3	Carboxylic acids and derivatives	15
Total				108

Class/ Term	Topic	Sub-topic		Periods
Senior Six Term 2	10. Electrochemistry	10.1	Redox reactions and oxidation numbers	18
		10.2	Electrochemical cells and applications	21

Class/ Term	Topic	Sub-topic		Periods
	11. Periodicity II	10.3	Electrolysis and Faraday's laws	15
		11.1	Trends in chemical properties of Group 14 elements and their compounds	15
		11.2	Trends in properties of Group 17 elements and their compounds	15
		11.3	The d-Block Transition Elements	24
Total				108

Class/ Term	Topic	Sub-Topic		Pds
Senior Six Term 3	12. Organic Chemistry III	12.1	Amines	18
		12.2	Polymers and Polymerisation	18
	13. Reaction Kinetics	13.1	Rate equations and orders of reaction	18
		13.2	Factors affecting rates of reactions	18
Total				72

SECTION TWO

DETAILED SYLLABUS

Senior Five Term 1

Topic 1: Moles and Equations

Duration: 51 Periods

Topic competency: The learner analyses stoichiometric relationships, evaluates experimental methods, and synthesises solutions to complex chemical problems.

Sub-topic 1.1: Masses of Atoms and Molecules, Accurate Relative Atomic Masses

Periods: 09

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategy
a. evaluate the relationship between atomic masses and isotopic abundances in calculating accurate relative atomic masses. (u, s)	a. In groups, learners discuss atomic masses, isotopes, and relative atomic masses. Use real examples from the Periodic Table.	a. Observe the learners' group discussion session to assess their levels of interaction, confidence, and respect for one another's opinions. b. Ask learners to find their level of understanding of the relationship between the atomic masses and isotopic masses of an element. c. Review learners' written responses to assess their coherence in explaining how to obtain relative atomic mass from isotopic masses.

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategy
b. synthesize methods to determine accurate relative atomic mass using given isotopic data. (u, s)	a. As a whole class, learners watch a video on the working of a mass spectrometer or individually, search for information about the working of the spectrometer and its application in daily life, discuss their findings in groups, and make presentations. b. In groups, learners carry out activities to interpret isotopic data such as isotope masses and relative abundance and use it to calculate relative atomic masses.	a. Observe learners' level of attention and participation in group discussions and presentations. b. Engage the learners in discussions to assess their comprehension of the working of the mass spectrometer and interpretation of data. c. Evaluate learners' written calculations for accuracy when determining relative atomic masses from isotopic masses.

Sub-topic 1.2: Amount of Substance, Mole Calculations

Periods: 12

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
a. analyse the concept of the mole as a fundamental unit of measurement for chemical substances and perform complex mole calculations in chemical reactions. (u, s)	a. In groups, learners use prior knowledge to discuss Avogadro's number and the mole concept using visuals to illustrate these ideas. b. In pairs, the learners complete worksheets with tasks involving the calculation of moles in chemical reactions.	a. Check learners' confidence and collaboration in the group discussion. b. Engage learners in discussion to assess their reasoning about strategies used in calculations. c. Assess the accuracy of calculations.
b. formulate strategies for calculating moles in	a. In pairs, learners use a Problem-Based approach to solve multi-step mole	a. Check learners' participation activities involving solving

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
compounds and reactions. (u, s)	calculation exercises in different contexts (emphasise correct units).	<p>problems on the mole concept.</p> <p>b. Probe learners to assess their reasoning for the methodology in solving problems on mole concepts.</p> <p>c. Evaluate learners' accuracy and coherence of written responses.</p>

Sub-topic 1.3: Chemical Formulae and Chemical Equations

Periods: 09

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
a. construct balanced chemical equations for given reactions, including synthesis, decomposition, and combustion reactions. (u, s)	a. In pairs, learners use prior knowledge to practice and demonstrate balancing equations with correct formulae and state symbols.	<p>a. Monitor learners' level of involvement in completing tasks on writing balanced equations.</p> <p>b. Question learners to evaluate reasoning in writing balanced equations.</p> <p>c. Review the accuracy of the balanced equations and correctness of formulae.</p>
b. critically examine the relationships between empirical and molecular formulae in representing compounds. (u, s)	<p>a. In groups, learners perform experiments to determine the empirical formula of Magnesium oxide.</p> <p>b. In groups, learners use worksheets to determine empirical and molecular formulae through a series of problem sets</p>	<p>a. Evaluate learners' ability to organise, plan and manipulate apparatus during laboratory activities.</p> <p>b. Probe learners' reasoning to assess the level of understanding of the relationship between</p>

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
	and contextual applications.	empirical and molecular formulae. c. Assess learners' solutions to problems on formulae for accuracy.

Sub-topic 1.4: Solutions and Concentration, Calculations Involving Gas Volumes

Periods: 21

Learning Outcome <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
apply the principles of concentration and gas laws to accurately calculate molarity and gas volumes in various solutions and reactions. (u, s)	a. Individually, learners search for information on the preparation of standard solutions and their use in calculations, discuss their findings in their groups, and make reports. b. In groups, learners carry out experiments to prepare solutions of different molarities and use them to standardize other solutions. c. In groups, learners use worksheets to carry out calculations involving Gay Lussac's and Avogadro's law to determine amounts of substances.	a. Monitor learners as they make presentations, checking the accuracy of their submissions. b. Ask learners to explain gas law principles and molarity to assess their understanding of the concept. c. Evaluate learners' written solutions to calculations for consistency and accuracy.

Topic 2: Atomic and Electronic Structure

Duration: 27 Periods

Topic competency: The learner deduces electronic configurations, evaluates their implications for chemical properties and bonding, and synthesises models to predict atomic behaviour in various contexts.

Sub-topic 2.1: Electron Configurations of Atoms and Ions

Periods: 12

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
apply the Aufbau principle, Pauli exclusion principle, and Hund's rule to write electronic configurations of atoms and ions and use them to predict reactivity. (u, s)	<ol style="list-style-type: none">Individually, learners use the Internet, demonstration videos, or suitable textbooks to search for information on principles of writing electronic configurations, discuss their findings in groups, and write electronic configurations of atoms and ions.In groups, learners use visual aids such as energy level diagrams to illustrate principles of writing electronic configurations.In pairs, learners use a problem-based approach to carry out exercises involving writing configurations of selected atoms and ions and predicting reactivity.	<ol style="list-style-type: none">Watch learners as they discuss to assess their confidence and respect for one another's opinion while determining electronic configurations.Engage learners in a discussion to assess their level of conceptualization of the s, p, d, f principle of writing electronic configurations.Evaluate the written electronic configurations for correct application of s, p, d, and f principles.

Sub-topic 2.2: Radioactivity and Its Applications

Periods: 15

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
a. examine the nature and types of radioactive decay and apply this knowledge to predict decay rates and half-lives in specific elements. (k, u, s)	a. In groups, learners search for information about radioactive decay, nuclear stability, decay rates, and half-life, discuss their findings, and carry out related calculations. b. In groups, learners use a problem-based approach to solve mathematical problems on radioactive decay and half-life.	a. Evaluate the level of participation in group discussions. b. Engage learners in discussions to assess how much they know about applications and effects. c. Assess the accuracy and coherence of written responses to problems on radioactive decay and half-life.
b. evaluate the principles of radioactivity in real-life applications, such as in medicine, industry, and environmental science and the associated health, environmental, and ethical implications of radioactive materials. (u, v/a)	a. Individually, learners search for information about applications and effects of radioactivity, discuss their findings in groups and make presentations. b. In groups, learners analyse case studies on applications of radioactivity in real life. c. Learners engage in a class debate to evaluate the ethical and related safety implications of radioactivity.	a. Monitor level of involvement of learners in the group discussions and debate. b. Ask learners to explain the safety and ethical implications of radioactivity to assess their appreciation. c. Evaluate the reports of the learners and debate for accuracy of facts and coherence.

Topic 3: Bonding and Structure

Duration: 30 Periods

Topic competency: The learner analyses the types of chemical bonds and molecular structures, and relates them to the properties and uses of substances in real-life contexts.

Sub-topic 3.1: Formation of Ionic and Metallic Bonds

Periods: 12

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
a. justify the formation of ionic and metallic bonds based on electron transfer and electrostatic forces. (u, s)	a. In groups, learners use prior knowledge to design models illustrating electron transfer in ionic bonding and electron pooling in metallic bonding.	a. Check the level of planning, manipulation, creativity, accuracy, and participation in hands-on model building. b. Discuss with the learners to assess understanding of the relationship between properties, structure, and bond strength. c. Evaluate the accuracy, creativity, and clarity of the models.
b. evaluate the properties of ionic and metallic compounds in relation to bond strength and structural composition. (u)	a. Individually, learners search for information about the properties of ionic and metallic bonds, their relative strengths, and how they relate to their properties, discuss in their groups, and make presentations.	a. Monitor the learners' involvement and respect for one another's opinions in the discussion groups. b. Check the learners' understanding of the relationship between properties of substances and bond strength by asking probing questions. c. Assess the learners' written reports for accuracy and coherence.

Sub-topic 3.2: Covalent Bonds and Molecular Structures

Periods: 18

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
a. analyse the formation of covalent bonds including dative covalency and explain molecular structures by applying VSEPR theory to predict molecular shapes and bond angles. (u, s)	a. Individually, learners search for information about covalent bonding, dative covalency, and the principles of VSEPR theory, discuss their findings in groups, and make presentations. b. In groups, learners predict, draw shapes of molecules and ions, and build 3D molecular models based on VSEPR theory.	a. Observe the learners' discussion about covalent bonding to assess the level of interaction and how confidently they present their ideas. b. Probe the learners to justify how they applied VSEPR theory to draw and design molecular shapes and models. c. Evaluate learners' drawn models and structures for accuracy.
b. analyse the polarity of molecules based on molecular structure and electron distribution. (u)	a. Individually, learners search for information about the bond and molecular polarity in relation to differences in electro negativity with emphasis on hydrogen bonding and Van der Waal's forces, discuss their findings in their groups, and make reports. b. In pairs, learners use problem-based methods to carry out exercises involving different molecular structures and their properties and make reports.	a. Monitor the learners as they discuss molecular and bond polarity to assess their level of confidence and clarity of facts. b. Probe the learners to assess their understanding of the difference between bond and molecular polarity. c. Evaluate the reports for accuracy and coherence.

Senior Five Term 2

Topic 4: Periodicity 1

Duration: 33 Periods

Topic competency: The learner analyses the trends and periodic properties of elements, to explain and predict the reactivity and properties of elements in the Periodic Table.

Sub-topic 4.1: The Periodic Table

Periods: 06

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
a. evaluate how the Periodic Table is organized based on atomic number and properties, recognizing its historical significance. (u, s)	a. Learners watch a video or search for information on the historical development of the Periodic Table (from Mendeleev's design to Mosely's atomic concept), discuss its organisation, and write group reports. b. In groups, learners use samples of the modern periodic table to explore, discuss its organisation and respond to specific tasks such as identifying similarities in blocks, groups and periods (use the IUPAC form with 18 groups).	a. Observe the learners' level of engagement in group discussions. b. Ask the learners to articulate the historical reasons for certain arrangements in the Periodic Table to clear any misconceptions. c. Evaluate written reports of the learners for coherence and accuracy.
b. analyse the position of elements to predict their chemical behaviour, considering periodic trends. (u, s, v/a)	a. In groups, the learners use an Inquiry-Based Approach to predict trends in properties such as reactivity based on element positions and make reports. b. Learners engage in problem-solving tasks where they predict the	a. Observe the learners to assess reasoning skills and teamwork during discussions. b. Engage the learners in one-on-one discussions to gauge understanding of trends.

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
	reactivity of unknown elements based on the position of elements in the Periodic Table.	c. Collect and review the learners' predictions on element behaviour for accuracy.

Sub-topic 4.2: Variation in Trends of Properties Across Periods and the Diagonal Relationships

Periods: 18

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
a. analyse the periodic physical and chemical properties in the Periodic Table, identifying patterns and exceptions. (u, s)	<p>a. Individually, learners search for information about the periodic physical properties of elements in the Periodic Table (melting point, atomic radius, ionisation energy, electron affinity, electronegativity, electropositivity), discuss their findings in groups and make joint reports.</p> <p>b. Learners apply the Jig saw method by working in groups, with each group focusing on one trend and teaching it to the rest of the class.</p> <p>c. In groups, learners use data sets of periodic trends (ionisation energy, electron affinity, atomic radius, ionic radius, electronegativity) to analyse and graph this data to infer</p>	<p>a. Monitor participation in group discussions.</p> <p>b. Ask probing questions to evaluate understanding of trends and exceptions.</p> <p>c. Evaluate data interpretations and completed plotted graphs for comprehension of trends.</p>

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
<p>b. justify the variation in physical and chemical properties across period 3, incorporating diagonal relationships. (u, s v/a)</p>	<p>relationships and patterns, identifying exceptions.</p> <p>a. Learners individually search for information about the physical properties of period 3 elements (physical state, melting points, structure and bonding, metallic character), discuss their findings in groups and present reports.</p> <p>b. Learners apply problem-based learning to analyse sets of data relating to the physical properties of elements in period 3.</p> <p>c. In groups, learners conduct laboratory activities where they observe chemical properties (reactivity with water, dilute acids and alkali) of elements like sodium, magnesium, and aluminium and sulphur. Record observations, draw inferences and present their reports.</p> <p>d. Individually, learners search for information about the oxides (structure and bonding, melting points, reaction with dilute acids, alkalis and water) and chlorides (structure and bonding, melting</p>	<p>a. Observe the learners to assess the level of participation in group discussions and data analysis.</p> <p>b. Ask questions to assess understanding of physical and chemical properties of period 3 elements and their compounds.</p> <p>c. Assess group presentations and reports for accuracy and depth of understanding.</p>

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
	<p>points, reaction with dilute acids, alkalis and water) of period 3 elements, discuss their findings in groups and present reports.</p> <p>e. In groups, learners carry out test tube experiments to identify Magnesium and Aluminium ions.</p> <p>f. Individually, learners search for information about diagonal relationships between Lithium and Magnesium and also between Beryllium and Aluminium.</p>	

Sub-topic 4.3: Trends in Properties of Group 2 Elements

Periods: 09

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
investigate the reactivity and properties of Group 2 elements and their compounds in relation to their applications in industry. (s, v/a)	<p>a. Individually, learners search for information about the physical properties (melting point, metallic radii and density) of group 2 elements, discuss their findings in groups and make reports.</p> <p>b. In pairs, learners use problem-based learning to interpret data on the physical properties of group 2 elements.</p> <p>c. In groups, learners carry out experiments to investigate the reactivity of</p>	<p>a. Assess learners' skills in planning, manipulation of apparatus and safety management during experiments.</p> <p>b. Probe learners' opinions, methodology used in experiments and assess knowledge of linkages of the metals to industrial uses.</p> <p>c. Evaluate group presentations and reports for the</p>

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
	<p>Group 2 metals with air, water and dilute acids.</p> <p>d. In groups, learners carry out laboratory experiments to investigate solubility, effect of heat and action of dilute acids on compounds of group 2 (Hydroxides, Sulphates, nitrates and carbonates).</p> <p>e. In pairs, learners carry out test tube experiments to identify ions in group 2 compounds $(Ca^{2+}, Ba^{2+}, CO_3^{2-}, Cl^-, SO_4^{2-}, NO_3^-)$</p> <p>f. Individually, learners search for information on the applications of Group 2 elements and their compounds, discuss their findings in groups and make presentations.</p> <p>g. In groups, learners carry out projects to make different industrial products from group 2 compounds.</p>	<p>accuracy, depth and coherence.</p>

Topic 5: Thermochemistry

Duration: 45 Periods

Topic competency: The learner analyses and evaluates thermodynamic principles and processes to predict the spontaneity and feasibility of chemical reactions and processes.

Sub-topic 5.1: Enthalpy Changes and Energy Profiles

Periods: 15

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
a. synthesise energy profiles for exothermic and endothermic reactions, explaining the concept of enthalpy change. (u, s)	a. In groups, learners use prior knowledge to discuss, draw and explain energy profiles for endothermic and exothermic reactions. b. In pairs, learners carry out experiments to demonstrate exothermic and endothermic reactions.	a. Monitor and assess the learners' planning, manipulation and safety management skills during experiments. b. Ask the learners to explain the differences between exothermic and endothermic reactions to check their knowledge of the concepts. c. Assess drawn energy profiles for correct depiction and explanations.
b. evaluate the role of activation energy in reaction mechanisms using energy profile diagrams. (u, v/a)	a. Individually, learners search for information about activation energy, discuss their findings in groups and make reports.	a. Monitor the learners' level of participation in group discussions. b. Assess the learners' understanding of activation energy by asking them key questions. c. Evaluate drawn diagrams for accurate representation of activation energy changes, reports for accuracy and coherence.

Sub-topic 5.2: Types of Enthalpy Changes and Hess's Law

Periods: 15

Learning Outcome <i>The learner should be able to:</i>	Suggested Learning Activities	Suggested Assessment Strategies
a. analyse different types of enthalpy changes and the conditions under which they occur, including their significance in thermochemical equations. (k, u)	a. Individually, learners search for information about enthalpy of reaction, formation, atomisation, bond energy, combustion, and neutralization, with real-life examples and discuss in groups their findings. b. Learners explore Hess's law by drawing simple energy cycle diagrams to deduce expected energy changes. c. In pairs, learners are engaged in problem-solving exercises using thermochemical equations.	a. Monitor the learners to assess the level of interaction and how they confidently express themselves in group discussions. b. Probe the learners to assess their understanding of the different types of enthalpies of reaction. c. Assess the accuracy of learners' responses to the problem-solving exercises.
b. apply Hess's law to calculate unknown enthalpy changes using energy cycles and enthalpy data. (s)	a. In pairs, learners engage in exercises where they apply Hess's law by using energy cycle diagrams, and thermochemical equations to solve given tasks. b. Individually, learners practice constructing energy cycle diagrams to apply Hess's law.	a. Observe the learners to assess their level of engagement and participation in solving problems. b. Assess the learners' ability to justify the use of energy cycle diagrams and thermochemical equations by asking key questions. c. Assess the learners' responses to the tasks for accuracy.

Sub-topic 5.3: Born-Haber Cycles and Lattice Energy

Periods: 15

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Suggested Assessment Strategies
a. analyse the concept of lattice energy, its role in the formation of ionic compounds, and describe the steps involved in constructing Born-Haber cycles. (k, u, s)	a. Individually, learners search for information on the concept of lattice energy, factors affecting lattice energy, its role in the formation of ionic compounds, and how it can be calculated using the Born Haber cycle, discuss their findings in groups, and make a report. b. In pairs, learners engage in practice exercises involving the calculation of lattice enthalpies.	a. Monitor the learners to assess levels of participation in group discussions about Born- Haber cycles involving lattice energies. b. Ask the learners to explain the concept of lattice energy and the steps in Born-Haber cycles to assess their understanding. c. Evaluate the learners' reports for skill of drawing Born- Haber cycles and correctness of responses to practice exercises.
b. apply Born-Haber cycles to solve problems involving the calculation of lattice energies and related thermodynamic quantities. (s)	a. In pairs, learners engage in problem-solving exercises involving the relationship between lattice energy, hydration energy, and enthalpy of solution. b. In groups, learners use case studies to analyse sets of data on lattice energy to predict the stability of ionic compounds.	a. Check the learners' level of engagement in finding solutions for tasks in exercises. b. Ask the learners to explain the methodology used in solving problems in the exercises. c. Evaluate the learners' written responses to tasks for accuracy.

Topic 6: Organic Chemistry I

Duration: 57 Periods

Topic competency: The learner analyses the structures, functional groups, and reactivity of organic compounds, and applies knowledge of organic reactions and organic reaction mechanisms to synthesise organic molecules.

Sub-topic 6.1: Introduction to Organic Compounds

Periods: 15

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Suggested Assessment Strategies
a. apply principles of organic chemistry to understand the classification and general characteristics of organic compounds, including functional groups, homologous series, and the concept of isomerism. (k, u)	a. Individually, learners search for information about the unique nature of carbon in organic compounds, such as how single, double, and triple bonds are formed, and engage in a teacher-led discussion. b. In groups, learners use molecular models to demonstrate functional groups and homologous series (C_nH_{2n+2} , C_nH_{2n} , C_nH_{2n-2}). c. In groups, learners use models to illustrate different types of isomers and create models of isomers for a given molecular formula and display their work. d. In groups, learners engage in a teacher guided discussion to explain the different properties of isomers.	a. Monitor the learners' confidence, accuracy of facts, and involvement during the teacher-led discussion about the unique nature of carbon. b. Discuss with the learners to assess justification for the choice of materials used in making the models. c. Assess the accuracy of responses to practice exercises involving drawing and naming simple organic compounds.
b. use IUPAC nomenclature to name different organic compounds. (u, s)	a. In pairs, learners practice naming and drawing organic	a. Observe the process of drawing and naming organic compounds to assess learners'

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Suggested Assessment Strategies
	molecules following IUPAC rules. b. In groups, learners analyse molecular structures to identify functional groups. c. Individually, learners carry out problem-solving exercises involving structure prediction based on functional groups.	interaction and participation. b. Question the learners to assess their knowledge of using IUPAC in naming organic compounds. c. Assess the correctness of responses to written exercises requiring the use of IUPAC nomenclature.

Sub-topic 6.2: Alkanes, Alkenes and Alkynes

Periods: 15

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Suggested Assessment Strategies
a. apply principles of organic chemistry to differentiate between alkanes, alkenes, and alkynes, and explain their physical properties based on molecular structure. (k, u)	a. Individually, learners search for information about the physical properties of alkanes, alkenes, and alkynes, discuss their findings in groups, and make reports. b. In groups, learners use molecular models to demonstrate bonding and structure in hydrocarbons. c. In groups, learners carry out laboratory experiments to observe the physical properties of the various functional groups of hydrocarbons (e.g. solubility, melting point).	a. Observe the learners during laboratory experiments to assess the planning, manipulation of apparatus and safety management skills. b. Probe the learners to assess their skills in interpreting results from experiments on functional groups of hydrocarbons. c. Assess the learners' reports from experiments and discussions for accuracy and coherence.

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Suggested Assessment Strategies
b. predict the reactivity and reaction mechanisms of alkanes, alkenes, and alkynes. (s)	a. Individually, learners search for information about the reactivity and reaction mechanisms of alkanes (uv-catalyzed chlorination), alkenes (Hydrogen, hydrogen halides, acidified water, halogens, Polymerisation and oxidation using potassium manganate (VII), discuss their findings in their groups and make reports. (NB: Addition reactions of alkenes are similar to those of alkynes). b. In pairs, learners carry out test-tube reactions to identify the double bond in alkenes using bromine water and potassium manganate (VII). c. In pairs, learners practice the writing of reactions and their mechanisms using worksheets. d. In groups, learners use case studies to explore the different applications of alkenes and alkynes in everyday life and make reports.	a. Observe the learners' discussions on reactivity and mechanisms of hydrocarbons to assess interaction and confidence in presentation. b. Discuss with the learners to assess their understanding of principle of writing addition reaction mechanisms. c. Evaluate written reports and mechanisms of reactions of hydrocarbons for accuracy and coherence.

Senior Five Term 3

Sub-topic 6.3: Halogen Compounds (Alkyl Halides)

Periods: 12

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
a. analyse the structure and properties of alkyl halides in terms of their reactivity with different reagents, identifying substitution and elimination reactions. (k, u, s)	a. Individually, learners search for information about the structure, nomenclature, and physical properties of alkyl halides, discuss their findings in groups, and make reports. b. Individually, learners search for information about the chemical properties of alkyl halides with different reagents (alkali, cyanide, ammonia, alcoholic alkali, reaction with metals) including synthesis, discuss their findings in their groups and make reports. c. In groups, learners create a visual map comparing substitution and elimination mechanisms, including key factors (e.g., reagents, solvents, temperature).	a. Monitor discussions of the learners about alkyl halides to assess learners' involvement and the ability to develop visual maps. b. Discuss with the learners to assess their understanding of the industrial impact and ethical considerations regarding products from alkyl halides. c. Assess the learners' reports on the physical and chemical properties of alkyl halides for accuracy of facts and coherence.
b. evaluate the uses and impacts of alkyl halides in industrial processes. (u, v/a)	a. In groups, learners analyse case studies involving the role of alkyl halides in industry, including environmental impacts, and discuss and make presentations.	a. Monitor discussions and presentations to assess participation, accuracy of facts, and respect for others. b. Discuss with the learners to assess their understanding of

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
		<p>the role of the alkyl halides in industry.</p> <p>c. Evaluate the learners' reports for accuracy of facts about the role of alkyl halides and their impact on the environment.</p>

Sub-topic 6.4: Benzene and Methyl Benzene

Periods: 15

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
a. compare benzene and methyl benzene in terms of structure, stability, and reactivity in electrophilic substitution reactions. (k, u, s)	<p>a. Individually, learners search for information about the structures of benzene, and methylbenzene in terms of their stability and reactivity. They discuss their findings in groups and make reports.</p> <p>b. In groups, learners discuss the difference between electrophilic substitution reactions involving benzene and methyl benzene, and make a report.</p> <p>c. In pairs, learners practice writing equations and mechanisms of electrophilic substitution reactions involving benzene and methylbenzene.</p>	<p>a. Monitor the learners' discussion to assess engagement and communication skills during discussions to understand the structures of benzene and methyl benzene.</p> <p>b. Engage the learners in discussions to assess their understanding of the difference between benzene and methyl benzene in terms of structure, stability and reactivity.</p> <p>c. Evaluate the accuracy of learners' reports, written equations, and mechanisms of reactions.</p>
b. analyse the environmental and health impacts of	a. In groups, learners analyse case studies involving the effects of	a. Assess the learners' participation in a discussion involving

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
benzene derivatives. (u, v/a)	benzene derivatives on health and the environment and discuss and present written reports.	analysing the health and environmental impact of benzene derivatives. b. Ask the learners to assess their knowledge of the impact of benzene derivatives on health and the environment. c. Assess the accuracy of the learners' reports about the effects of benzene derivatives on health and the environment.

Topic 7: Equilibria I

Duration: 81 Periods

Topic competency: The learner analyses principles of chemical equilibrium and applies them to explain and solve problems related to industrial processes, ionic equilibria, buffer systems, and solubility equilibria in various chemical and real-world contexts.

Sub-topic 7.1: The Concept of Chemical Equilibrium

Periods: 18

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
a. evaluate the dynamic nature of chemical equilibrium and determination of equilibrium constants. (k, u, s)	<p>a. Individually, learners' search for information about conditions for equilibrium, characteristics of the dynamic equilibrium, nature of chemical equilibrium systems, types of chemical equilibrium and equilibrium constants, discuss their findings in groups, and make presentations (derivation of the relationship between K_c and K_p not required).</p> <p>b. Learners carry out experiments to determine K_c involving the esterification of ethanol and ethanoic acid using concentrated Sulphuric acid.</p> <p>c. In groups, learners use work sheets to</p>	<p>a. Observe the learners to assess their planning, manipulation of apparatus, safety management skills and respect for one another during laboratory work.</p> <p>b. Discuss with the learners to assess their interpretation of observations from laboratory work.</p> <p>c. Evaluate written responses of the learners for accuracy of calculations of K_c and K_p.</p>

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
	discuss and solve mathematical problems about K_c and K_p .	
b. predict how closed systems respond to stress, by applying Le Chatelier's principle. (u, s, v/a)	a. Individually, learners search for information about the different factors that affect chemical equilibria, discuss their findings in groups and make presentations. b. In groups, learners use digital simulation tools such as PhET to explore equilibrium dynamics by modifying conditions and observing shifts. c. In pairs, learners use worksheets to practice solving problems involving Le Chatelier's principle and predict shifts.	a. Check the learners' skills of ICT proficiency in using digital software to explore equilibrium dynamics. b. Probe the learners to assess their methodology in completing worksheet tasks involving Le Chatelier's principle. c. Assess the correctness of the learners' reports on practising problems involving Le Chatelier's principle.

Sub-topic 7.2: Equilibria and the Chemical Industry

Periods: 15

Learning Outcome <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
evaluate how temperature, concentration, and pressure influence chemical equilibrium and propose methods to optimize reaction conditions in industrial applications. (u, v/a)	a. In groups, learners discuss real-life applications of equilibrium shifts, such as in industrial processes. b. In groups, learners analyse industrial applications of chemical equilibria,	a. Monitor the learners to assess their confidence in expression and interaction during discussions about real-life applications of chemical equilibria. b. Discuss with the learners to assess

Learning Outcome <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
	such as the Haber process and contact process where equilibrium control is essential.	<p>their understanding of the application of chemical equilibria in industry.</p> <p>c. Assess the learners' reports about the application of chemical equilibria for accuracy and coherence.</p>

Sub-topic 7.3: Ionic Equilibrium, Hydrolysis of Salts and Buffer Solutions

Periods: 30

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
a. apply the concepts of ionic equilibrium, including the dissociation of acids and bases, the pH scale, the hydrolysis of salts, and how buffer solutions maintain pH stability in chemical systems. (k, u, s)	<p>a. Individually, learners search for information about theories of acids and bases, acid and base dissociation constants, and pH calculation, discuss their findings, and make reports.</p> <p>b. In pairs, learners apply problem-based learning to perform practice exercises to solve mathematical problems involving pH and dissociation constants.</p> <p>c. Individually, learners search for information about the hydrolysis of salts and hydrolysis constants (K_h), discuss their findings, and make reports.</p>	<p>a. Observe the learners as they carry out laboratory experiments to assess their level of interaction within the group.</p> <p>b. Discuss with the learners to assess their understanding of theories of acids and bases.</p> <p>c. Assess written reports of the learners from discussion and practice exercises for accuracy and coherence.</p>

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
	<ul style="list-style-type: none"> d. In pairs, learners apply problem-based learning to carry out practice exercises to solve mathematical problems involving hydrolysis constants. e. Individually, learners search for information about buffer solutions, their preparation, mode of action, and pH calculation, discuss their findings and make reports. f. In groups, learners perform laboratory experiments to prepare buffer solutions of a given (pH). g. In pairs, learners use worksheets to practice solving mathematical problems involving the (pH) of buffer solutions. 	
b. evaluate the role of buffer solutions in biological and environmental systems, predicting their behaviour under acidic or basic conditions. (u, a/v)	a. Individually, learners search for information on the role of buffer solutions in biological and environmental systems, discuss their findings in groups, and make presentations.	<ul style="list-style-type: none"> a. Check the learners as they discuss to assess their level of participation and confidence in presenting during group discussions on applications of buffers. b. Discuss with the learners to assess their appreciation of the importance of buffer solutions. c. Evaluate reports of the learners about biological and environmental

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
		applications of buffer solutions for accuracy and coherence.

Sub-topic 7.4: Solubility Equilibria

Periods: 18

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
a. investigate the factors affecting solubility equilibria, calculate solubility product (K_{sp}), and predict precipitation in different ionic solutions. (k, u, s)	a. Individually, learners search for information on solubility, solubility product, and prediction of precipitation, discuss their findings in groups, and make presentations. b. In groups, learners carry out experiments to determine solubility and solubility products of salts using salts such as calcium iodate and sodium oxalate. c. In groups, learners apply problem-based learning to solve mathematical problems involving solubility equilibria.	a. Monitor the learners as they perform experiments to assess planning, manipulation and safety management skills and also level of participation. b. Engage in discussions with the learners to gauge the level of skills in calculation of solubility products. c. Evaluate reports of the learners from experiments, discussion on solubility, solubility product and prediction of precipitation and exercises for accuracy and coherence.
b. apply the concept of solubility equilibria to real-life scenarios, such as water treatment and mineral formation. (s, v/a)	a. In groups, learners study, analyse, and discuss case studies involving real-life applications of solubility in fields like geology and environmental science.	a. Monitor the learners to assess their level of participation in group discussions involving real-life applications of solubility. b. Engage in discussions with the learners to gauge their level of

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
		<p>knowledge on the applications of solubility equilibria in real life.</p> <p>c. Evaluate reports of the learners and case study task solutions involving applications of solubility equilibria for accuracy.</p>

Senior Six Term 1

Topic 8: Equilibria II

Duration: 45 Periods

Topic competency: The learner applies principles of physical equilibria and colligative properties to analyse and predict changes in physical systems, including phase transitions and effects of solute concentration on solution behaviour, in scientific and real-world contexts.

Sub-topic 8.1: Physical Equilibria

Periods: 27

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
a. evaluate the principles of Raoult's Law in ideal and non-ideal solutions, distinguishing their behaviours under varying conditions. (u, s, v/a)	<p>a. Individually, learners search for information about two-component systems involving miscible liquids, Raoult's Law, and non-ideal solutions, discuss their findings in groups, and prepare reports.</p> <p>b. In pairs, learners apply problem-based learning to solve problems using Raoult's law and its deviations and write reports.</p> <p>c. Learners analyse data by drawing vapor pressure/boiling point</p>	<p>a. Monitor the learners' level of engagement in group discussions about two component systems.</p> <p>b. Ask the learners to explain Raoult's Law, deviations and its applications to gauge their level of knowledge about the concept.</p> <p>c. Assess reports about two component systems involving Raoult's law, drawings of pressure/boiling point vs. mole fraction and responses from</p>

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
	<p>vs. mole fraction and interpreting the phase diagrams for ideal and non-ideal solutions.</p> <p>d. In groups, learners use digital simulations (e.g., PhET Interactive Simulations) to visualize molecular interactions in ideal and non-ideal solutions.</p> <p>e. In groups, learners discuss how the principle of separation of miscible liquids is applied in distillation and separation of azeotropic mixtures.</p>	<p>set tasks for accuracy and coherence.</p>
<p>b. evaluate properties of two component systems involving immiscible liquid mixtures and their applications in real-life. (u, s, v/a)</p>	<p>a. Individually, learners search for information about properties of immiscible liquids, steam distillation and solvent extraction, discuss their findings in groups and make reports.</p> <p>b. In pairs, learners use problem-based learning to solve mathematical problems on steam distillation (molecular mass determination and composition of distillate).</p> <p>c. In groups, learners carry out experiments to determine partition coefficients between immiscible liquid mixtures.</p>	<p>a. Observe the learners' planning, manipulation and safety management skills in carrying out experiments on partition coefficients between immiscible liquid mixtures.</p> <p>b. Probe the learners to justify methodology used in dealing with mathematical problems on steam distillation.</p> <p>c. Evaluate the reports of the learners from research on steam distillation, experiments on partition coefficients, and related mathematical</p>

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
	d. In pairs, learners use problem-based learning to solve mathematical problems on partition coefficient and its application in solvent extraction.	problems for accuracy and coherence.
c. analyse the behaviour of solid-liquid mixtures and their applications in industry. (u, s, v/a)	a. Individually, learners search for information about solid-liquid mixtures, phase diagrams for simple eutectic mixtures, and their applications, discuss their findings, and write reports. b. Learners work in pairs to construct phase diagrams for solid-liquid systems with simple eutectics and explain their features.	a. Take note of the learners' involvement in constructing phase diagrams. b. Discuss with the learners to gauge their understanding of the difference between eutectic mixtures and compounds. c. Assess the accuracy of reports from the discussion on phase diagrams for simple eutectic mixtures, and their applications and how representative the drawn phase diagrams on solid liquid systems are.

Sub-topic 8.2: Colligative Properties

Periods: 18

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
analyse colligative properties such as boiling point elevation and freezing point depression, and relate them to solute	a. Individually, learners search for information about the effect of adding non-volatile solutes to solvents on boiling point, freezing point, osmotic	a. Evaluate the learners' collaboration and experimental design skills on the effect of adding non-volatile solute to a solvent on

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
concentration in different solutions. (u, s)	<p>pressure, and vapour pressure, discuss their findings and make reports.</p> <p>b. In groups, learners carry out experiments to demonstrate the effect of adding non-volatile solute to a solvent on freezing point (using naphthalene or stearic acid), boiling point, and vapour pressure.</p> <p>c. In pairs, learners carry out exercises to calculate molecular mass and changes in boiling/freezing points with varied solute concentrations.</p>	<p>freezing point.</p> <p>b. Gauge the learners' level of appreciation of real-life applications of colligative properties by asking them probing questions.</p> <p>c. Assess the learners' reports about calculations about colligative properties and reports from discussions on different colligative properties for accuracy and coherence.</p>

Topic 9: Organic Chemistry II

Duration: 63 Periods

Topic competency: The learner analyses reaction mechanisms, evaluates reaction pathways and conditions, and designs multi-step syntheses to achieve target compounds (considering alcohols, phenols, carbonyl compounds).

Sub-topic 9.1: Alcohols and Phenols

Periods: 24

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
a. analyse the structure, nomenclature, physical and chemical properties of alcohols and phenols. (u, s)	a. Individually, learners search for information about the structure, nomenclature, preparation and physical properties of alcohols and phenols, discuss their findings	a. Monitor the learners on skills of planning, design, manipulation of apparatus and also respect for one another during laboratory experiments on

Learning Outcomes The learner should be able to:	Suggested Learning Activities	Sample Assessment Strategies
	<p>in groups and make reports (preparation of phenols not required).</p> <p>b. Individually, learners search for information about the chemical properties of alcohols and phenols and their mechanisms, discuss their findings in groups and make reports.</p> <p>c. In pairs, learners use problem-based learning to carry out exercises on chemical reactions of alcohols and phenols and their mechanisms.</p> <p>d. In groups, learners perform test tube experiments on identification and reactions of alcohols (include distinction between classes) and phenols and write reports.</p>	<p>identification and reactions of alcohols and phenols.</p> <p>b. Ask the learners to explain observed reactivity differences between alcohols and phenols to assess their understanding.</p> <p>c. Assess completed reports from research on structure, nomenclature, preparation and physical properties of alcohols and phenols and laboratory experiments for accuracy and interpretation of data.</p>
<p>b. evaluate the applications of alcohols and phenols in real-life. (u, v/a)</p>	<p>a. In groups, learners analyse case studies to evaluate the applications of alcohols and phenols in real-life and make presentations.</p> <p>b. In groups, learners carry out projects to make useful products from alcohols and phenols.</p>	<p>a. Evaluate the learners' level of participation in planning and execution of project work.</p> <p>b. Gauge the learners' understanding of the project process by asking probing questions on reasons, choice of projects and methodology used.</p> <p>c. Assess completed reports of projects and responses from case study tasks for</p>

Learning Outcomes The learner should be able to:	Suggested Learning Activities	Sample Assessment Strategies
		accuracy and coherence.

Sub-topic 9.2: Carbonyl Compounds (Aldehydes and Ketones)

Periods: 24

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
a. analyse the structure, preparation and reactivity of aldehydes and ketones, identifying how functional groups affect chemical behaviour in different environments. (u, s)	a. Individually, learners search for information about the structure, nomenclature, preparation (by oxidation of alcohols) and physical properties of carbonyl compounds, discuss their findings in groups and make presentations. b. Individually, learners search for information about chemical properties of carbonyl compounds and their mechanisms, discuss their findings in groups and write reports. c. In pairs, learners use problem-based learning to carry out exercises on chemical reactions of carbonyl compounds and their mechanisms: i) Addition reactions ii) Condensation reactions (hydroxylamine and Brady's reagent) iii) Redox reactions iv) Reaction with iodine d. In groups, learners perform test tube experiments on identification and reactions of carbonyl	a. Track the learners' level of participation in discussions and laboratory work on identification and reactions of carbonyl compounds. b. Engage the learners in discussion to gauge their knowledge of physical and chemical properties of carbonyl compounds. c. Assess laboratory reports for proper interpretation and explanations and also reports from discussions for accurate representation of facts on chemical reactions of carbonyl compounds and their mechanisms.

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
	compounds and write reports.	
b. evaluate the different applications of carbonyl compounds in real life. (u, v/a)	a. Learners work in groups to analyse case studies involving applications of carbonyl compounds in real life and present their findings. b. In groups, learners identify and carry out projects to produce products from carbonyl compounds and write reports.	a. Evaluate the level of the learners' engagement and interaction during project work on products from carbonyl compounds. b. Discuss with the learners to assess the choices made in identification and project pathway design. c. Evaluate the project reports on making products from carbonyl compounds, responses of tasks from case studies for accuracy and creativity.

Sub-topic 9.3: Carboxylic Acids and Derivatives

Periods: 15

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
a. analyse the structure, nomenclature, preparation and properties of carboxylic acids and their derivatives (esters, acyl chlorides).	a. Individually, learners search for information about the structure, nomenclature, preparation (by hydrolysis of esters & oxidation) and properties of carboxylic acids and their derivatives, discuss their findings in groups and make reports. b. In groups, learners use problem-solving approach to perform	a. Monitor planning and manipulation of apparatus skills and also level of participation meanwhile carrying out experiments on reactions of carboxylic acids and identification of the functional group. b. Engage the learners in question-and-answer discussion about acidity variations of

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
	<p>exercises on reactions of carboxylic acids and their derivatives and make reports.</p> <p>c. In pairs, learners carry out laboratory tests on reactions of carboxylic acids and identification of the functional group in acids.</p>	<p>different carboxylic acids.</p> <p>c. Assess laboratory reports on reactions of carboxylic acids and reports from discussions for correctness of facts about carboxylic acids and their derivatives.</p>
<p>b. evaluate the different applications of carboxylic acids and their derivatives in real life. (u, v/a)</p>	<p>a. In groups, learners analyse case studies involving applications of carboxylic acids and their derivatives in real life and write reports.</p> <p>b. Learners work in groups to identify and carry out projects to make products from carboxylic acids and their derivatives and make reports.</p>	<p>a. Evaluate the level of engagement and interaction during project work on products from carboxylic acids and their derivatives.</p> <p>b. Discuss with the learners to assess their choices made in identification and project pathway design.</p> <p>c. Evaluate the reports of projects and responses to tasks from case studies on applications of carboxylic acids and their derivatives for accuracy and creativity.</p>

Senior Six Term 2

Topic 10: Electrochemistry

Duration: 42 Periods

Topic competency: The learner analyses redox reactions, electrochemical processes and electrochemical cells, applies the principles of electrode potentials to predict reaction spontaneity and electrolysis outcomes.

Sub-topic 10.1: Redox Reactions and Oxidation Numbers

Periods: 18

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
a. analyse the concept of redox reactions, including the identification of oxidation and reduction processes, and assign oxidation numbers to elements in compounds and ions. (k, u, s)	a. Individually, learners search for information about the concept of oxidation and reduction, finding oxidation numbers in binary compounds and ions, discuss their findings in groups and make reports. b. In pairs, learners use work sheets to solve problems involving calculation of oxidation numbers for binary compounds and ions.	a. Monitor the level of the learners' engagement in group discussions on finding oxidation numbers. b. Ask the learners to explain key concepts about redox reactions to gauge their understanding. c. Assess the learners' reports on finding oxidation numbers in binary compounds and ions, for accuracy and coherence.
b. apply the rules for determining oxidation numbers to balance redox equations (in acidic and basic media) and predict the products of redox reactions in various chemical contexts, including redox titrations. (u, s)	a. In groups, learners engage in a teacher guided discussion to write balanced redox equations and related quantitative calculations and share their findings. b. In pairs, learners use problem-based learning to perform exercises involving balancing redox equations and related	a. Observe the learners as they make presentations checking on the accuracy of facts; and also contributions of the team members to the presentations relating to writing balanced redox equations. b. Gauge the level of understanding by asking the learners to

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
	<p>calculations and write reports.</p> <p>In groups, learners carry out quantitative experiments on redox titration involving common redox reagents.</p>	<p>explain their choice of methodology during the practical activities on redox titrations.</p> <p>Evaluate the learners' reports from balancing redox equations and quantitative experiments for accuracy and coherence.</p>
<p>c. evaluate the importance of redox reactions in industrial and biological systems, explaining their impact on processes like respiration and corrosion. (u, s, v/a)</p>	<p>a. In groups, learners analyse case studies involving real-life applications of redox reactions and make presentations.</p> <p>b. Learners work in groups to identify and carry out projects involving redox reactions.</p>	<p>a. Monitor the learners' creativity, planning, and participation in project work involving redox reactions.</p> <p>b. Discuss with the learners to assess their choice of procedures used during project work on redox reactions.</p> <p>c. Assess the reports from projects and presentations from real-life applications of redox reactions for accuracy and creativity.</p>

Sub-topic 10.2: Electrochemical Cells and Applications

Periods: 21

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
a. analyse the structure and functioning of electrochemical cells, including galvanic (voltaic) and electrolytic cells, and describe the role of electrodes, electrolytes, and the movement of ions in these cells. (u, s)	a. Individually, learners search for information about electrode potentials and electrochemical cells, discuss their findings and make presentations. b. In groups, learners design and construct a simple electrochemical cell using copper and zinc electrodes, measure voltage and explain the reactions at each electrode. c. In pairs, learners carry out exercises about redox potentials and reactions and write reports.	a. Evaluate the learners' presentations on electrode potentials and electrochemical cells for clarity and accuracy of facts. b. Engage the learners in discussions to assess their appreciation of real-life applications of electrode potentials. c. Evaluate constructed electrochemical copper and zinc cell for functionality and reports from redox reaction exercises for accuracy and coherence.
b. apply principles of electrochemistry to calculate cell potentials, predict the feasibility of redox reactions, and evaluate the industrial applications of electrochemical cells, such as in batteries, electroplating, and corrosion prevention. (u, s, v/a)	a. Learners engage in a guided class discussion about the significance of electrochemical cells in batteries, renewable energy, and sustainable solutions. b. In groups, learners carry out projects involving real-life applications of electrode potentials.	a. Monitor the learners' participation in the discussion and engagement during project work. b. Discuss with the learners to assess their justification for choice of projects and methodology. c. Evaluate presentations of the learners about electrode potentials and electrochemical cells for accuracy and creativity.

Sub-topic 10.3: Electrolysis and Faraday's Laws

Periods: 15

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
apply Faraday's laws to calculate the quantities of substances produced during electrolysis in various electrolytes. (k, u, s)	<ul style="list-style-type: none"> a. Learners engage in a class discussion to review prior knowledge about the concept of electrolysis. b. Individually, learners search for information about the process of electrolysis, Faraday's laws and how to calculate quantities of substances liberated at electrodes, discuss their findings and write reports. c. In pairs, learners use problem-based learning to perform exercises on Faraday's laws and calculate amounts of substances produced at electrodes. 	<ul style="list-style-type: none"> a. Monitor the learners' participation during class discussions about prior knowledge on the process of electrolysis. b. Ask the learners to explain their understanding of Faraday's laws in practical contexts. c. Assess the learners' reports from discussion on the process of electrolysis, Faraday's laws and how to calculate quantities of substances for accuracy.

Topic 11: Periodicity II

Duration: 51 Periods

Topic competency: The learner analyses the trends in physical and chemical properties of Group 14 elements, Group 17 elements and d-block elements and relates these trends to their applications in industrial and environmental contexts.

Sub-topic 11.1: Trends in Properties of Group 14 Elements and their Compounds

Periods: 15

Learning Outcomes The learner should be able to:	Suggested Learning Activities	Sample Assessment Strategies
a. examine the general trends in physical properties, chemical reactivity, oxidation states, and bonding within Group 14 elements, with emphasis on their unique characteristics and variations down the group. (k, u, s)	a. Individually, learners search for information about properties of Group 14 elements such as melting point, metallic character, bond energy, structure and bonding, reaction with water, air and halogens, discuss in groups about their findings and make reports. b. In groups, learners carry out test tube experiments on the qualitative analysis of lead II compounds. c. In pairs, learners apply problem-based learning to carry out exercises about properties of Group 14 elements and write reports.	a. Observe the learners to assess their: i) interaction and collaboration during discussion. ii) practical skills of carrying out test experiments. b. Talk to the learners to assess their critical thinking ability in using problem-based information to carry out exercises about properties of Group 14 elements. c. Evaluate the accuracy and coherence of the learners' reports.
b. analyse the properties of chlorides and oxides of Group 14 elements and use them to explain the stability of the different oxidation states. (u, s)	a. Individually, learners search for information about the physical properties (structure and bonding, melting points/boiling points) and chemical properties (thermal stability, reaction with water) of Group 14	a. Observe the learners to find out their level of involvement in discussions and skills of carrying out test tube experiments. b. Talk to the learners to assess their critical thinking ability in use of work sheets to

Learning Outcomes The learner should be able to:	Suggested Learning Activities	Sample Assessment Strategies
	<p>chlorides, discuss their findings and write reports.</p> <p>b. In pairs, learners use work sheets to perform exercises on explaining trends and writing equations about chlorides of Group 14 elements.</p> <p>c. Individually, learners search for information about the physical properties (structure and bonding, melting points/boiling points) and chemical properties (bonding, thermal stability, reaction with water, acids and alkalis) of Group 14 oxides, discuss their findings and write reports.</p> <p>d. In pairs, learners use work sheets to perform exercises on explaining trends and writing equations about reactions of oxides of Group 14 elements.</p> <p>e. Learners carry out test tube experiments to identify Pb^{2+} and Sn^{2+} ions.</p>	<p>perform exercises on trends and writing equations about chlorides of Group 14.</p> <p>c. Assess the learners' reports for accuracy and coherence.</p>

Learning Outcomes The learner should be able to:	Suggested Learning Activities	Sample Assessment Strategies
c. evaluate the applications and limitations of Group 14 elements and compounds in technology and industry. (u, v/a)	a. Individually, learners search for information about applications and limitations of Group 14 elements and compounds in technology and industry, discuss their findings in groups and make reports. b. In groups, learners carry out projects about the application of Group 14 elements and their compounds in real life.	a. Monitor the learners as they discuss and carry out the projects to assess their involvement in discussion, project planning and execution. b. Discuss with the learners to assess their reasoning for choice and methodology of projects. c. Assess the accuracy and coherence of the learners' reports.

Sub-topic 11.2: Trends in Properties of Group 17 Elements and their Compounds

Periods: 15

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
a. examine the trends in electronegativity, boiling points, and reactivity of Group 17 elements and their compounds, relating them to their physical and chemical properties. (k, u, s)	a. Individually, learners search for information about properties of Group 17 elements such as boiling point/melting point, atomic radius, colour, and electronegativity, discuss in their groups, and make reports. b. Learners work in pairs using worksheets to respond to tasks about the physical	a. Gauge the learners': i) level of involvement in group discussions ii) skill of carrying out laboratory experiments b. Engage the learners into discussions to find out their critical thinking ability in using worksheets to respond to tasks about the physical

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
	<p>properties of Group 17 elements.</p> <p>c. Individually, learners search for information about the chemical reactions of halogens with;</p> <p>i) Metals</p> <p>ii) Hydrogen</p> <p>iii) Alkalis (disproportionation)</p> <p>iv) Water</p> <p>They discuss their findings in groups and make reports.</p> <p>d. Individually, learners search for information about properties of compounds of Group 17 elements (hydrides and oxoacids) such as acidic strength, bond energy, displacement reactions, discuss in groups and make reports.</p> <p>e. Learners work in pairs using worksheets to respond to tasks about the chemical properties of Group 17 elements.</p> <p>f. Learners work in pairs to carry out test tube experiments to identify Cl^-, Br^-, and I^- ions and make reports.</p>	<p>properties of Group 17 elements.</p> <p>c. Assess the learners' reports and worksheets for accuracy.</p>
<p>b. evaluate the impact of Group 17 elements in daily life and industry,</p>	<p>a. In groups, learners analyse case studies about applications of</p>	<p>a. Observe the learners to assess their interaction and</p>

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
particularly in disinfection and manufacturing, considering both advantages and environmental concerns. (u, s, v/a)	<p>Group 17 elements and their compounds in daily life considering both advantages and environmental health concerns and make reports.</p> <p>b. In groups, learners carry out projects about the application of Group 17 elements and their compounds in real life.</p>	<p>collaboration during discussion.</p> <p>b. Talk to the learners to assess their critical thinking ability in analysing case studies about applications of Group 17 elements and their compounds in daily life, considering both advantages and environmental health concerns.</p> <p>c. Assess the learners' reports for accuracy and coherence.</p>

Sub-topic 11.3: The d-Block Transition Elements

Periods: 24

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
a. analyse trends of physical properties of the first series of the d-block elements (atomic radius, melting point, ionisation energy, density) across the period and compare them with s-block elements. (k, u, s)	<p>a. Individually, learners search for information about the periodic physical properties of the transition elements, comparing them with s-block elements, discuss their findings in groups and write reports.</p> <p>b. Learners analyse case studies about periodic physical properties of transition elements,</p>	<p>a. Observe the learners to assess their;</p> <p>i) interaction and collaboration during discussion</p> <p>ii) level of attentiveness in watching videos</p> <p>iii) practical skills of carrying out test experiments</p> <p>b. Talk to the learners to assess their critical</p>

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
	interpret them and respond to given tasks.	thinking ability in analysing case studies about periodic physical properties of transition elements and interpreting them. c. Assess the learners' reports for accuracy and coherence.
b. evaluate the properties of transition elements, explaining concepts like variable oxidation states, complex formation, coloured ions, magnetic properties and catalytic behaviour. (k, u, s)	a. Individually, learners search for information about electronic structure, magnetic properties and catalytic properties of transition elements, discuss their findings in groups and make presentations. b. Individually, learners search for information about complex ion formation (shapes and isomerism not required) and naming of complexes of transition elements, discuss their findings in groups and make reports. c. In groups, learners engage in a guided discussion with the teacher to practice naming of complex ions. d. As a class, learners watch a video on variable oxidation states and coloured	a. Observe the learners to assess their: <ul style="list-style-type: none"> i) interaction and collaboration during discussion. ii) level of attentiveness in watching videos. iii) practical skills of carrying out test experiments. b. Converse with the learners to assess their; <ul style="list-style-type: none"> i) critical thinking in the use of problem-based information to solve tasks involving redox reactions of transition elements. ii) ability to comprehend information presented in videos. c. Assess the learners' reports for accuracy and coherence.

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
	<p>ions of transition elements and respond to set tasks.</p> <p>e. In pairs, learners perform test tube experiments to identify common transition metal ions such as;</p> <p>Fe^{2+}, Fe^{3+}, Co^{2+}, Ni^{2+}, Mn^{2+}, Cr^{3+}, Cu^{2+} and Zn^{2+}</p> <p>and make reports.</p> <p>f. In groups, learners use problem-based learning to solve problems involving redox reactions of transition metal ions.</p>	
<p>c. critique the role of transition metals in industrial processes, medicine, and biological systems, assessing both their utility and environmental or health risks. (u, v/a)</p>	<p>a. Individually, learners search for information about the applications and risks involved in using transition elements, discuss their findings and write reports.</p> <p>b. In groups, learners carry out projects on the uses and environmental concerns of transition metals in various fields.</p>	<p>a. Check the learners' ability for planning and level of participation in project work.</p> <p>b. Discuss with the learners to assess their:</p> <p>i) understanding about application and risks involved in the use of transition elements.</p> <p>ii) decisions during project work.</p> <p>c. Evaluate learners' reports for creativity and innovation.</p>

Senior Six Term 3

Topic 12: Organic Chemistry III

Duration: 36 Periods

Competency: The learner analyses the chemical properties, industrial applications, and environmental impacts of amines and polymers, evaluates their social and ecological implications and proposes innovations and sustainable solutions for addressing challenges in their use and disposal.

Sub-topic 12.1: Amines

Periods: 18

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
a. analyse the structure, nomenclature, preparation and properties of amines in relation to their functional group. (k, u, s)	a. Individually, learners search for information about the structure, nomenclature, physical properties and reactions of amines, discuss their findings in groups and make reports. b. Learners work in groups to construct molecular models to demonstrate primary, secondary, and tertiary amine structures. c. In pairs, learners apply problem-based learning to perform exercises and fill worksheets on nomenclature and properties of amines. d. Learners work in pairs to carry out test tube experiments involving reactions of amines.	a. Watch the learners as they discuss, model structures of molecules, perform exercise to assess their: i) collaboration spirit. ii) respect for one another's involvement. iii) skills to manipulate apparatus during experiment. b. Probe the learners to find out their perception about chemical nature and use of amines in real life. c. Evaluate written experiment reports produced by learners for accuracy and consistency of procedure.
b. evaluate the industrial and biological significance of amines,	a. In groups, learners examine case studies involving examples of amines in	a. Assess the learners' commitment in collaborating, engaging in project

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
and assess their roles in real life. (u, s, v/a)	<p>pharmaceuticals and dyes and discuss their functions.</p> <p>b. In groups, learners carry out projects involving the use of amines in daily life.</p>	<p>activities and presentation skills.</p> <p>b. Engage the learners into discussion to assess their critical thinking in;</p> <p>i) analysing case studies.</p> <p>ii) choosing projects.</p> <p>iii) planning and executing projects.</p> <p>iv) depth of understanding and relevance of application.</p> <p>c. Evaluate the learners' presentations and reports for coherence and accuracy of facts.</p>

Sub-topic 12.2: Polymers and Polymerization

Periods: 18

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
a. synthesize information on the types of polymerisation (addition and condensation), including the mechanisms involved in forming polymers from monomers, and distinguish between natural and synthetic polymers based on	<p>a. As a class, learners watch a video about the process of addition and condensation, polymerisation and use the information to hold group discussions and perform related tasks.</p> <p>b. In groups, learners use the Inquiry-Based approach to compare the properties of</p>	<p>a. Assess the learners' level of attention in watching video and engagement in the discussions.</p> <p>b. Discuss with the learners to assess how they can predict and explain properties of polymers based on polymerisation type.</p> <p>c. Review the learners' written reports for</p>

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
their structures and properties. (u, s)	different polymers created through each type of polymerization. c. In pairs, learners perform exercises involving formation, classification and properties of polymers.	accuracy and coherence.
b. evaluate the environmental impact of polymers with emphasis on artificial polymers, proposing sustainable alternatives and analysing recycling techniques. (u, s, v/a)	a. As a class, learners engage in a debate on the pros and cons of synthetic polymers. b. In groups, learners carry out projects on polymers and sustainable alternatives to synthetic polymers.	a. Watch the learners' participation in: i) debate for confidence and clarity of communication. ii) projects for reasoning skills during the debate. b. Discuss with the learners to assess their reasoning and critical thinking ability about polymers and sustainable alternatives to synthetic polymers. c. Evaluate the learners' project reports for feasibility and usefulness.

Topic 13: Reaction Kinetics

Duration: 36 Periods

Topic competency: The learner evaluates factors influencing reaction rates, and applies the principles of reaction, mechanisms and rate laws to predict the speed of chemical reactions under various conditions.

Sub-topic 13.1: Rate Equations and Orders of Reaction

Periods: 18

Learning Outcome <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
deduce rate equations from experimental data, determine the order of reactions, and explain the significance of rate constants. (u, s, v/a)	<ol style="list-style-type: none">Individually, learners search for information about key concepts in reaction kinetics such as rate of reaction, rate law, molecularity of reaction, mechanisms of reaction, discuss in their groups and make reports.Learners engage in a teacher-guided discussion and use kinetic data provided to determine the order of reaction, rate constant and half-life.Learners engage in guided discussions to analyse and interpret graphical data and use it to determine the order of reaction (first- and zero-order reactions), rate constant and half-life. (Derivations of integrated forms of orders of reaction are not required).In pairs, learners design experiments to determine orders of reaction (iodination of propanone and decomposition of hydrogen peroxide) and make reports.	<ol style="list-style-type: none">Assess the learners':<ol style="list-style-type: none">level of co-operation with peers.confidence and respect for one another's opinions during discussions.Converse with the learners to find out their reasoning in interpreting kinetic data.Evaluate the learners' written reports for accuracy and coherence.

Sub-topic 13.2: Factors Affecting Rates of Reactions

Periods: 18

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
a. evaluate how temperature, concentration, surface area, and catalysts affect reaction rates by applying collision theory to support conclusions. (u, s, v/a)	a. In groups, learners use prior knowledge to discuss the effect of different factors on reaction rates, linking them to the collision theory, and then write reports. b. In pairs, learners experimentally determine the activation energy of a redox reaction between ethanedioate ions and manganate (VII) ions in the acidic medium, and make reports.	a. Observe the learners to find out their; <ul style="list-style-type: none"> i) confidence and respect for one another's opinions during discussions. ii) skills in manipulating apparatus during laboratory experiments. b. Converse with the learners to find out their reasoning about how factors that affect the rate of reaction can be usefully applied in real-life contexts. c. Evaluate the learner's written reports for accuracy and coherence.
b. evaluate the influence of factors affecting reaction rates in industrial contexts, critically analysing how optimizing reaction rates benefits production processes. (u, s, v/a)	a. In groups, learners analyse industrial case studies where reaction rate optimisation is crucial and role-play as industry chemists, presenting solutions.	a. Observe the learners to find out their level of engagement and analytical skills in case studies and role-plays. b. Discuss with the learners to assess their objectiveness and critical thinking about the industrial relevance of reaction optimisation. c. Assess the learners' written case study analyses for thoroughness and

Learning Outcomes <i>The learner should be able to:</i>	Suggested Learning Activities	Sample Assessment Strategies
		application of concepts.

ASSESSMENT

Assessing Chemistry

The adapted curriculum sets new expectations for learning, with a shift from Objectives to Learning Outcomes that focus mainly on the application of knowledge and deeper learning that leads to the acquisition of skills. These Learning Outcomes require a different approach to assessment. The “Learning Outcomes” in the syllabi are set out in terms of Knowledge, Understanding, Skills, Values and Attitudes. This is what is referred to by the letters k, u, s v & a.

It is not possible to assess attitudes in the same way as knowledge, understanding and skills because they are more personal and variable, and are long-term aspirations. This does not mean that values and attitudes are not important or cannot be assessed. They too can be assessed but not easily done through tests and examinations. Values and attitudes can be assessed over a period of time through observing and having interactions with the learner.

So, this section focuses on knowledge, understanding and skills. Each has its own implications for learning and assessment.

To assess knowledge and its application, understanding and skills, we need to look for different things. Knowledge can be assessed to some extent through written tests, but the assessment of skills, application of what is learnt and deeper understanding requires different approaches. Because of this, the role of the teacher in assessment becomes much more important.

Formative Assessment

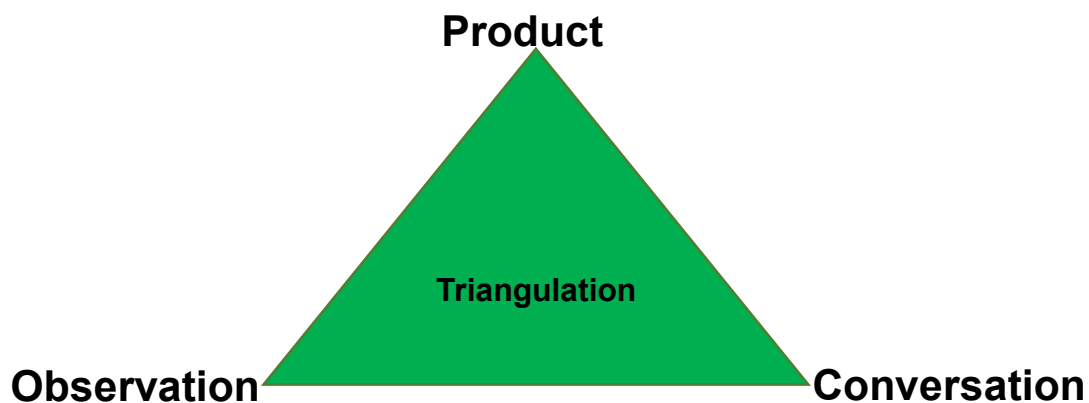
In this aligned curriculum, the teacher’s assessment role is not only to write tests for learners, but to make professional judgements about learners’ learning in the course of the normal teaching and learning process. The professional judgement is about how far the learner achieves the Learning Outcomes that are set out in this syllabus. To make these judgements the teacher needs to look at how well the learners are performing in terms of each Learning Outcome.

The formative assessment opportunities occur in three forms. They can be done through:

- Observation** – watching learners working (good for assessing skills, values and attitudes)

- b. **Conversation** – asking questions and talking to learners (good for assessing knowledge and understanding)
- c. **Product** – appraising the learner’s work (writing, report, translation, calculation, presentation, map, diagram, model, drawing, painting etc). In this context, a “product” is seen as something physical and permanent that the teacher can keep and look at, not something that the learner says.

When all three are used, the information from any one can be checked against the other two forms of assessment opportunity (e.g. evidence from “observation” can be checked against evidence from “conversation” and “product”). This is often referred to as “triangulation”



Assessing Generic Skills

The Generic Skills have been built into the syllabuses and are part of the Learning Outcomes. It is therefore not necessary to assess them separately. It is the increasingly complex context of the subject content that provides progression in the Generic Skills, and so they are assessed as part of the subject Learning Outcomes. Assessing generic skills is done with the help of **an observation checklist and scoring rubric**.

Assessing Values/Attitudes

It is not possible to assess values and attitudes in the same way as knowledge, understanding and skills because they are more personal and variable and are long-term aspirations. This does not mean that attitudes are not important. It means that we must value things that we cannot easily assess through tests and examination. However, values and attitudes can be assessed over a long period of time through observing and interactions.

Assessment of Project-based learning

Project-based learning is a teaching method in which learners or participants gain knowledge and skills by engaging for an extended period of time to investigate and respond to an authentic challenge. The task must have a driving question and it involves sustained inquiry.

Project-based learning is assessed using a rubric and an observation checklist.

Examinations

There will be only one school based summative assessment at the end of the year. There will no longer be examinations or tests set at the beginning and end of every term. Instead, there will be a summing up of on-going teacher assessments made in the context of learning through end of topic scenario-based tasks (Activities of Integration). The learners will also be subjected to the end of cycle assessment for certification.

Record keeping

In competency-based learning, accurate and comprehensive record keeping is crucial to track learners' progress and achievements. Therefore, the teacher and school **must keep accurate records about learners' achievement.**

Various assessment tools and strategies are employed to capture learners' demonstration of abilities and achievements, including observation checklists, rubrics, and scoring grids. These tools provide a holistic picture of learners' strengths, weaknesses, and areas for improvement.

The collected data and evidence from these assessments are correctly recorded and maintained in learners' files, portfolios and anecdotal notes.

Glossary of Key Terms

TERM	DEFINITION
Competency Curriculum	One in which learners develop the ability to apply their learning with confidence in a range of situations.
Differentiation	The design or adaptation of learning experiences to suit an individual learner's needs, strengths, preferences, and abilities.
Formative Assessment	The process of judging a learner's performance, by interpreting the responses to tasks, to gauge progress and inform subsequent learning steps.
Generic Skills	Skills which are deployed in all subjects, and which enhance the learning of those subjects. These skills also equip young people for work and life.
Inclusion	An approach to planning learning experiences which allows each student to feel confident, respected, safe and equipped to learn at his or her full potential.
Learning Outcome	A statement which specifies what the learner should know, understand, or be able to do within a particular aspect of a subject.
Process Skill	A capability acquired by following the programme of study in a particular Learning Area; enables a learner to apply the knowledge and understanding of the Learning Area.
Sample Assessment Activity	An activity which allows a learner to show the extent to which s/he has achieved the Learning Outcomes. This is usually part of the normal teaching and learning process and not something extra at the end of a topic.
Suggested Learning Activity	An aspect of the normal teaching and learning process that will enable a formative assessment to be made.