Marietta City Schools

2024–2025 District Unit Planner

Teacher(s)	IB Chemistry PLC	**Subject Group and Course**	Group 4 - Chemistry		
Course Part and Topic	**UNIT 4 - APPLICATIONS OF ORGANIC CHEMISTRY** Reactivity 3.3 - Electron Sharing Reactions Reactivity 3.4 - Electron-Pair Sharing Reactions	**SL or HL / Year 1 or 2**	SL Year 2	**Dates**	Semester 2 (6 weeks)
Unit Description and Texts		**DP Assessment(s) for Unit**			
Resources for 2025 “New” Syllabus ● Brown et al. *Pearson Baccalaureate Standard Level Chemistry*, 3rd edition ● Bylikin et al. *Oxford IB Diploma Programme: Chemistry Course Companion*, 2023 edition. ● Talbot et al. *Chemistry for the IB Diploma Programme*, 3rd edition. ● IB Chemistry Guide First Assessment 2025 ● InThinking IB subject site for Chemistry ● IB Chemistry Schoology Course Resources for 2016 “Old” Syllabus ● Murphy et al. *Oxford IB Diploma Programme: Chemistry Course Companion*, 2014 edition. ● Brown and Ford. *Pearson Baccalaureate Standard Level Chemistry*, 2nd edition. ● Hodder Study and Revision Guide for the IB Diploma ● Hodder IA Internal Assessment for Chemistry		● Unit 04 Summative Assessment - *Paper 1 and 2 questions modeled after the real IB Exam Papers (2025 syllabus)*			

INQUIRY: establishing the purpose of the unit

Transfer Goals *List here one to three big, overarching, long-term goals for this unit. Transfer goals are the major goals that ask students to "transfer" or apply their knowledge, skills, and concepts at the end of the unit under new/different circumstances, and on their own without scaffolding from the teacher.*
Phenomenon: Organic molecules react in a predictable manner based on their structures and functional groups present. Statement of Inquiry: Alkanes and alkenes react differently with halogens; alkanes undergo substitution reactions while alkenes undergo addition reactions. 1. **Students can** evaluate and predict the reactivity of various chemical species, including radicals, nucleophiles, and electrophiles, in unfamiliar reactions by applying their understanding of bond breaking (homolytic and heterolytic fission), electron movement (curly arrows), and reaction mechanisms. 2. **Students can** construct accurate models (using diagrams, equations, and arrow notation) to represent radical substitution and nucleophilic or electrophilic reactions, applying these concepts to new contexts such as organic synthesis or industrial chemical processes.

ACTION: teaching and learning through inquiry

Content / Skills / Concepts - Essential Understandings	**Learning Process** *Check the boxes for any pedagogical approaches used during the unit. Aim for a variety of approaches to help facilitate learning.*
Reactivity 3.3.1 **A radical is a molecular entity that has an unpaired electron. Radicals are highly reactive.** ● Identify and represent radicals, e.g. $\cdot CH_3$ and $Cl\cdot$ **Reactivity 3.3.2** **Radicals are produced by homolytic fission, e.g. of halogens, in the presence of ultraviolet (UV) light or heat.** ● Explain, including with equations, the homolytic fission of halogens, known as the initiation step in a chain reaction.	Learning experiences and strategies/planning for self-supporting learning: ☒ Lecture □ Socratic seminar ☒ Small group/pair work

- The use of a single-barbed arrow (fish hook) to show the movement of a single electron should be covered.

Reactivity 3.3.3

Radicals take part in substitution reactions with alkanes, producing a mixture of products.

- Explain, using equations, the propagation and termination steps in the reactions between alkanes and halogens.
- Reference should be made to the stability of alkanes due to the strengths of the C–C and C–H bonds and their essentially non-polar nature.

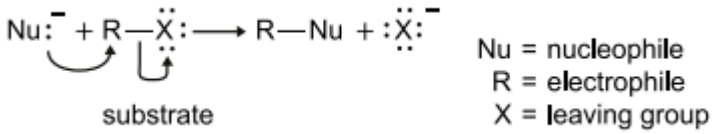
Reactivity 3.4.1

A nucleophile is a reactant that forms a bond to its reaction partner (the electrophile) by donating both bonding electrons.

- Recognize nucleophiles in chemical reactions.
- Both neutral and negatively charged species should be included.

Reactivity 3.4.2

- Deduce equations with descriptions and explanations of the movement of electron pairs in nucleophilic substitution reactions.



- Further details of the mechanisms are not required at SL.

Reactivity 3.4.3

Heterolytic fission is the breakage of a covalent bond when both bonding electrons remain with one of the two fragments formed.

- Explain, with equations, the formation of ions by heterolytic fission.
- Curly arrows should be used to show the movement of electron pairs during reactions.

Reactivity 3.4.4

An electrophile is a reactant that forms a bond to its reaction partner (the nucleophile) by accepting both bonding electrons from that reaction partner.

- Recognize electrophiles in chemical reactions.
- Both neutral and positively-charged species should be included.

Reactivity 3.4.5

Alkenes are susceptible to electrophilic attack because of the high electron density of the carbon–carbon double bond. These reactions lead to

☒ PowerPoint lecture/notes

☒ Individual presentations

☒ Group presentations

☒ Student lecture/leading

□ Interdisciplinary learning

Details:

Students will learn through a combination of presentations, small group work, practice problems, and lab work.

☒ Other(s): *practice problems, lab work*

Formative assessment(s):

Short closer quizzes for each lesson
Practice with Tools and Inquiries
Daily formative checks

Summative assessments:

Unit Exam - *Paper 1 and 2 questions modeled after the real IB Exam Papers (2025 syllabus)*

Differentiation:

☒ Affirm identity - build self-esteem

☒ Value prior knowledge

☒ Scaffold learning

electrophilic addition. ● Deduce equations for the reactions of alkenes with water, halogens, and hydrogen halides. ● The mechanisms of these reactions will not be assessed at SL.	☒ Extend learning Details: ● *SWD/504 – Accommodations Provided* ● *ELL – Reading & Vocabulary Support* ● *Intervention Support* ● *Extensions – Enrichment Tasks and Project*

Approaches to Learning (ATL)

Check the boxes for any explicit approaches to learning connections made during the unit. For more information on ATL, please see the guide.

☒ Thinking

☒ Social

☒ Communication

☒ Self-management

☒ Research

Details:

Students will be continuously challenged to develop higher-order thinking skills as they take prior knowledge, combine it with new content, and synthesize new understandings and connections.

Students will build social groups through group work and intentional reflection activities.

Language and Learning	**TOK Connections**	**CAS Connections**
Check the boxes for any explicit language and learning connections made during the unit. For more information on the IB's approach to language and learning, please see the guide.	*Check the boxes for any explicit TOK connections made during the unit*	*Check the boxes for any explicit CAS connections. If you check any of the boxes, provide a brief note in the "details" section explaining how students engaged in CAS for*

		this unit.
☒ Activating background knowledge ☒ Scaffolding for new learning ☒ Acquisition of new learning through practice ☒ Demonstrating proficiency Details: *Content and vocabulary introduced in previous science courses will be used in this unit.* *Students will use many of the concepts from this unit in future units throughout the two-year course.* *Students will acquire new vocabulary.* *Students will continually demonstrate proficiency with chemistry vocabulary in class discussions and group work.*	□ Personal and shared knowledge ☒ Ways of knowing □ Areas of knowledge □ The knowledge framework Details: *TOK knowledge questions will be included as discussion options for each lesson.*	☒ Creativity □ Activity □ Service Details: *Students will be encouraged to consider the creativity involved in scientific experimentation. Students can explore alternative ways (visual, for example) to express and explain this creativity to others.*
Resources *List and attach (if applicable) any resources used in this unit*		
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- Brown and Ford. *Pearson Baccalaureate Standard Level Chemistry*, 2nd edition.
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REFLECTION: considering the planning, process, and impact of the inquiry

What worked well	**What didn't work well**	**Notes / Changes / Suggestions**
List the portions of the unit (content, assessment, planning) that were successful	*List the portions of the unit (content, assessment, planning) that were not as successful as hoped*	*List any notes, suggestions, or considerations for the future teaching of this unit*