Allegheny–Clarion Valley School District

Chemistry - Organic: Unit 5 - Nomenclature

Unit #:	ACVSD-00068656	Date(s)	01-02-2019 to 02-06-2019

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Grade(s): 11, 12
Subject(s): Science

Unit Focus

This unit of organic chemistry covers basic nomenclature of molecules. Students will learn to name and draw formulas for organic molecules, using the modern IUPAC nomenclature system that breaks names down into 5 basic parts: Stereoisomerism, subsituents, parent chains, unsaturation, and functional groups.

Prior Learnings/Connection

Students must be able to read and draw bond-line structures and understand molecule geometries and bonding angles.

Stage 1: Desired Results - Key Understandings

Standard(s)

Pennsylvania Assessment Anchors and Eligible Content
Chemistry: 11

- Apply a systematic set of rules (IUPAC) for naming compounds and writing chemical formulas (e.g., binary covalent, binary ionic, ionic compounds containing polyatomic ions). *CHEM.A.1.1.5*
- Explain the relationship between the electron configuration and the atomic structure of a given atom or ion (e.g., energy levels and/or orbitals with electrons, distribution of electrons in orbitals, shapes of orbitals). *CHEM.A.2.2.3*

Transfer

What kinds of long-term, independent accomplishments are desired? Students will be able to independently use their learning to...

Meaning

Understanding(s)

What specifically do you want students to understand? What inferences should they make? Students will understand that...

U1 Students will understand that...

- being able to follow a set of rules for naming molecules (IUPAC nomenclature) is vital in order for chemists to communicate effectively
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- there are five parts to every

Essential Question(s)

What thought-provoking questions will foster inquiry, meaning making, and transfer? Students will keep considering...

Q1

- Why must chemists have a universal system of naming?
- How can "common names" cause confusion between chemists?
- How can the IUPAC system of naming be used?

organic molecule name as follows:

- stereoisomerism indicates whether double bonds are cis/trans or E/Z, and indicates stereocenters (R,S). (E/Z and R/S will be covered in a later unit)
- subsituents are additional groups coming off of the main chain of carbons and are characterized by a "yl" suffix
  - they are listed in alphabetical order and can also be used to identify lower-ranking functional groups when multiple groups are present
- parent chains are the main chains of carbon
  - 1 C = meth
  - 2 C = eth
  - 3 C = prop
  - 4 C = but
  - 5 C = pent
  - 6 C = hex
  - 7 C = hept
  - 8 C = oct
  - 9 C = non
  - 10 C = dec
- unsaturation identifies any double (en) or triple bonds (yn)
- functional groups are specialized groups of bonded atoms that have their own unique/predictable bonding qualities and are used to identify the type of molecule (carboxylic acid, ester, aldehyde, ketone,

	alcohol, amine) • Chains are numbered so that the lowest values are given first to functional groups, double bonds, then triple bonds • Molecules can be drawn from IUPAC names that are provided	
	Acquisition of Knowledge and Skill	
	Knowledge	**Skill(s)**
	What facts and basic concepts should students know and be able to recall? Students will know... K1 The students will be expected ot know the definitions of the following terms and how/when to apply them in different scientific settings: • IUPAC • nomenclature • stereoisomerism • subsituents • parent chain • unsaturation • functional groups • carboxylic acid • ester • aldehyde • ketone • alcohol • amine • hydroxy • keto • aldo • carbon parent chains: meth, eth, prop, but, pent, hex, hept, oct, non, dec • an , en, yn for single, double, and triple bonds • multiple prefixes: di, tri, tetra,	*What discrete skills and processes should students be able to use? Students will be skilled at...* S1 The students will be able to: • use the IUPAC system of nomenclature to name simple organic molecules • draw a bond-line structure of a molecule when provided its IUPAC name • identify functional groups in molecules • apply a system of hierarchy to a molecule with multiple functional groups to determine which functional group will recieve the suffix of the name • identify the type of bonding occurring in a molecule and provide the correct type of unsaturation • locate and number the parent chain of a molecule • identify and name the substituents of a molecule • determine if a double bond is cis or trans or if stereoisomerism even applies • place the different parts of the

	penta, hexa • halogen root names: fluoro, chloro, bromo, iodo • cis • trans	name in the correct order with the correct numbering system • place commas between numbers and dashes between letters and numbers when writing the IUPAC name

Stage 2: Assessment Evidence

Performance Task(s)

Alignment	Code	Assessment Evidence
	PT1	**Untitled** **Performance Task** **Diagnostic:** • Classroom questioning and discussion • Google Classroom activities/ YouTube videos • Notes/practice problems on the board • Functional group flash cards • "Fold-able" naming guide **Formative:** • Homework (Detailed assignments are listed in the Learning Plan) • In-class assignments (reading packet and practice problems) **Summative:** • Chapter Quizzes - Identifying functional groups and general nomenclature • Chapter test - Nomenclature

Stage 3: Learning Plan

Alignment	Code	Learning Activities
	LA1	**Chapter 5 Lesson Plans**

Chapter 5 Lesson Plans

Learning Activity

Day 1:

- The students will read the introduction to "Chapter 5- Nomenclature" They will look at and discuss why the naming of molecules are important.
- They will read, annotate, and highlight section 5.1 - Functional Groups.
- The students will complete practice problems 5.2-5.10 and go over them in class.
- HW: Make flashcards for all of the FG's in the correct hierarchy.

Day 2:

- Review functional groups and practice drawing molecules on the board and identifying groups.
- They will read, annotate, and highlight section 5.2 - Unsaturation.
- They will add/create flashcards for unsaturation.
- Time permitting/HW: the students will complete practice problems 5.12-5.17 and go over them in class.

Day 3:

- Quick quiz on functional groups and their suffixes
- Review functional groups and unsaturation.
- Complete worksheet #1 for functional groups and unsaturation parts of the name.

Day 4:

- They will read, annotate, and highlight section 5.3 - Naming the Parent Chain.
- We will also note exceptions to choosing the parent chain and to pick the chain with the greatest number of substituents if there is more than one option.
- They will add/create flashcards for the parent chain.
- Time permitting/HW: the students will complete practice problems 5.19-5.27 and go over them in class.

Day 5:

- They will read, annotate, and highlight section 5.4 - Substituents.
- We will also review functional groups, unsaturation, and parent chains.
- They will add/create flashcards for the substituents.
- Time permitting/HW: the students will complete practice problems 5.29 - 5.38 and go over them in class.

Day 6:

- Review functional groups, unsaturation, parent chains, and substituents.
- Complete worksheet #2 for parent chains and substituent parts of the name.
- HW: Bring (or take a picture) of an ingredient list that contains different parts of nomenclature rules we

		have been looking at (ex: shampoo, soaps, lotions, food, etc). (Prize for the greatest # of finds per label) Day 7: • They will read, annotate, and highlight section 5.5 - Stereoisomerism. • We will also review functional groups, unsaturation, parent chains, and substituents. • They will add/create flashcards for the stereoisomerism. • Time permitting/HW: the students will complete practice problems 5.40-5.45 and go over them in class. Day 8: • They will read, annotate, and highlight section 5.6 - Numbering. • We will also review functional groups, unsaturation, parent chains, substituents and stereoisomerism. • Time permitting/HW: the students will complete practice problems 5.47-5.55 and go over them in class. Days 9-10: • The students will "put it all together" and create a fold-able that has all of the rules for naming all the parts of the name. • The will complete the end of chapter problems 5.57-5.66 together, as needed, then by themselves. Days 11-13: • The students will discuss common names for molecules (section 5.7) and how to go from a name to a structure (section 5.8) • They will complete Worksheets #3, #4, and #5 for additional nomenclature practice for naming molecules and drawing them from names. Day 14: • We will review for the chapter 5 test. Day 15: • The students will take their chapter 5 test. Day 16-17: optional extension (it can also be added throughout the chapter) • Functional group identification fragrance lab.