

BPS Science Department Chemistry – Unit 14

Chemistry Unit 14 – Organic Chemistry

Unit Overview: In this unit students will learn the foundations of organic chemistry. Foundations of organic chemistry include classification of organic compounds using the International Union of Pure and Applied Chemistry (IUPAC) system; naming organic compounds using the IUPAC system; and creating structural diagrams of organic compounds using the IUPAC system. Students will be able to identify functional groups. Students will use the functional groups to determine types of organic chemical reactions. Students will be able to identify missing products and/or missing reactants in an organic chemical reaction.

Essential Questions:

- What is organic chemistry?
- What are organic compounds?
- How are organic compounds organized and classified?
- What is the naming system of organic compounds?
- How are structural diagrams of organic compounds created?
- What are functional groups in organic chemistry and how do functional groups determine types of organic chemical reactions?
- What is an isomer?
- How do you draw an isomer?
- What are the properties and uses of organic compounds?

MST Standard 4 - Science

Key Idea 3: Matter is made up of particles whose properties determine the observable characteristics of matter and its reactivity.

Key Idea 5: Energy and Matter interact through forces that result in changes of motion.

New York State Science Learning Standards Performance Expectations:

HS-PS 2-6 Communicate scientific and technical information about why the particulate-level structure is important in the functioning of designed materials

HS-PS 1-2 Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties

HS-PS 1-4 Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.

HS-PS 1-5 Apply scientific principles and evidence to explain how the rate of a physical or chemical change is affected when conditions are varied.

HS-PS 1-7 Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.

BPS Science Department Chemistry – Unit 14

Time Frame	Skills, Practices, or Expectations	Specific Standards / Performance Indicators	Resources	Content Vocabulary	Measurement of Student Learning
<p>4.17.23 - 5.05.23</p> <p>4.26.23 Early Release</p> <p>4.27.23 Superintendent Conference Day</p>	<p><u>Chemistry of Carbon</u> Understand the special characteristics of carbon.</p> <p><u>Classification of Organic Compounds:</u> Compare and contrast organic and inorganic compounds. List the properties of organic compounds.</p> <p><u>Homologous Series</u> Identify and name types of homologous series. Use the International Union of Pure and Applied Chemistry (IUPAC) system to name and draw specific compounds.</p> <p><u>Functional Groups</u> Name, draw, and identify an organic molecule that contains functional groups given a structural or condensed structural formula. Know properties and uses of different functional groups.</p> <p><u>Isomerism</u> Define isomer. Draw isomers of given compounds.</p> <p><u>Organic Reactions</u> Identify types of organic reactions. Determine a missing product or reactant in an organic reaction.</p>	<p>MST Standard 4 Science Key Idea 3</p> <p>3.1 – Explain the properties of materials in terms of the arrangement and properties of the atoms that compose them.</p> <p>3.1ff – Organic compounds contain carbon atoms, which bond to one another in chains, rings, and networks to form a variety of structures. Organic compounds can be named using the IUPAC system.</p> <p>3.1gg – Hydrocarbons are compounds that contain only carbon and hydrogen. Saturated hydrocarbons contain only single carbon-carbon bonds. Unsaturated hydrocarbons contain at least one multiple carbon-carbon bond.</p> <p>3.1hh – Organic acids, alcohols, esters, aldehydes, ketones, ethers, halides, amines, amides, and amino acids are categories of organic compounds that differ in their structures. Functional groups impart distinctive physical and chemical properties to organic compounds.</p> <p>3.1ii – Isomers of organic compounds have the same molecular formula, but different structures and properties.</p> <p>3.2 – Use atomic molecular models to explain common chemical reactions.</p> <p>3.2c – Types of organic reactions include addition, substitution, polymerization, esterification, fermentation, saponification, and combustion.</p>	<p>Castle Learning- Access through Clever</p> <p>BPS Science Department Recommended Virtual Labs – must be logged into BPS google document account through BPS Gmail account to access</p> <p><i>Holt NY Chemistry</i> Textbook Chapters 19</p> <p>Regents Chemistry Reference Tables - Tables P, Q, R</p> <p>Dynamic Periodic Table</p> <p>BPS Science K-12 Schoology Folder 9-12 Resources Chemistry Resources</p> <p>National Geographic: Science 101: Plastics - Video (5:45) - Real world connection - Brief history of plastics; making of plastics, includes polymer, alkanes, and polymerization</p> <p>Royal Society of Chemistry:</p> <ul style="list-style-type: none"> ● Aspirin Level 1 - Set up and run an experiment to synthesize aspirin ● Aspirin Level 2 - Learn the chemical properties of aspirin and purify by recrystallization ● Aspirin Level 3 - Learn the reaction conditions for aspirin synthesis and determine optimal conditions ● Aspirin Level 4 - Use chromatography to identify which reactants produce aspirin <p>PBS: Forgotten Genius - Story of Percy Julian* -video (1:52:00) - Chemist who discovered how to</p>	<ul style="list-style-type: none"> ● addition ● alkanes ● alkenes ● alkyl group ● alkynes ● combustion ● condensation ● esterification ● fermentation ● halogenation ● homologous series ● hydrocarbons ● hydrogenation ● inorganic ● saturated ● isomer ● organic ● polymerization ● saponification ● saturated ● substitution ● unsaturated 	<ul style="list-style-type: none"> ● Ticket Out ● Think-Pair –Share ● Formative Assessment ● Weekly Quiz ● Unit Test ● Homework ● Review Questions ● DDI process using data from Edoctrina & Castle Learning to generate data <p>Higher Level Questions: Regents Exams: June 2018 Questions 74, 76 August 2019 Question 81</p>

BPS Science Department Chemistry – Unit 14

5.2 – Explain chemical bonding in terms of the behavior of electrons.
5.2e – In a multiple covalent bond, more than one pair of electrons are shared between two atoms. Unsaturated organic compounds contain at least one double or triple bond.

extract sterols and synthesize hormones
[Percy Julian the Trailblazer*](#) – article - Percy Julian, chemist and civil rights leader
[How Percy Julian Became a great 20th Century Scientist*](#) - Video (5:29)

St. Elmo Brady*

- Biography: St. Elmo Brady was the first African-American to receive a Ph.D. in chemistry. Equally as significant, Brady went on to build chemistry curricula, faculty, programs and facilities at four major historically black colleges and universities

Discovery of Ivermectin: Preventing Blindness and Heartworm*

- Inquiry Based Activity: A team of scientists in the U.S. finds that the bacterium produces compounds that interfere with the activity of nematode worms. It is developed into a drug that wards off parasites in countless pets and farm animals, averting billions of dollars in losses worldwide. The drug also prevents or treats human parasitic diseases that would otherwise cause blindness and other severe symptoms in hundreds of millions of people in many of the poorest countries on Earth. Students will read the article and answer the worksheet that follows.

Women Scientists of India: Dr. Asima Chatterjee*

- Article: Asima Chatterjee was the first woman to be awarded a Doctor of Science by an Indian University - in 1944, by the University of Calcutta. She was also the first woman to be elected as the General President of the Indian Science Congress, a premier institution that oversees scientific research.

BPS Science Department Chemistry – Unit 14

			<p>NC State University Thin layer chromatography -Virtual Lab -Advanced</p> <p>Z Space Activities (code) Collection: Molecules (A237) Make observations about molecules. Draw and compare molecules - relate structure to function. Some of the molecules explored: sucrose, ibuprofen, caffeine, dopamine, estrogen, testosterone, serotonin and more Teacher Resource pdf Student Resource #1 pdf Student Resource #2 pdf</p>		
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Resources

<http://ngss.nsta.org/Classroom-Resources.aspx> - Searchable NYSSLS/NGSS aligned resources curated by NSTA

[Buffalo Public Schools Science Department Chemistry Webpage](#) – BPS chemistry curriculum resource hub

[BPS Science Department Recommended Virtual Labs](#) – Virtual lab resources with embedded links to virtual labs and student sheets. Must be logged into BPS google document account through BPS Gmail account to access.

[NYS Regents Chemistry Exams 2012-2020](#) NYSED’s Office of State Assessment webpage for released Regents Chemistry Examinations

[NYS MST Science Learning Standards Physical Setting/Chemistry](#) – Current NYS Physical Setting/Chemistry Standards

[NYS P-12 Science Learning Standards \(HS\)](#) – NYSSLS High School Standards

[Regents Chemistry Reference Tables](#) – Reference Tables for Regents Chemistry

BPS Science Department Chemistry – Unit 14

<p>ELL Enhancements</p> <p>To access hyperlinked material, you must be logged into your BPS Google Drive</p>	<p>Listening</p> <ul style="list-style-type: none"> ● <u>Cross- Linguistic Practices:</u> Gives students opportunities to make connections between what they hear and their home language (For example, allow students to listen to a passage and identify cognates.) ● <u>Build background knowledge</u> ● <u>Activating Prior Knowledge</u> Activating prior knowledge means both eliciting from students what they already know and building initial knowledge that they need in order to access upcoming content ● <u>Activating Prior Knowledge</u> ● <u>Visuals</u> - GIFs, pictures- will assist students in understanding what they are listening to. Use <u>visual thinking strategies</u> to set the lens for learning. ● Video to review or introduce a topic – use <u>closed captioning</u> to help students see the words and pronunciations while they listen to the content. ● <u>Word stretching / Vowel stretching</u> when instructing allows student to listen closely to the pronunciation of the word ● <u>Performance Level Descriptors</u> this document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in the modality of listening Scroll for grades 9-12. 	<p>Speaking</p> <ul style="list-style-type: none"> ● <u>Sentence Frames</u> - to begin a sentence - such as <i>Evolution is...</i> or <i>I think that evolution is...</i> ● <u>Academic Conversation Starters:</u> Have a visual of a list of academic sentence starters that students can refer to in a discussion. Examples include- I expect ____ to happen. My data shows that... This helps students have a more science focused dialogue. ● <u>Choral Reading</u> - To build fluency, self-confidence and motivation with <u>reading/speaking</u> ● Create <u>movement</u> to go with the word. Movement can be a motivating factor, as well as a kinesthetic tool for conceptualizing the rhythm and flow of fluent reading while triggering brain function for optimal learning ● <u>Performance Level Descriptors</u> This document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in the modality of speaking. Scroll for grades 9-12 	<p>Reading</p> <ul style="list-style-type: none"> ● <u>Supplementary Text</u> to help reinforce concepts. If necessarily, use lower Lexile levels to ensure comprehension. ● <u>Visual Aids</u> - Pictures or models to support vocabulary words and concepts ● Video to review or introduce a topic - use <u>closed captioning</u> to help students read along while they listen to the content ● <u>4 Square / Frayer models</u> to help students gain a deeper understanding of vocabulary. ● <u>Highlighting</u> important text to assist students in answering questions after the reading. ● <u>Chunking</u>-Break reading of text into chunks or paragraphs ● <u>Vocabulary Morphology-</u> Morphology relates to the segmenting of words into affixes (prefixes and suffixes) and roots or base words, and the origins of words. Understanding that words connected by meaning can be connected by spelling can be critical to expanding a student’s vocabulary ● <u>Performance Level Descriptors</u> this document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in the modality of reading. Scroll for grades 9-12. 	<p>Writing</p> <ul style="list-style-type: none"> ● <u>Sentence Frames</u> - to begin a sentence- such as <i>Biodiversity is...</i> or <i>An example of competition is....</i> ● <u>Cloze passages</u> with word banks ● <u>Word banks</u> ● <u>Graphic Organizers</u> to help break down the writing process and organize thoughts ● <u>Standards-based sentence stems</u> ● <u>Performance Level Descriptors</u> this document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in the modality of writing. Scroll for grades 9-12. 	<p>Instructional Accommodations (depending on the student’s needs)</p> <ul style="list-style-type: none"> ● <u>Extended time</u> for tests in class, projects and assignments ● <u>Directions read.</u> Broken down as necessary ● <u>Model</u> how to complete the activity in the lesson ● <u>Oral simplification</u> of directions or questions ● <u>Translated version</u> of test when available. Student may have both version English and native language version ● Use of <u>approved bilingual glossaries</u> from NYS in each subject
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BPS Science Department Chemistry – Unit 14

<p>Special Education Modifications</p> <p>Special Education students must have accommodations as per Individual Educational Plan (IEP)</p>	<p><u>Instructional</u></p> <ul style="list-style-type: none"> ● Pre-teach vocabulary ● Use picture vocabulary ● Scaffold Depth of Knowledge questions ● Provide copy of notes/notes in “cloze” form ● Use of Think, Pair, and Share strategy to help process information ● Scaffold written assignments with the use of graphic organizers ● Allow for multiple ways to respond (verbal, written, response board) ● Provide model of performance task ● Modify informational text to fit the needs of the students ● Provide a digital or paper interactive notebook ● Present complex tasks in multiple ways ● Provide mnemonic strategies for Chemistry concepts 	<p><u>Technology:</u></p> <ul style="list-style-type: none"> ● Audio reading of text ● Text to type functions ● Videos to clarify/visualize Chemistry concepts ● Record class lecture/discussions and make accessible to student ● Nearpod- interactive presentations of notes ● Playposit - show a video clip about the topic and add your own questions for them to answer as they watch ● Allow students to type answers in chat on Teams <p><u>Other:</u></p> <ul style="list-style-type: none"> ● Arrange seating for maximum engagement and minimum distraction ● Accessible lab space (counter level) 	<p><u>In Class Assessments</u></p> <ul style="list-style-type: none"> ● Provide review packet or review sheet of concepts covered on the test ● Practice similar questions prior to the test ● Provide multiple options for projects ● Give a timeline of when things are due and remind them of the process often. ● Use of timer in class ● Break all complex tasks into chunks
<p>Step Up to Writing</p> <p>Step Up to Writing materials can be found in BPS Science K-12 Schoology Folder 9-12</p> <p>Resources Chemistry Resources Curriculum Materials</p>	<p><u>SUTW Strategy</u></p> <ul style="list-style-type: none"> ● Informal Outline ● Color-Coding – Informative/Explanatory Text ● Two-column notes ● I-V-F Topic Sentence progressing to Four Step Summary Paragraph ● CUPS – Capitalization, Usage, Punctuation, Spelling ● Transitions 		
<p>Culturally and Linguistically Responsive Teaching (CLRT) in the Science Classroom</p>	<p>Materials, resources, and/or discussions address diverse cultural backgrounds and real-world applications</p> <ul style="list-style-type: none"> ● Artifacts (posters, charts, etc.) in the science classroom are representative of the cultures of the student population ● All students are given an opportunity to engage in science discourse ● Teacher demonstrates high expectations for all students <p>CLRT resources which align to Science content are denoted with a *</p>		