

BPS Science Department Chemistry – Unit 4

Chemistry Unit 4 – The Periodic Table

Unit Overview: The students will learn to use the Periodic Table as a reference tool. They will be able to classify an element as a metal, nonmetal or metalloid by its position on the table. The students will learn how elements are arranged on the table using atomic numbers and will be able to explain the similarity of the chemical properties of elements within a group. They will learn about periodic trends in atomic radius, electronegativity, and ionization energy. Students will also be able to identify the similarity of allotropic forms of elements.

Essential Questions:

- What characteristic of the elements determines its placement in the Periodic Table?
- What are the classes of elements?
- What are the differences between metals, nonmetals and metalloids on the Periodic Table?
- What are the trends of the properties of elements in a group or period as you move throughout the Periodic Table?
- What is an allotrope and what are some examples of allotropes?

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 in motion.

New York State Science Learning Standards Performance Expectations:

HS-PS 1-1 Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.

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

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Time Frame	Skills, Practices, or Expectations	Specific Standards / Performance Indicators	Resources	Content Vocabulary	Measurement of Student Learning
<p>10.24.2022 - 11.04.2022</p>	<p><u>Arrangement of Modern Periodic Table</u> Understand the arrangement of elements on the Periodic Table by atomic number. Explain the arrangement of atoms in a group based on chemical properties. Classify an element as a metal, a nonmetal, or a metalloid.</p> <p><u>Periodic Trends: Ionization Energy, Electronegativity, and Size</u> List properties of metals, nonmetals, and metalloids. Identify and use periodic trends to predict properties of elements.</p> <p><u>Allotropes</u> Identify and cite examples of common allotropes.</p>	<p>MST Standard 4 Science Key Idea 3 3.1 - Explain the properties of matter in terms of the arrangement and properties of the atoms that compose them. 3.1v - Elements can be classified by their properties and located on the Periodic Table as metals, nonmetals, and metalloids (B, Si, Ge, As, Sb, Te) and noble gases. 3.1x - Elements can also be differentiated by chemical properties. Chemical properties describe how an element behaves during a chemical reaction. 3.1y - The placement or location of an element on the Periodic Table gives an indication of the physical and chemical properties of that element. The elements on the Periodic Table are arranged in order of increasing atomic number. 3.1z – For Groups 1, 2, and 13-18 on the Periodic Table, elements within the same group have the same number of valence electrons (helium is an exception) and therefore similar chemical properties. 3.1aa – The succession of elements within the same group demonstrates characteristic trends: Differences in atomic radius, ionic radius, electronegativity, first ionization energy, metallic/nonmetallic properties. 3.1bb – The succession of elements across the same period demonstrates characteristic trends: differences in atomic radius, ionic radius, electronegativity, first ionization energy, metallic/nonmetallic properties.</p> <p>Key Idea 5 5.2 – Explain chemical bonding in terms of the behavior of electrons. 5.2f – Some elements exist in two or more forms in the same phase. These forms differ in their molecular or crystal structure and hence in their properties.</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 Chapter 1, 4</p> <p>Regents Chemistry Reference Tables - Table S</p> <p>Dynamic Periodic Table</p> <p>BPS Science K-12 Schoology Folder 9-12 Resources Chemistry Resources</p> <p>Setting the Table - A brief visual history of the periodic table - scroll and read the history of the periodic table, with visuals of table changes</p> <p>Virtual PPTs</p> <ul style="list-style-type: none"> Periodic Trends - Trends across periods and down groups <p>PBS Learning Media Periodic Table - Interactive Tutorial - Identify mystery elements; drag into periodic table</p> <p>James Andrew Harris*</p> <ul style="list-style-type: none"> Article: James Andrew Harris co-discovered elements 104 and 105 on the periodic table, a massive accomplishment. Second, he was the first African American in history to discover an element. James Harris was a true pioneer, and he worked hard his entire life to make room for African Americans in the sciences. 	<ul style="list-style-type: none"> allotrope atomic radius electron configuration electronegativity family group ionic radius ionization energy metal metalloid noble gas nonmetal Periodic Law Period properties transitions 	<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 Exam: January 2019 Questions 58-60</p>

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			<p>Z Space Activities (code)</p> <p>Electron Shells and Orbitals (A325) learn how electrons are distributed into orbitals and how electron shells fill across the periodic table Teacher Resource pdf Student Resource pdf</p> <p>Elements of a Feather Part 1 (A326) explore the periodic table and understand the elements' groups and related classifications Teacher Resource pdf Student Resource pdf</p> <p>Elements of a Feather Part 2 (A327) Teacher Resource pdf Student Resource pdf</p> <p>The Lighter Side of Chemistry (AP24) review the elements' symbols with puns Teacher Resource pdf Student Resource pdf</p> <p>All Atoms Great and Small (A331) learn about the atomic radius and its significance Teacher Resource pdf Student Resource pdf</p> <p>Ionization Energy (A330) investigate ionization energy and learn what is required to change the electrons in an atom Teacher Resource pdf Student Resource pdf</p> <p>Idea Sheet: Periodic Table (AP24) explore characteristics of metals, nonmetals, and semimetals. Identifying energy levels and valence electrons Teacher Resource pdf Student Resource pdf</p> <p>Inside the Human Body (A335) Identify the elements found in the human body, Explain how elements support structures and functions in the human body Teacher Resource pdf Student Resource pdf</p>		
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			<p>What is the Earth made of? (A332) Compare elements based on their abundance. Identify where elements can be found on Earth Teacher Resource pdf Student Resource pdf</p> <p>The Trendiest Elements of all (A329) Identify trends across the periodic table Compare elements based on their atomic radius, ionization energy, and electronegativity, predict trends Teacher Resource pdf Student Resource pdf</p> <p>Don't be so Electronegative (A328) Identify trends in electronegativity across the periodic table, compare elements based on their electronegativity, make predictions, relate electronegativity to first ionization energy and atomic radius Teacher Resource pdf Student Resource 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

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<p>ELL Enhancements To access hyperlinked material, you must be logged into your BPS Google Drive</p>	<p>Listening</p> <ul style="list-style-type: none"> ● Cross- Linguistic Practices: 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.) ● Build background knowledge ● Activating Prior Knowledge 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 ● Activating Prior Knowledge ● Visuals - GIFs, pictures- will assist students in understanding what they are listening to. Use visual thinking strategies to set the lens for learning. ● Video to review or introduce a topic – use closed captioning to help students see the words and pronunciations while they listen to the content. ● Word stretching / Vowel stretching when instructing allows student to listen closely to the pronunciation of the word ● Performance Level Descriptors 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"> ● Sentence Frames - to begin a sentence - such as <i>Evolution is...</i> or <i>I think that evolution is...</i> ● Academic Conversation Starters: 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. ● Choral Reading - To build fluency, self-confidence and motivation with reading/speaking ● Create movement 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 ● Performance Level Descriptors 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"> ● Supplementary Text to help reinforce concepts. If necessarily, use lower Lexile levels to ensure comprehension. ● Visual Aids - Pictures or models to support vocabulary words and concepts ● Video to review or introduce a topic - use closed captioning to help students read along while they listen to the content ● 4 Square / Frayer models to help students gain a deeper understanding of vocabulary. ● Highlighting important text to assist students in answering questions after the reading. ● Chunking-Break reading of text into chunks or paragraphs ● Vocabulary Morphology- 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 ● Performance Level Descriptors 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"> ● Sentence Frames - to begin a sentence- such as <i>Biodiversity is...</i> or <i>An example of competition is....</i> ● Cloze passages with word banks ● Word banks ● Graphic Organizers to help break down the writing process and organize thoughts ● Standards-based sentence stems ● Performance Level Descriptors 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"> ● Extended time for tests in class, projects and assignments ● Directions read. Broken down as necessary ● Model how to complete the activity in the lesson ● Oral simplification of directions or questions ● Translated version of test when available. Student may have both version English and native language version ● Use of approved bilingual glossaries from NYS in each subject
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<p>Special Education Modifications Special Education students must have accommodations as per Individual Educational Plan (IEP)</p>	<p>Instructional</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>Technology:</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>Other:</p> <ul style="list-style-type: none"> ● Arrange seating for maximum engagement and minimum distraction ● Accessible lab space (counter level) 	<p>In Class Assessments</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 Step Up to Writing materials can be found in BPS Science K-12 Schoology Folder 9-12 Resources Chemistry Resources Curriculum Materials</p>	<p>SUTW Strategy</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>		