

BPS Science Department Chemistry – Unit 1

Chemistry Unit 1 – Introduction, Safety, and Measurement

Unit Overview: In this unit, students will learn about safety in the Chemistry Lab and Chemistry classroom. Students will learn to make accurate and precise measurements and use significant figures to express measurements. Students will be able to use dimensional analysis to determine appropriate units for a quantity. Students will use density to describe physical properties of elements.

Essential Questions:

- What are the Chemistry Lab safety rules and why are they important?
- Why is it crucial to express measurements in scientific notation and to the correct number of significant figures?
- What are standard and derived units in science and what are examples?
- How can you use conventional techniques and procedures to test explanations?
- What is the process to design experiments using scientific methodology to test proposed calculations?
- Why is it important to use scientific methodology when carrying out experiments/investigations to test proposed calculations?

MST Standard 1 – Mathematical Analysis

Key Idea 1 - Abstraction and symbolic representation are used to communicate mathematically.

MST Standard 1 – Scientific Inquiry

Key Idea 2 – Beyond the use of reasoning and consensus, scientific inquiry involves the testing of proposed explanations involving the use of conventional techniques and procedures and usually requiring considerable ingenuity.

S2.1 – Devise ways of making observations to test proposed explanations.

- Design and/or carry out experiments using scientific methodology to test proposed calculations

New York State Science Learning Standards Performance Expectations:

HS-PS 1-10 Use evidence to support claims regarding the formation, properties and behaviors of solutions at bulk scales.

HS-ETS 1-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

HS-ETS 1-2 Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

HS-ETS 1-3 Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

HS-ETS 1-4 Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.

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Time Frame	Skills, Practices, or Expectations	Specific Standards / Performance Indicators	Resources	Content Vocabulary	Measurement of Student Learning
<p>09.12.2022 - 09.23.2022</p>	<p>Safety Understand safety in the science classroom and lab. Know the location and function of eyewash, fire extinguisher, acid spill kit, safety shower etc.</p> <p>Measurement Determine the number of significant figures. Use Dimensional Analysis to determine units. Use scientific notation. Understand the concept of density. Organize data Describe and compare data Measure accurately Use and convert scales appropriately Predict particle properties of behavior</p> <p>Scientific Inquiry Make appropriate observations Design experiments using appropriate scientific methodology Carryout experiments using appropriate scientific methodology</p>	<p>MST Standard 1 Math Key Idea 1 M1.1 Use algebraic and geometric representations to describe and compare data. Organize, graph, and analyze data gathered from laboratory activities or other sources Measure and record experimental data and use data in calculations Recognize and convert various scales of measurement Use knowledge of geometric arrangements to predict particle property of behavior</p> <p>MST Standard 1 – Scientific Inquiry Key Idea 2 S2.1 Devise ways of making observations to test proposed explanations</p> <ul style="list-style-type: none"> Design and/or carryout experiments using scientific methodology to test proposed calculations 	<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 1-2</p> <p>Regents Chemistry Reference Tables - Tables C, D, T</p> <p>Dynamic Periodic Table</p> <p>BPS Science K-12 Schoology Folder 9-12 Resources Chemistry Resources</p> <p>Virtual PPTs:</p> <ul style="list-style-type: none"> Lab Equipment - Pictures & descriptions of various lab equipment Lab Safety – Review of how to work safely in the lab Measurement - Includes examples - meniscus, graduated cylinders, triple beam balance, thermometer Scientific Notation - The basics plus adding & subtracting Significant Figures - Rules, uncertainty in digits, and examples Metric Conversions - How to perform conversions with examples <p>CK12 Gone Fishing - Density – Interactive - Define density as ratio of mass to volume; identify density as an intensive property; observe different states of matter have different densities; real world connections</p>	<ul style="list-style-type: none"> accuracy conversion factor density exponent S.I. units significant figures 	<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 Edocrina & Castle learning to generate data <p>Higher Level Questions:</p> <p>Regents Exam: January 2020 Question 56 June 2019 Question 55 January 2019 Question 70</p>

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			<p>PBS Forgotten Genius - Story of Percy Julian - video (1:52:00) - The chemist who discovered how to extract sterols and synthesize hormones</p> <p>Percy Julian the Trailblazer – Article - Percy Julian chemist and civil rights leader</p> <p>How Percy Julian Became a Great 20th Century Scientist - video (5:29)</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](#) – Regents Tables for Regents Chemistry

<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 	<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 	<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. 	<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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	<ul style="list-style-type: none"> ● 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. 	<ul style="list-style-type: none"> ● 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 	<ul style="list-style-type: none"> ● 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>Special Education Modifications</p> <p>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 concept 	<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 		

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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	<u>SUTW Strategy</u> <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
Culturally and Linguistically Responsive Teaching (CLRT) in the Science Classroom	Materials, resources, and/or discussions address diverse cultural backgrounds and real-world applications <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 CLRT resources which align to Science content are denoted with a *