

BPS Science Department Chemistry – Unit 9

Chemistry Unit 9 – Mole Concepts and Stoichiometry

Unit Overview: In this unit, students will learn the definition of a mole and be able to convert from moles to mass and mass to moles. Students will be able to identify a compound and given its gram formula mass, calculate the empirical or molecular formulas of the compound. Students will recognize and write empirical, molecular, and structural formulas for a given compound.

Essential Questions:

- What is gram formula mass (GFM) and how do you use it to determine moles or grams?
- How is percent composition calculated?
- What is the process used to calculate the amount of a substance in a reaction based upon the ratio of coefficients?
- What makes a substance a compound?

MST Standard 4 - Science

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

New York State Science Learning Standards Performance Expectations:

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

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Time Frame	Skills, Practices, or Expectations	Specific Standards / Performance Indicators	Resources	Content Vocabulary	Measurement of Student Learning
<p>1.16.2023 - 2.03.2023</p> <p>1.16.23 Martin Luther King Jr Day</p> <p>1.24.23-1.27.23 Regents Week</p>	<p><u>Mole/Gram Formula Mass (GFM)</u> Calculate GFM. Determine what a mole is. Given moles or grams, convert from one to the other.</p> <p><u>Stoichiometry</u> Calculate the percent by mass of a compound and a hydrate. Calculate amount of a substance based upon the ratio of coefficients.</p> <p><u>Equation Conversion Problems</u> Explain the difference between molecular and empirical formulas. Convert from empirical to molecular formulas.</p> <p><u>Compounds</u> Know the concept of a compound. Be able to recognize and calculate empirical, molecular, and structural formulas given percent composition and molecular mass.</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>3.1cc – A compound is a substance composed of two or more different elements that are chemically combined in a fixed proportion. A chemical compound can be broken down by chemical means. A chemical compound can be represented by a specific chemical formula and assigned a name based on the IUPAC system.</p> <p>3.1ee – Types of chemical formulas include empirical, molecular, and structural.</p> <p>3.3 – Apply the principle of conservation of mass to chemical reactions.</p> <p>3.3a – In all chemical reactions there is a conservation of mass, energy, and charge.</p> <p>3.3c - A balanced chemical equation represents conservation of atoms. The coefficients in a balanced chemical equation can be used to determine mole ratios in the reaction.</p> <p>3.3d – The empirical formula of a compound is the simplest whole-number ratio of atoms of the elements in a compound. It may be different from the molecular formula, which is the actual ratio of atoms in a molecule of that compound.</p> <p>3.3e – The formula mass of a substance is the sum of the atomic masses of its</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 7, 9</p> <p>Regents Chemistry Reference Tables - Table T</p> <p>Dynamic Periodic Table</p> <p>BPS Science K-12 Schoology Folder 9-12 Resources Chemistry Resources</p> <p>PhET Interactives: Molarity - Change solute amount and solution volume to see effect on molarity; visualize when solution is saturated</p> <p>Virtual PPTs:</p> <ul style="list-style-type: none"> • The Mole - Avogadro’s number; gram formula mass; conversions and calculations • Percent Composition - Percent composition; molecular/ empirical formulas with examples • Stoichiometry - How to perform stoichiometry with examples <p>CK12: Moles – Interactive - Practice using dimensional analysis to convert, mass, volume, moles, number of particles</p>	<ul style="list-style-type: none"> • coefficient • empirical formula • gram formula mass • mole • molecular formula • percent composition • structural formula • stoichiometry • subscript 	<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 Question: Regents Exams: June 2019 Questions 53, 68 August 2019 Question 67</p>

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		atoms. The molar mass (gram-formula mass) of a substance equals one mole of that substance. 3.3f – The percent composition by mass of each element in a compound can be calculated mathematically.			
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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

ELL Enhancements To access hyperlinked material, you must be logged into your BPS Google Drive	Listening <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 	Speaking <ul style="list-style-type: none"> ● Sentence Frames - to begin a sentence - such as <i>Evolution is... or 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 	Reading <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 	Writing <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 	Instructional Accommodations (depending on the student’s needs) <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>pronunciations while they listen to the content.</p> <ul style="list-style-type: none"> ● 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>kinesthetic tool for conceptualizing the rhythm and flow of fluent reading while triggering brain function for optimal learning</p> <ul style="list-style-type: none"> ● 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>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</p> <ul style="list-style-type: none"> ● 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>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>	
<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 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</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>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 				

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Culturally and Linguistically Responsive Teaching (CLRT) in the Science Classroom

- Materials, resources, and/or discussions address diverse cultural backgrounds and real-world applications
- 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 *