

BPS Science Department Chemistry – Unit 11

Chemistry Unit 11– Solutions

Unit Overview: In this unit, the students will be able to describe a solution in terms of solute and solvent. Use of reference tables to determine if a solute is soluble; if a solution is saturated, unsaturated; or supersaturated will be employed. Determining the molarity of a solution and explaining the effects of a solute on the properties of a solvent will be instructed.

Essential Questions:

- What is a solution?
- Who do you create a solubility curve?
- How is information on a solubility curve interpreted?
- How can the concentration of a solution be described?
- What are the factors that affect solubility?

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

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 11

Time Frame	Skills, Practices, or Expectations	Specific Standards / Performance Indicators	Resources	Content Vocabulary	Measurement of Student Learning
2.27.2023 - 3.10.2023	<p>Solutions</p> <p>Construct and interpret a solubility curve.</p> <p>Understand and predict the solubility/precipitation of a compound in water.</p> <p>Calculate and prepare the various types of solution concentrations. Be able to explain the effects of a solute on the physical properties of a solvent.</p>	<p>MST Standard 4 Science Key Idea 3</p> <p>3.1 - Explain the properties of matter in terms of the arrangement and properties of the atoms that compose them.</p> <p>3.1q - Matter is classified as a pure substance or as a mixture of substances.</p> <p>3.1oo - A solution is a homogeneous mixture of a solute dissolved in a solvent. The solubility of a solute in a given amount of solvent is dependent on the temperature, the pressure, and the chemical natures of the solute and solvent.</p> <p>3.1pp – The concentration of a solution may be expressed in molarity (M), percent by volume, percent by mass, or parts per million (ppm).</p> <p>3.1qq – The addition of a nonvolatile solute to a solvent causes the boiling point of the solvent to increase and the freezing point of the solvent to decrease. The greater the concentration of solute particles, the greater the effect.</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 13</p> <p>Regents Chemistry Reference Tables - Table F, G, H, T</p> <p>Dynamic Periodic Table</p> <p>BPS Science K-12 Schoology Folder 9-12 Resources Chemistry Resources</p> <p>PhET Interactives:</p> <p>Concentration - Add various solutes and change volume; see concentration & effects of evaporation</p> <p>Salts and Solubility - Add various salts to water; see the number of ions dissolved to visualize solubility; change volume</p> <p>Sugar and Salt Solutions - At macro level check conductivity of salt & sugar; on micro level visualize ionic & covalent compounds in water</p> <p>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"> Solutions - Solution vocabulary, properties of solutions and solubility curves 	<ul style="list-style-type: none"> colligative properties molarity solute solvent saturated unsaturated normal boiling point vapor pressure 	<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:</p> <p>June 2019 Question 57 January 2020 Question 62 August 2019 Question 59</p>

BPS Science Department Chemistry – Unit 11

			<p>CK12: Rock Candy – Interactive - Distinguish saturated, unsaturated, supersaturated solutions; define relationship of solubility and temperature</p> <p>Colligative Properties - Simulation - Define colligative properties as a property based on number of solute particles; observe molecular interactions, read world connections</p> <p>Around the World – Interactive -Observe relationship between atmospheric pressure, vapor pressure, and boiling point; define boiling point as point when vapor pressure equals atmospheric pressure; real world connections</p> <p>Norbert Rillieux*</p> <ul style="list-style-type: none">• Biography: Norbert Rillieux, widely considered to be one of the earliest chemical engineers, revolutionized sugar processing with the invention of the multiple effect evaporator under vacuum. <p>Molecular Workbench Intermolecular attractions and solubility - Interactive Tutorial - Includes multiple choice and short answer questions, students can generate a report and share the report</p>		
--	--	--	--	--	--

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 11

<p>ELL Enhancements To access hyperlinked material, you must be logged into your BPS Google Drive</p>	<p><u>Listening</u></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><u>Speaking</u></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><u>Reading</u></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><u>Writing</u></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><u>Instructional Accommodations (depending on the student’s needs)</u></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
--	---	---	--	--	---

BPS Science Department Chemistry – Unit 11

<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 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>		