

FRANKLIN-SIMPSON HIGH SCHOOL

Course Name: Chemistry

Unit Name: Quantitative Aspects of Solutions

Days: 7

Quality Core Objectives:

Unit 14 Quantitative Aspects of Solutions	
I.A.1. Scientific Inquiry	a. Identify and clarify research questions and design experiments
	b. Design experiments so that variables are controlled and appropriate numbers of trials are used
	c. Collect, organize, and analyze data accurately and use techniques and equipment appropriately
	d. Interpret results and draw conclusions, revising hypotheses as necessary and/or formulating additional questions or explanations
	e. Write and speak effectively to present and explain scientific results, using appropriate terminology and graphics
	f. Safely use laboratory equipment and techniques when conducting scientific investigations
	g. Routinely make predictions and estimations
I.A.2. Mathematics and Measurement in Science	a. Distinguish between precision and accuracy with respect to experimental data
	b. Use appropriate SI units for length, mass, time, temperature, quantity of matter, area, volume, and density; describe the relationships among SI unit prefixes (e.g., centi-, milli-, kilo-); recognize commonly used non-SI units
	c. Use the correct number of significant figures in reporting measurements and the results of calculations
	d. Use appropriate statistical methods to represent the results of investigations
	e. Express numbers in scientific notation when appropriate
	f. Solve for unknown quantities by manipulating variables
	g. Use graphical, mathematical, and/or statistical models to express patterns and relationships inferred from sets of scientific data
I.A.3. Science in Practice	e. Use a variety of appropriate sources (e.g., Internet, scientific journals) to retrieve relevant information; cite references properly
V.A.1. Types of Solutions, Concentration, and Solubility	e. Define and calculate the molarity of a solution
	f. Define and calculate the percent composition of a solution
	g. Describe the preparation and properties of solutions
	h. Solve stoichiometry calculations based on reactions involving aqueous solutions

V.A.2. Colligative Properties	a. Describe qualitatively the effect of adding solute on freezing point, boiling point, and vapor pressure of a solvent
	b. Define molality and mole fraction
	c. Calculate changes in the boiling point and freezing point when nonvolatile, nonelectrolyte solutes are added to solvents

Purpose of the Unit: Students will be able to define the different units of concentration for solutions, identifying similarities and differences. They will also be able to calculate concentrations of solutions and prepare solutions with varying concentrations. Students should also be able to identify the effects of adding solutes to pure solvents in terms of changing freezing and boiling points and vapor pressure. Ultimately, students will be able to perform stoichiometric calculations for reactions in aqueous solution.

Prerequisites: Students should be able to:

- calculate moles of a sample from its mass
- convert metric volumes
- predict insoluble products from double replacement reactions
- perform stoichiometric calculations

Daily Lesson Guide

Day	Lesson Content and Objectives	Focus Questions	Critical Thinking (High Yield / Literacy /LTF/etc.)	Engagement	Assessment and/or Accommodations
1	* Concentrations of solutions (molarity, % by mass, % by volume, molality, mole fraction) V.A.1.e, f V.A.2.b	* How are concentrations of solutions determined? * How are the different units alike/ different?	* Summarizing/ note taking * Advanced organizers * Application * Identifying similarities and differences * I Do – We Do – You Do	* Pre- Test * ACT bell ringer * Math notes * Model notes * Work sample problems together, alone (formative)	* Evaluate pre- test * Evaluate sample problems and math notes for understanding Accommodations: prompting/ cueing, extended time, paraphrasing, reader, scribe, reduced assignment, use of formula sheet (as needed)

2	<ul style="list-style-type: none"> * Concentrations, continued * Preparation of solutions V.A.1.e, f, g V.A.2.b 	<ul style="list-style-type: none"> * How can I prepare solutions of varying concentrations? 	<ul style="list-style-type: none"> * Summarizing/ note taking * Analysis/ Application * I Do – We Do – You Do * Nonlinguistic representation 	<ul style="list-style-type: none"> * ACT bell ringer * Model notes * Work sample problems together, alone (formative) * Article on how sports drinks are made/ formulated 	<ul style="list-style-type: none"> * Evaluate sample problems for understanding * Evaluate comprehension of article Accommodations: prompting/ cueing, extended time, paraphrasing, reader, scribe, reduced assignment, use of formula sheet (as needed)
3	<ul style="list-style-type: none"> * Effect of adding solute (both electrolytes and nonelectrolytes) on freezing and boiling points, and vapor pressure V.A.2.a, c 	<ul style="list-style-type: none"> * What effect does adding a solute to a pure solvent have on its properties? 	<ul style="list-style-type: none"> * Summarizing/ note taking * Identifying similarities and differences * Application * I Do – We Do – You Do * Advanced organizers 	<ul style="list-style-type: none"> * ACT bell ringer * Model notes * Math notes * Work sample problems together, alone (formative) 	<ul style="list-style-type: none"> * Evaluate math notes and sample problems for understanding Accommodations: prompting/ cueing, extended time, paraphrasing, reader, scribe, reduced assignment, use of formula sheet (as needed)
4	<ul style="list-style-type: none"> * Stoichiometric calculations for reactions in aqueous solutions V.A.1.h 	<ul style="list-style-type: none"> * How can concentration data be used to solve stoichiometric problems for reactions in solution? 	<ul style="list-style-type: none"> * Summarizing/ note taking * Identifying similarities and differences * Application/ Analysis * I Do – We Do – You Do 	<ul style="list-style-type: none"> * ACT bell ringer * Model notes * Sample problems together, alone (formative) 	<ul style="list-style-type: none"> * Evaluate sample problems for understanding Accommodations: prompting/ cueing, extended time, paraphrasing, reader, scribe, reduced assignment, use of formula sheet (as needed)

5	<p>* Laboratory: Predicting and verifying the mass of product in an aqueous reaction I.A.1.a, b, c, d, e, f, g I.A.2.a, b, c, d, e, f, g I.A.3.e V.A.1.e, f, g, h V.A.2.a, b, c</p>	<p>* How can I apply what I know from this unit to predict and verify the mass of product obtained from a reaction in aqueous solution?</p>	<p>* Synthesis/ Application/ Analysis * Identifying similarities and differences * Learning with others * Authenticity * Novelty and Variety * Generating and testing hypotheses</p>	<p>* ACT bell ringer * Conduct lab according to procedures provided (summative)</p>	<p>* Evaluate lab report Accommodations: Partner students based on skill level, prompting/ cueing, extended time (as needed)</p>
6	<p>* Review I.A.1.a, b, c, d, e, f, g I.A.2.a, b, c, d, e, f, g I.A.3.e V.A.1.e, f, g, h V.A.2.a, b, c</p>	<p>* What can I do to be better prepared for the exam?</p>	<p>* Use clickers to test students' knowledge and clarify and misconceptions before the exam with immediate feedback.</p>	<p>* ACT bell ringer * Use clickers to review with exam like questions (summative)</p>	<p>* Students participate in review Accommodations: prompting/ cueing, extended time, paraphrasing, reader, use of formula sheet (as needed)</p>
7	<p>* Exam I.A.1.a, b, c, d, e, f, g I.A.2.a, b, c, d, e, f, g I.A.3.e V.A.1.e, f, g, h V.A.2.a, b, c</p>	<p>* Can I demonstrate my knowledge on the exam?</p>	<p>* Evaluation * Analysis * Application * Synthesis</p>	<p>* ACT bell ringer * Students take exam (summative)</p>	<p>* Evaluate exam Accommodations: prompting and cueing, extended time, paraphrasing, reader, limited choices, use of formula sheet (as needed)</p>