

FRANKLIN-SIMPSON HIGH SCHOOL

Course Name: Chemistry Unit Name: Gases and Gas Stoichiometry

Days: 8

Quality Core Objectives:

Unit 7 Gases and Gas Stoichiometry	
I.A.1. Scientific Inquiry	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	d. Explain why all scientific knowledge is subject to change as new evidence becomes available to the scientific community
	e. Use a variety of appropriate sources (e.g., Internet, scientific journals) to retrieve relevant information; cite references properly
	g. Compare the scientific definitions of fact, law, and theory, and give examples of each in chemistry
II.B.1. Phases of Matter, Phase Changes, and Physical Changes	a. Compare the definition of matter and energy and the laws of conservation of matter and energy
	b. Describe how matter is classified by state of matter and by composition
	c. Describe the phase and energy changes associated with boiling/condensing, melting/freezing, sublimation, and crystallization (deposition)

	d. Explain the difference between chemical and physical changes and demonstrate how these changes can be used to separate mixtures and compounds into their components
	e. Define chemical and physical properties and compare them by providing examples
II.B.2. The Nature of Gases	a. Define gas pressure and the various pressure units (e.g., torr, kilopascals, mm Hg, atmospheres)
	b. Describe the use and operation of mercury barometers and manometers to find atmospheric pressure or relative gas pressures
	c. Define the gas laws given by Boyle, Charles, Gay-Lussac, and Dalton and solve problems based on these laws
	e. Explain the basis for gaseous diffusion and effusion
	f. Describe Avogadro's hypothesis and use it to solve stoichiometric problems

Purpose of the Unit: The purpose of this unit is to continue the stoichiometry unit and expand its application to gasses, due to their peculiar behavior. Students will also explore the conversions between temperature scales and units of pressure. Students will also relate their prior knowledge of the kinetic theory of matter to their understanding of the behavior of gasses.

Prerequisites: Students should be able to:

- Calculate molar mass.
- Perform basic dimensional analysis and use SI units.
- Balance equations.
- Apply the law of conservation of mass/ energy/ matter.
- Identify experimental sources of error.
- Apply the kinetic theory of matter.

Daily Lesson Guide

Day	Lesson Content and Objectives	Focus Questions	Critical Thinking (High Yield / Literacy /LTF/etc.)	Engagement	Assessment and/or Accommodations
1	<ul style="list-style-type: none"> * Review of kinetic molecular theory and states of matter II.B.1.a, b, c, d, e IV.A.1a IV.A.2.a 	<ul style="list-style-type: none"> * What do I remember about the kinetic molecular theory and states of matter? 	<ul style="list-style-type: none"> * Identifying similarities and differences 	<ul style="list-style-type: none"> * Pre-test * ACT Bell Ringer * Modeled notes and examples 	<ul style="list-style-type: none"> * Evaluate pre-test * Evaluate practice problems <p>Accommodations: More guidance in calculations, fewer steps in conversions, prompting/ cueing, paraphrasing, reader, scribe, extended time, reduced assignment (as needed)</p>
2	<ul style="list-style-type: none"> * Measuring pressure, units of pressure * Diffusion, effusion, and other properties of gasses II.B.2.a, b, e 	<ul style="list-style-type: none"> * How is pressure measured and what units are used? * What are the important properties of gasses? 	<ul style="list-style-type: none"> * Summarizing and note taking * Application * Identifying similarities and differences * I Do-We Do-You Do 	<ul style="list-style-type: none"> * ACT Bell ringer * Modeled notes and examples * Practice pressure conversions and diffusion calculations together (formative) 	<ul style="list-style-type: none"> * Evaluate practice problems <p>Accommodations: More guidance in calculations, fewer steps in conversions, given formulas, prompting/ cueing, paraphrasing, reader, scribe, extended time, reduced assignment (as needed)</p>
3	<ul style="list-style-type: none"> * Boyle's, Charles's, Gay-Lussac's, Dalton's, Avagadro's and combined gas laws II.B.2.c, f II.B.3.b IV.A.2.c 	<ul style="list-style-type: none"> * Can I distinguish between the different gas laws and the properties they relate to choose the correct one for calculations? 	<ul style="list-style-type: none"> * Summarizing and note taking * Application * Identifying similarities and differences * Non-linguistic representation * I Do-We Do-You Do 	<ul style="list-style-type: none"> * ACT Bell ringer * Modeled notes and examples * Read article about hot air balloons * Practice various gas law calculations together (formative) 	<ul style="list-style-type: none"> * Evaluate practice problems and understanding of article on hot air balloons <p>Accommodations: More guidance in calculations, fewer steps in conversions, given formulas, prompting/ cueing, paraphrasing, reader, scribe, extended time, reduced assignment (as needed)</p>

4	<ul style="list-style-type: none"> * Ideal vs. real gasses * Computing density from MM, P, and T * Molar mass of volatile compounds II.B.3.a, c, d	<ul style="list-style-type: none"> * How is the behavior of a gas affected by being ideal or non-ideal? * How can molar mass and density of a gas be determined? 	<ul style="list-style-type: none"> * Summarizing and note taking * Application * Identifying similarities and differences * I Do-We Do-You Do 	<ul style="list-style-type: none"> * ACT Bell ringer * Modeled notes and examples * Practice various density and molar mass calculations together (formative) 	<ul style="list-style-type: none"> * Evaluate practice problems Accommodations: More guidance in calculations, fewer steps in conversions, given formulas, prompting/ cueing, paraphrasing, reader, scribe, extended time, reduced assignment (as needed)
5	<ul style="list-style-type: none"> * Conversions with temperature * Gas stoichiometry calculations at standard and non-standard conditions II.B.3.e IV.a.2.b	<ul style="list-style-type: none"> * How can I use stoichiometric relationships to convert between gaseous reactants and products? 	<ul style="list-style-type: none"> * Summarizing and note taking * Application * Identifying similarities and differences * I Do-We Do-You Do 	<ul style="list-style-type: none"> * ACT Bell ringer * Modeled notes and examples * Practice various temperature conversions and stoichiometric calculations together (formative) 	<ul style="list-style-type: none"> * Evaluate practice problems Accommodations: More guidance in calculations, fewer steps in conversions, given formulas, prompting/ cueing, paraphrasing, reader, scribe, extended time, reduced assignment (as needed)
6	Laboratory: Gas Law Rotations I.A.1.c, d, e, f, g I.A.2.a, b, c, d, e, f, g I.A.3.d, e, g II.B.1.a, b, c, d, e II.B.2.a, b, c, e, f II.B.3.a, b, c, d, e IV.A.1.a IV.A.2.a, b, c	<ul style="list-style-type: none"> * Can I use my knowledge to explain my observations at various lab stations? 	<ul style="list-style-type: none"> * Synthesis * Application/ Analysis * Identifying similarities and differences * Learning with others * Authenticity * Novelty and Variety * Generating and testing hypotheses 	<ul style="list-style-type: none"> * ACT Bell ringer * Conduct lab according to procedures provided (summative) 	<ul style="list-style-type: none"> * Evaluate lab report Accommodations: Partner students based on skill level, prompting/ cueing, paraphrasing, reader, scribe, extended time (as needed)

7	Review I.A.1.c, d, e, f, g I.A.2.a, b, c, d, e, f, g I.A.3.d, e, g II.B.1.a, b, c, d, e II.B.2.a, b, c, e, f II.B.3.a, b, c, d, e IV.A.1.a IV.A.2.a, b, c	* What can I do to be better prepared for the exam?	* Use clickers to test students' knowledge and clarify and misconceptions before the exam with immediate feedback.	* ACT Bell Ringer * Use clickers to review with exam like questions (summative)	* Students participate in review Accommodations: prompting/ cueing, extended time, paraphrasing, reader, scribe, use of formula sheet (as needed)
8	Exam I.A.1.c, d, e, f, g I.A.2.a, b, c, d, e, f, g I.A.3.d, e, g II.B.1.a, b, c, d, e II.B.2.a, b, c, e, f II.B.3.a, b, c, d, e IV.A.1.a IV.A.2.a, b, c	* Can I demonstrate my knowledge on the exam?	* Evaluation * Analysis * Application * Synthesis	* ACT Bell Ringer * Students take exam (summative)	* Evaluate exam Accommodations: prompting and cueing, extended time, paraphrasing, reader, scribe, limited choices, reduced assignment, use of formula sheet (as needed)