

STEM Innovation Academy Unit Plan

Subject: NJIT Chemistry 125/125A Unit Title: Unit 4- The Gas Laws Grade: 11 th	Teacher: Ms. Dy-Anni Austin Duration: 9-10 80 min blocks
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Unit Summary

In this unit of study, students analyze the structure and interactions of matter by investigating the relationships between the pressure, temperature, and volume of a gas. They develop models and construct explanations of the cause-and-effect relationships among these factors. They explain how a real gas differs from an ideal gas.

ESSENTIAL QUESTION(S) AND ENDURING UNDERSTANDINGS

Essential Questions /Focus Questions	Enduring Understandings
<ul style="list-style-type: none"> How can one explain the structure, properties, and interactions of matter? How do substances combine or change (react) to make new substances? How can one explain the structure, properties, and interactions of matter? How does one characterize and explain these reactions and make predictions about them? How do particles combine to form the variety of matter one observes? How are waves used to transfer energy and information? How do we classify things around us? What relationships exist among different kinds of matter? How and why does matter change? What separation techniques can be used to separate mixtures? Compounds? Elements? How does molecular motion affect the behavior of matter? In a system of fixed mass, what is the relationship between pressure, volume, and temperature? 	<ul style="list-style-type: none"> Differences in the physical properties of solids, liquids, and gasses are explained by the ways in which atoms, ions, or molecules of the substances are arranged, and by the strength of the forces of attraction between the atoms, ions, or molecules. In a neutral atom, the same number of negatively charged electrons surrounds the positively charged nucleus. Electrons, protons, and neutrons, are parts of the atom and have measurable properties, including mass, and in the case of protons and electrons, charges. Gas particles move independently and are far apart relative to each other. The behavior of gasses can be explained by the kinetic molecular theory. The kinetic molecular theory can be used to explain the relationship between pressure and volume, volume and temperature, pressure and temperature, and the number of particles in a gas sample. There is a natural tendency for a system to move in the direction of disorder or entropy. An atom's electron configuration, particularly of the outermost electrons, determines how the atom interacts with other atoms.

NJIT CHEM 125/125A Scope and Sequence

Unit 1- Atomic Structure	Unit 2- The Periodic Table	Unit 3- Chemical Bonding	Unit 4- Gas Laws	Unit 5- The Mole and Chemical Quantities	Unit 6- Chemical Reactions
Standards HS-PS1-1	Standards HS-PS1-1 HS-PS1-2	Standards HS-PS1-2 HS-PS1-3 HS-PS1-7 HS-PS2-4 HS-PS3-5	Standards HS-PS1-3 HS-PS2-4 HS-PS3-5	Standards HS-PS1-7	Standards HS-PS1-2 HS-PS1-4 HS-PS1-5 HS-PS1-7
30-35 days	15-20 days	30-35 days	9-10 days	11-15 days	12-15 days

Pacing Guide

Section	Lesson	Learning Goal	NJSLS	Pacing
4.1- Inquiry Activity	Unit 4 The Gas Laws	Identify the factors that influence the properties of gasses, specifically temperature, pressure, and volume of a gas.	HS-PS1-3 HS-PS2-4 HS-PS3-5	2 days
4.2- Dimensional Analysis	Unit 4 The Gas Laws	Perform unit conversions using the factor label method.	HS-PS1-3 HS-PS2-4 HS-PS3-5	1 day
4.3- Gas Laws Introduction	Unit 4 The Gas Laws	Use Boyle's Law, Charles Law, and Gay-Lussac's Law to calculate pressure, volume, and temperature of a gas.	HS-PS1-3 HS-PS2-4 HS-PS3-5	2 days
4.4- The Ideal Gas Law	Unit 4 The Gas Laws	Use the ideal gas law to determine the relationship between pressure, volume, mole of a gas, and temperature of an ideal gas.	HS-PS1-3 HS-PS2-4 HS-PS3-5	2 days
4.5- Dalton's Law of Partial Pressures	Unit 4 The Gas Laws	Calculate the partial pressure of a gas if the total pressure is know.	HS-PS1-3 HS-PS2-4 HS-PS3-5	1 days
4.6- Kinetic Molecular Theory	Unit 4 The Gas Laws	Describe the properties of an ideal gas vs a real gas. Identify the variables that influence the properties of gasses.	HS-PS1-3 HS-PS2-4 HS-PS3-5	1 days

Student Self-Assessment and Reflection

Students will write down their questions and or comments of the day's events. They will write their questions about any topics or problems they have, and they will discuss them as a class the following day. Students will also write down any observations they experienced during labs and/or lecture presentations into their Journals.

Differentiated Instruction (by student readiness):

Tiers 2-3: Students who have scored a 3 or below (approaching expectations) on the ELA and Math NJSLAs

1. Scaffolding
2. Group work
3. Peer tutoring
4. One on one discussions
5. Office hour appointments
6. Laboratory Investigations
7. Group PowerPoint Presentation
8. Unit Test

Tier 1: for students who have scored a 4 or 5 (met or exceeded expectations) on the ELA and Math NJSLAs

1. One on one discussions
2. Office hour appointments

3. Laboratory Investigations
4. Group PowerPoint Presentation
5. Unit Test

Literacy Connections

ELA/Literacy

RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.

WHST.9-12.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

WHST.9-12.9 Draw evidence from informational texts to support analysis, reflection, and research.

WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.

WHST.9-12.5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

WHST.9-12.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

SL.11-12.5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

Expert/Field Experiences

Students will attend a field trip to the Mignone Hall of Gems and Minerals at the American Museum of Natural History. They will use this experience to better understand the properties of elements and compounds through the study of rocks and minerals. Students will complete a pre-trip assignment and a scavenger hunt on site.

Students will also travel to NJIT in June to take the American Chemical Society Chemistry End of Course Exam, which will cover all of the topics in our scope and sequence.