

Scope and Sequence – Chemistry II A



Course Chem II A (.5 credits)

Instructor(s)	Capi Marceau, Joe Ruwitch,
Text	<i>Chemistry by Addison - Wesley</i>
Prerequisite	Algebra 1 and Physical Science Matter with a B or better
Grade	11-12 (10 th only with instructor permission)
Course Description	Chemistry II is a college preparatory course with an in-depth study of the atom, elements, compounds and the periodic table. Additional topics include chemical reactions, moles and stoichiometry. Laboratory activities are a critical component of the course. This course is designed to meet and in many areas exceed the OSA standards and benchmarks in physical science, science concepts and processes, history and nature of science, and scientific inquiry. This course will also prepare the student for further study in the advanced courses in Chemistry.
Units	<p>Unit 1 (3 weeks): Atomic structure and the periodic table – topics include: subatomic particles, isotopes, atomic size, electron configuration, periodic trends, scientific measurement, and unit analysis.</p> <p>Content Standards Covered (Codes only): H.3S.1, H.3S.2, H.3S.3, H.1P.1, H.2P.1 CCSS Literacy Standards Covered (Codes only): See NGSS NGSS: HS-PS1-1 HS-PS4-1</p>
	<p>Unit 2 (2 weeks): Matter and chemical bonding – topics include: nomenclature, ionic compounds, covalent compounds, bonding theory, and oxidation and reduction.</p> <p>Content Standards Covered (Codes only): H.3S.1, H.3S.2, H.3S.3, H.3S.4, H.3S.5, H.1P.1, H.1P.2, H.2P.1, H.2P.2, H.3S.1, H.3S.2, H.3S.3, H.3S.5 CCSS Literacy Standards Covered (Codes only): See NGSS NGSS: HS-PS1-2 HS-PS1-3</p>
	<p>Unit 3 (2 weeks): The mole – topics include: the mole concept, size and number of particles, and conversion of units.</p> <p>Content Standards Covered (Codes only): H.1P.1, H.1P.2, H.2P.1, H.2P.2, H.3S.1, H.3S.2, H.3S.3, H.3S.5 CCSS Literacy Standards Covered (Codes only): See NGSS NGSS: HS-PS1-7</p>
	<p>Unit 4 (3 weeks): Chemical equation and types of reactions – topics include: balancing chemical equations, types of reactions, and writing chemical equations</p> <p>Content Standards Covered (Codes only): H.1P.1, H.1P.2, H.2P.1, H.2P.2, H.3S.1, H.3S.2, H.3S.3, H.3S.5 CCSS Literacy Standards Covered (Codes only): See NGSS NGSS: HS-PS1-7</p>
	<p>Unit 5 (2 weeks): Stoichiometry – topics include: conversions between mass, particles, volumes, concentration, and density.</p> <p>Content Standards Covered (Codes only): H.1P.1, H.1P.2, H.2P.1, H.2P.2, H.3S.1, H.3S.2, H.3S.3, H.3S.5 CCSS Literacy Standards Covered (Codes only): See NGSS NGSS: HS-PS1-7</p>
EA Opportunities	None
CRLE Opportunities	None
Work Sample(s) or Performance Task Opportunities	None

Unit 1:	Atomic structure and the periodic table	
Time Frame	3 weeks	
Summary of Unit	Studies will include atoms and their base components, using and reading the periodic table, identifying period trends and chemical periodicity. The historical development of the atomic structure model and the significant changes these developments have had on society. This unit will also cover measurement, data collection and analysis of results of laboratory procedures.	
NGSS Content Standards	Standard's Code	Standard
	HS-PS1-1	Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.
	HS-PS4-1	Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.
CCSS Literacy Standards	Imbedded in NGSS:	<p>RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. (HS-PS4-1),(HS-PS4-4)</p> <p>MP.2 Reason abstractly and quantitatively. (HS-PS4-1),(HS-PS4-3)</p> <p>MP.4 Model with mathematics. (HS-PS4-1)</p> <p>HSA-SSE.A.1 Interpret expressions that represent a quantity in terms of its context. (HS-PS4-1),(HS-PS4-3)</p> <p>HSA-SSE.B.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. (HS-PS4-1),(HS-PS4-3)</p> <p>HSA.CED.A.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. (HS-PS4-1),(HS-PS4-3)</p>
Major Assignments/ Learning Activities	<ul style="list-style-type: none"> • Lab: Atomic size • Lab: Isotopes 	
Common Summative Assessments	Unit 1 Test	
Performance Tasks or Work Samples	None	
Materials	You will need a supply of paper, pen with blue or black ink and/or pencil, calculator, and a composition lab book that is graph paper ruled.	

Unit 2:	Matter and chemical bonding	
Time Frame	2 weeks	
Summary of Unit	Students will focus on the mechanics of naming and classifying chemical compounds. The forces of chemical change that control the formation of compounds and the principles of chemical bonding are additional topics.	

NGSS Content Standards	Standard's Code	Standard
	HS-PS1-3	Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.
	HS-PS1-2	Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.
CCSS Literacy Standards	Imbedded in NGSS:	<p>WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (HS-PS1-2),(HS-PS1-5)</p> <p>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. (HS-PS1-2)</p> <p>HSN-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-PS1-2),(HS-PS1-4),(HS-PS1-5),(HS-PS1-7)</p> <p>HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-PS1-2),(HS-PS1-4),(HS-PS1-5),(HS-PS1-7)</p>
Major Assignments/ Learning Activities		<ul style="list-style-type: none"> • Lab: Density of Aluminum • Lab: Density and significant figures • Lab: Reactivity of Alkaline earth metal
Common Summative Assessments		Unit 2 Test
Performance Tasks or Work Samples		None
Materials		You will need a supply of paper, pen with blue or black ink and/or pencil, calculator, and a composition lab book that is graph paper ruled.

Unit 3:	The mole
Time Frame	2 weeks
Summary of Unit	Students will investigate the concept of the mole in chemistry. Being the cornerstone of chemical computation the mole is an essential element of the study of chemistry. This unit builds a solid background in the “language” of chemistry for pre-college students.

NGSS Content Standards	Standard's Code	Standard
	HS-PS1-7	Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.
CCSS Literacy Standards	Imbedded in NGSS:	MP.2 Reason abstractly and quantitatively. (HS-PS1-5),(HS-PS1-7) HSN-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-PS1-2),(HS-PS1-4),(HS-PS1-5),(HS-PS1-7) HSN-Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. (HS-PS1-4),(HS-PS1-7) HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-PS1-2),(HS-PS1-4),(HS-PS1-5),(HS-PS1-7)
Major Assignments/ Learning Activities	<ul style="list-style-type: none"> • Lab: Six solution set • Lab: The mole bag • Lab: The mole bean lab 	
Common Summative Assessments	Unit 3 Test	
Performance Tasks or Work Samples	None	
Materials	You will need a supply of paper, pen with blue or black ink and/or pencil, calculator, and a composition lab book that is graph paper ruled.	

Unit 4:	Chemical equation and types of reactions	
Time Frame	3 weeks	
Summary of Unit	Students will focus on balancing chemical equations and the law of Conservation of Mass. Student will recognize chemical reactions and will provide evidence for the Conservation of Mass in the laboratory.	
NGSS Content Standards	Standard's Code	Standard
	HS-PS1-7	Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.
CCSS Literacy Standards	Imbedded in NGSS:	MP.2 Reason abstractly and quantitatively. (HS-PS1-5),(HS-PS1-7) HSN-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-PS1-2),(HS-PS1-4),(HS-PS1-5),(HS-PS1-7) HSN-Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. (HS-PS1-4),(HS-PS1-7) HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-PS1-2),(HS-PS1-4),(HS-PS1-5),(HS-PS1-7)
Major Assignments/ Learning Activities	<ul style="list-style-type: none"> • Lab: single replacement reactions • Lab: empirical formulas • Lab: double replacement reactions 	
Common Summative Assessments	Unit 4 Test	
Performance	None	

Tasks or Work Samples	
Materials	You will need a supply of paper, pen with blue or black ink and/or pencil, calculator, and a composition lab book that is graph paper ruled.

Unit 5:	Stoichiometry	
Time Frame	2 weeks	
Summary of Unit	Like the mole concept, stoichiometry is an essential component in the study of chemistry. This unit builds a solid background in the “language” of chemistry for pre-college students.	
NGSS Content Standards	Standard's Code	Standard
	HS-PS1-7	Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.
CCSS Literacy Standards	Imbedded in NGSS:	<p>MP.2 Reason abstractly and quantitatively. (HS-PS1-5),(HS-PS1-7)</p> <p>HSN-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-PS1-2),(HS-PS1-4),(HS-PS1-5),(HS-PS1-7)</p> <p>HSN-Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. (HS-PS1-4),(HS-PS1-7)</p> <p>HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-PS1-2),(HS-PS1-4),(HS-PS1-5),(HS-PS1-7)</p>
Major Assignments/Learning Activities	<ul style="list-style-type: none"> • Lab: Chemical changes of copper • Lab: Tin and Oxygen 	
Common Summative Assessments	Final Exam	
Performance Tasks or Work Samples	None	
Materials	You will need a supply of paper, pen with blue or black ink and/or pencil, calculator, and a composition lab book that is graph paper ruled.	