Syllabus

Chemistry A

Course Overview

Chemistry is the study of how a set of substances with particular physical properties—like solid paper and the oxygen in the air—can react with each other to form different substances with entirely different properties—like gaseous water and carbon dioxide. In most cases, these chemical changes result in an energy change as well, either giving off energy or absorbing energy.

Chemistry is considered one of the core scientific disciplines because it is so practical and widely useful in the modern world. The development of new types of materials, new methods of producing or storing energy, or new methods of interacting with genetic material all depend upon a knowledge of chemistry.

In Chemistry A, you will learn some of the "basics" of chemistry: the atomic and molecular structures that result in different chemical properties and the concepts and tools that will enable you to predict chemical properties and chemical reactions.

Course Goals

By the end of this course, you will be able to do the following:

- Understand the difference between a chemical change and a physical change and understand the basics of atomic theory, which underlies the study of chemistry.
- Be able to use the periodic table to understand atomic structure and predict the chemical behavior of substances.
- Understand the different types of chemical bonding and how they may result in different molecular structures and different chemical properties.
- Understand how quantitative chemical results in the "real world" are based on reactions that occur on the atomic and molecular scale.
- Carry out activities used in real-world chemistry, including predicting the products of a chemical reaction and predicting the amounts of products you would expect from an initial quantity of chemical substances.
- Investigate the relationships between energy and matter, including phase changes and the effects of changing the volume, pressure, or temperature of a gas.

Math and Science Skills

Successful completion of Algebra 1 provides the mathematical skills you'll need for Chemistry A.

In addition, you should have a good working understanding of inquiry science methods, including:

- Experimental design, including the importance of experimental controls.
- Basic data analysis skills, including the ability to interpret mathematical patterns from data tables and graphs.
- The ability to use experimental results and/or real data sets to propose general rules.

General Skills

To participate in this course, you should be able to do the following:

- Complete basic operations with word processing software, such as Microsoft Word or Google Docs.
- Perform online research using various search engines and library databases.
- Communicate through email and participate in discussion boards.

For a complete list of general skills that are required for participation in online courses, refer to the Prerequisites section of the Plato Student Orientation document, found at the beginning of this course.

Credit Value

Chemistry A is a 0.5-credit course.

Course Materials

- Computer with Internet connection and speakers or headphones
- Microsoft Word or equivalent
- *Test and Study References* found at the end of this syllabus. They include a periodic table for testing purposes and a periodic table for student study.
- Notebook

Course Pacing Guide

This course description and pacing guide is intended to help you keep on schedule with your work. Note that your course instructor may modify the schedule to meet the specific needs of your class.

Unit 1: Matter and Atomic Structure

Summary

In this unit, you will be introduced to the concept of chemical change as opposed to physical change and you will review atomic theory, which underlies the study of chemistry.

Day	**Activity**/*Objective*	Type
1 day: 1	**Syllabus and Plato Student Orientation** *Review the Plato Student Orientation and Course Syllabus at the beginning of this course.*	Course Orientation
2 days: 2–3	**Types of Matter** *Learner will identify different types of matter.*	Lesson
2 days: 4–5	**Physical Changes Versus Chemical Changes** *Learner will identify physical and chemical properties and changes.*	Lesson
2 days: 6–7	**Models of the Atom** *Learner will describe the experimental basis for the atom and identify the parts of the atom.*	Lesson
2 days: 8–9	**Isotopes and Atomic Mass** *Learner will calculate average atomic mass from isotopic information.*	Lesson
2 days: 10–11	**Unit Activity and Discussion—Unit 1**	Unit Activity Discussion
1 day: 12	**Posttest—Unit 1**	Assessment

Unit 2: The Periodic Table

Summary
In this unit, you will explore the periodic table which helps us understand atomic structure and predict the chemical behavior of substances.

Day	**Activity**/*Objective*	Type
2 days: 13–14	**The Periodic Table** *Learner will use the periodic table to identify information about an element and to predict element properties.*	Lesson
2 days: 15–16	**Electron Configurations** *Learner will write electron configurations.*	Lesson
2 days: 17–18	**Periodic Trends** *Learner will identify and compare periodic trends from the periodic table.*	Lesson
2 days: 19–20	**Electromagnetic Radiation** *Learner will describe electromagnetic radiation and perform appropriate calculations.*	Lesson
2 days: 21–22	**Spectral Lines** *Learner will* identify *spectral lines for elements.*	Lesson
2 days: 23–24	**Unit Activity and Discussion—Unit 2**	Unit Activity Discussion
1 day: 25	**Posttest—Unit 2**	Assessment

Unit 3: Bonding

Summary

In this unit, you will learn about chemical bonding and explore how different types of bonds result in different molecular structures and different chemical properties.

Day	**Activity**/*Objective*	Type
2 days: 26–27	**Ionic, Covalent, and Metallic Bonds** *Learner will Identify ionic, covalent, and metallic substances and describe their bonding.*	Lesson
2 days: 28–29	**Compound Names** *Learner will use rules for naming compounds.*	Lesson
2 days: 30–31	**Lewis Structures** *Learner will draw Lewis structures.*	Lesson
2 days: 32–33	**Electronegativity** *Learner will differentiate between ionic, polar covalent, and nonpolar covalent bonds.*	Lesson
2 days: 34–35	**Three-Dimensional Molecules** *Learner will predict the three-dimensional bond shape of a molecule.*	Lesson
3 days: 36–37	**Molecular Polarity** *Learner will predict molecular polarity.*	
2 days: 38–39	**Intermolecular Forces** *Learner will identify intermolecular forces.*	
3 days: 40–42	**Unit Activity and Discussion—Unit 3**	Unit Activity Discussion
1 day: 43	**Posttest—Unit 3**	Assessment

Unit 4: The Mole Concept

Summary

In this unit, you will learn about how quantitative chemical results in the “real world” are based on reactions occurring on the atomic and molecular scale.

Day	**Activity**/*Objective*	Type
2 days: 44–45	**Moles and Molar Mass** *Learner will identify a mole and calculate molar mass.*	Lesson
2 days: 46–47	**Mole Calculations** *Learner will calculate representative particles, mass, volume, and moles from given data.*	Lesson
2 days: 48–49	**Percent Composition** *Learner will calculate percent composition.*	Lesson
2 days: 50–51	**Empirical and Molecular Formulas** *Learner will determine empirical and molecular formulas.*	Lesson
2 days: 52–53	**Unit Activity and Discussion—Unit 4**	Unit Activity Discussion
1 day: 54	**Posttest—Unit 4**	Assessment

Unit 5: Chemical Reactions

Summary
In this unit, you will carry out activities used in real-world chemistry, including predicting the products of a chemical reaction and predicting the amounts of products you would expect from an initial quantity of chemical substances.

Day	**Activity**/*Objective*	Type
2 days: 55–56	**Balancing Chemical Equations** *Learner will balance chemical equations.*	Lesson
2 days: 57–58	**Types of Reactions** *Learner will identify different types of chemical reactions.*	Lesson
2 days: 59–60	**Predicting Chemical Products** *Learner will predict products for simple chemical reactions.*	Lesson
2 days: 61–62	**Mole Ratios and Stoichiometry** *Learner will determine mole ratios from balanced chemical equations and perform mole to mole stoichiometry problems.*	Lesson
2 days: 63–64	**Mass and Volume Stoichiometry** *Learner will calculate stoichiometry problems involving mass and volume.*	Lesson
2 days: 65–66	**Percent Yield** *Learner will calculate percent yield for chemical reactions.*	Lesson
3 days: 67–69	**Unit Activity and Discussion—Unit 5**	Unit Activity Discussion
1 day: 70	**Posttest—Unit 5**	Assessment

Unit 6: Kinetic Molecular Theory and Gas Law

Summary
In this unit, you will investigate the relationships between energy and matter, including phase changes and the effects of changing the volume, pressure, or temperature of a gas.

Day	**Activity**/*Objective*	Type
2 days: 71–72	**Energy and Chemical Reactions** *Learner will identify different forms of energy and how they relate to chemical reactions.*	Lesson
2 days: 73–74	**Endothermic and Exothermic Reactions** *Learner will differentiate between endothermic and exothermic processes.*	Lesson
2 days: 75–76	**Kinetic Theory** *Learner will describe the kinetic theory.*	Lesson
2 days: 77–78	**States of Matter** *Learner will differentiate between the states of matter.*	Lesson
2 days: 79–80	**Heating Curves and Phase Changes** *Learner will understand a heating curve and describe heat changes during phase changes.*	Lesson
2 days: 81–82	**Gas Law Calculations** *Calculate problems using gas laws.*	Lesson
2 days: 83–84	**Ideal Gas Law** *Learner will identify an ideal gas and use the ideal gas law.*	Lesson
2 days: 85–86	**Dalton's Law and Graham's Law** *Learner will use Dalton's law of partial pressures and Graham's law of effusion to describe gases.*	Lesson
2 days: 87–88	**Unit Activity and Discussion—Unit 6**	Unit Activity Discussion
1 day: 89	**Posttest—Unit 6**	Assessment
1 day: 90	**End of Semester Test**	Assessment

Test and Study References