

Atomic Structure & Periodicity



Unit Introduction

What can we learn from the color of light emitted by stars? We will explore this question by starting at the fundamentals of chemistry - atomic structure. Building on that, we will go further and explore the organization of the periodic table in order to recognize patterns. Armed with atomic structure and periodic trends, we can then study electron configuration and its connection to the electromagnetic spectrum to make connections between the energy emitted by electrons and the emission spectra of individual elements to the color of the stars.

Unit Priority Standards

- **SS.SCI.CHEM.1.1** - HS-PS1-1 Valence Electrons and Properties of Elements
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.
- **SS.SCI.CHEM.2.3** - Develop & Using Models
Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds.
- **SS.SCI.CHEM.2.5** - Analyzing & Interpreting Data
Analyzing data in 9–12 builds on K–8 experiences and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data.
- **SS.SCI.CHEM.2.6** - Mathematics & Computational Thinking
Mathematical and computational thinking in 9- 12 builds on K-8 experiences and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions.

Unit Essential questions
1. How can we use patterns in the Periodic Table to make predictions about the properties of elements?
Enduring Understandings
1. Science progresses as new information is obtained. 2. Advancements in technology lead to advancements in science. 3. Patterns and observations lead to the development of models that can be used to predict relationships between systems or between components of a system.
Essential Knowledge
1. It can be difficult to change models and integrate new information. 2. The components of an atom 3. Isotopes and ions 4. Mass spectroscopy and relative atomic mass calculations 5. Periodic trends 6. Electron configurations

7. Electromagnetic spectrum
Essential Skills
1. Determine the #p, #n, #e, atomic #, mass #, ionic charge, and atomic symbol for a given element. 2. Identify isotopes & ions. 3. Determine the average atomic mass and identify an unknown element. 4. Write the electron configuration for a given element. 5. Compare and explain atomic radii, electronegativity, ionization energy, metallic character for given elements. 6. Identify elements and their proper placement on the periodic table.

Unit Outline

Week 1	• Atomic Structure • Mass Spectroscopy & Atomic Mass
Week 2	• Formative Assessment (quiz) • Periodic Table • Periodic Trends • Electron Configuration
Week 3	• Electron Configuration • Formative Assessments (project + quiz) • Unit Review
Week 4	• Summative Assessment (unit test) • Electromagnetic Spectrum & Emission Spectra
Week 5	• Electron Excitation Lab (data collection) • Summative Assessment (lab)

Assessment Details

Evidence	
I will check students' understanding throughout the unit by...	
Summative • Unit 1 Test • Unit 1 Lab	Formative • Check for understanding quizzes (not entered in PowerSchool) • Formative Group Project: The Scientific Method • Formative Quiz #1: Atomic structure, mass spectroscopy, & atomic mass • Formative Quiz #2: Periodic trends & electron configuration