Anoka-Hennepin Secondary Curriculum Unit Plan

Department:	Science	Course:	Chemistry I	Unit 2 Title:	Atomic Structure Periodic Table	Grade Level(s):	10th
Assessed Trimester:	Trimester A	Pacing:	10-15 Days	Date Created:	6/7/2012	Last Revision Date:	6/24/14

Course Understandings: *Students will understand that:*

- Problems can be solved and knowledge gained in a systematic way: solutions to one problem can create new questions and problems.
- Chemistry is recognized as significant in its application to other disciplines and the world.
- Ideas are expressed symbolically, numerically, and graphically.
- Behavior and properties of materials are organized, classified, and predicted utilizing periodic trends.
- Mathematical relationships are interpreted and manipulated to model the real world.
- The basic building blocks combine and recombine in a variety of ways to make all matter from the simple to the complex.
- The laws of chemistry predict outcomes that impact and apply to daily life.

DESIRED RESULTS (Stage 1) - WHAT WE WANT STUDENT TO KNOW AND BE ABLE TO DO?

Established Goals

- **Standard:** Matter
  The periodic table illustrates how patterns in the physical and chemical properties of elements are related to atomic structure.
  9C.2.1.1.1: Explain the relationship of an element's position on the periodic table to its atomic number and electron configuration
  9.2.1.2.1: Describe the role of valence electrons in the formation of chemical bonds.
  9C.2.1.1.1: Explain the relationship of an element's position on the periodic table to its atomic number and electron configuration
  9C.2.1.1.2: Identify and compare trends on the periodic table, including reactivity and relative sizes of atoms and ions; use the trends to explain the properties of subgroups, including metals, non-metals, alkali metals, alkaline earth metals, halogens and noble gases.
  9.2.1.1.2: Describe how experimental evidence led Dalton, Rutherford, Thomson, Chadwick, and Bohr to develop increasingly accurate models of the atom.

  Benchmark:
  ACT-S-13: Identify strengths and weaknesses in one or more models
  ACT-S-14: Identify similarities and differences between models
  ACT-S-15: Determine which models are supported or weakened by new information
  ACT-S-5: Identify and/or use a simple (linear) mathematical relationship between data

- **Literacy Standards:**
  9.13.1.1: Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
  9.13.2.2: Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
  9.13.4.4: Determine the meaning of symbols, equations, graphical representations, tabular representations, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
  9.14.1.1: Write arguments focused on discipline-specific content.
  a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence.
  b. Develop claim(s) and counterclaims fairly, supplying data and credible evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns.
  c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.
  d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.
  e. Provide a concluding statement or section that follows from or supports the argument presented.

Transfer

Students will be able to independently use their learning to: (product, high order reasoning)

- Understand the process of scientific progress and the role technology plays in understanding matter.
- Understand that different materials are used for different purposes based on their properties as elements and compounds.

Meaning

Unit Understanding(s):

Students will understand that:

- Atoms are the basic building blocks of matter.
- Repeating (periodic) patterns of physical and chemical properties occur among elements that define families with similar properties. The periodic table displays the repeating patterns, which are related to the atoms' outermost electrons.

Essential Question(s):

Students will keep considering:

- How does the organization of the periodic table show the properties and characteristics of the elements?

Acquisition

Knowledge - Students will:

- Describe how principal energy levels (spdf) fill with electrons in atoms 9C.2.1.1.1 (M)
- Use noble gas notation to write electron configurations, excluding exceptions such as Chromium. 9C.2.1.1.1 (L)
- Know the contributions of Dalton, Rutherford, Thomson, Chadwick, and Bohr to changing models of the atom. 9.2.1.1.2 (M)
- Identify the metals, non-metals, alkali metals, alkaline-earth metals, halogens and noble gases on the periodic table. 9C.2.1.1.2 (L)

Reasoning - Students will:

- Explain how new technology enables the discovery of new evidence which leads to changing models of the atom 9.2.1.1.2 (M)
- Relate position of an element on the periodic table to its subatomic particles (H) and electron configuration (M) 9C.2.1.1.1
- Analyze trends in atomic size and ionic size in groups and periods on the periodic table. 9C.2.1.1.2 (L)
- Understand the concepts of periodic trends including: electronegativity, ionization energy and reactivity of an element based on its position on the periodic table. 9C.2.1.1.2 (M)
- Predict chemical and physical properties of an element based on its position on the periodic table. 9C.2.1.1.2 (M)

Skills - Students will:

- Determine electron configuration of a given element or given electron configuration, determine which element it is. 9C.2.1.1.1 (M)
- Use electron configurations to predict probable ionic charges for Group 1, 2, and 13, 14, 15, 16, 17, 18. 9C.2.1.1.1 (M)
- Determine protons, neutrons and electrons from mass number and atomic number. 9C.2.1.1.1 (H)
- Use the periodic table to determine the probable ionic charge of an element. 9C.2.1.1.1 (H)
- Determine the valence electrons for an element or an ion by the location on the periodic table. 9.2.1.2.1 (H)

Common Misunderstandings

- The elements on the periodic table are arranged by increasing atomic mass.
- A property or characteristic does not need to vary uniformly to vary periodically.
- Groups are rows across and periods are columns down.

Essential new vocabulary

- Proton
- Neutron
- Electron
- Atomic number
- Group
- Period
- Isotope
- Mass number
- Average atomic mass
- Atomic mass unit
- Valence electrons
- Energy level
- Chemical property
- Physical property
- Reactivity
- Ion
- Atomic radius
- Alkali metals
- Alkaline earth metals
- Halogen Noble gas
- Metal
- Non-metal
- Metalloid
- Cation
- Anion
- Orbital
- Electron configuration