Anoka-Hennepin Secondary Curriculum Unit Plan

Department:	Science	Course:	Chemistry I (H)	Unit 2 Title:	Atomic Structure Periodic Table	Grade Level(s):	10th
Assessed Trimester:	Trimester A	Pacing:	1 Trimester (Tri A)	Date Created:		Last Revision Date:	6/17/2013

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
  Benchmark:
  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.

- **ACT Standards:**
  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-11: Select a conclusion supported by 2 or more data presentations or models.
  ACT S-1: Compare data from 2 or more data presentations.
  ACT S-6: Analyze new, simple information.
- **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)

- Predict the activity and properties of an element based on its position on the periodic table. [9C.2.1.1.1]

Meaning

Unit Understanding(s):

Students will understand that:

- Atoms are the basic building block of matter. [9C.2.1.1.2]
- The periodic table organizes the elements. [9C.2.1.1.1]
- The historical contributions of scientists and their work has changed our model of the atom over time. [9.2.1.1.2]

Essential Question(s):

Students will keep considering:

- How is an atom identified?
- How is the position of an element on the periodic table determined?

Acquisition

Knowledge - Students will:

- Know the contributions of Dalton, Rutherford, Thomson, Chadwick, and Bohr to changing models of the atom. [9.2.1.1.2]
- The periodic table is arranged according to atomic number/number of protons. [9C.2.1.1.1]
- The periodic table is arranged according to an atom's electron configuration (spdf). [9C.2.1.1.1]
- Know how to find the number of protons, neutrons, and electrons for elements and ions. [9C.2.1.1.1]
- Identify elements as to what subgroup(s) they belong to (including metals, non-metals, alkali metals, alkaline earth metals, halogens and noble gases.) [9C.2.1.1.2]
- Understand the concepts of periodic trends including: atomic radii, ionic radii, electronegativity, electron affinity, ionization energy. [9C.2.1.1.2]

Reasoning - Students will:

- Predict the electron configuration of an atom and ion relative to its position on the periodic table. [9C.2.1.1.1]
- Analyze trends in atomic size and ionic size in groups and periods of the periodic table. [9C.2.1.1.2]
- Predict the properties of an element (e.g. metals and nonmetals) based on their position in the periodic table. [9C.2.1.1.2]

Skills - Students will:

- Use Lewis dot structures to model atoms to represent valence electrons. [9C.2.1.1.1]
- Use Models to build and draw 2-dimensional and 3-dimensional representations of molecules. [9C.2.1.1.2]

Common Misunderstandings

- Materials can only exhibit properties of one state of matter.
- Particles possess the same properties as the materials they compose. For example, atoms of copper are "orange and shiny," gas molecules are "transparent," and solid molecules are "Hard."
- Particles viewed as mini-versions of the substances they comprise: oxygen molecules are invisible, water molecules are tiny droplets, and diamond molecules are hard.
- Particles misrepresented in sketches: no differentiation is made between atoms and molecules.
- Particles misrepresented and undifferentiated in concepts involving elements, compounds, mixtures, solutions, and substances.
- Gamma rays, X-rays, ultraviolet light, visible light, infrared light, microwaves, and radio waves are forms of matter and are all very different entities.
- 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.

Essential new vocabulary

- Proton
- Neutron
- Electron
- Nucleus
- Atomic Number (Z)
- Mass Number (A)
- Chemical Symbol (X)
- Isotope
- Average Atomic Mass
- Group
- Period
- Metal
- Nonmetal
- Metalloid
- Ion
- Monatomic Ion
- Cation
- Anion
- Alkali Metal
- Alkaline Earth Metal
- Transition Metal
- Halogen
- Noble Gas
- Quantum Numbers
- Atomic Orbital
- Electron Configuration
- Valence electron
- Periodic Law
- Periodic Trends
- Lewis Dot Structure
- Atomic Size / Ionic Size
- Electronegativity
- Electron Affinity
- Ionization Energy
- Melting/Boiling Point