Anoka-Hennepin Secondary Curriculum Unit Plan

Department:	Science	Course:	Chemistry I	Unit 1 Title:	Nature of Science and Matter	Grade Level(s):	10th
Assessed Trimester:	Trimester A	Pacing:	5-10 Days	Date Created:	6/7/2012	Last Revision Date:	4/3/2014

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:** Interactions Among Science, Technology, Engineering, Mathematics, and Society
  Developments in chemistry affect society and societal concerns affect the field of chemistry.
  9.1.3.3.1: Describe how values and constraints affect science and engineering.
  9C.1.3.3.1: Explain the political, societal, economic and environmental impact of chemical products and technologies.
  9C.2.1.4.1: Use kinetic molecular theory to explain how changes in energy content affect the state of matter (solid, liquid and gaseous phases).

- **Literacy Standards:**
  9.13.6.6: Analyze the author's purpose in describing phenomena, providing an explanation, describing a procedure, or discussing/reporting an experiment in a text, defining the question the author seeks to address.
  9.13.9.9: Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. (discuss models)
  9.14.4.4: Produce clear and coherent writing in which the development, organization, and style are appropriate to discipline, task, purpose, and audience.
  9.14.5.5: Use a writing process to develop and strengthen writing as needed by planning, drafting, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience, and appropriate to the discipline.
  9.14.6.6: Use technology, including**,** but not limited to, the Internet, to produce, publish, and update individual or shared writing products and multi-media texts, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
  9.14.10.10: Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes and audiences.

Transfer

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

- Describe, using examples, how chemistry has influenced their quality of life.
- Explain how the unique properties of matter are responsible for natural phenomena.

Meaning

Unit Understanding(s):	Essential Question(s):
Students will understand that:	**Students will keep considering:**
• The field of chemistry has had a major impact on all areas of modern life.	• How have chemical products influenced politics, the economy, the environment, and society.

● The unique properties of water is one of the reasons life exists as it does on earth.	● How life would be different if water followed similar patterns as other matter.

Acquisition

Knowledge - Students will:
● Know A theory is defined as —a well-substantiated explanation of some aspect of the natural world that can incorporate facts, laws, inferences and tested hypotheses‖ (National Academy of Sciences, Teaching About Evolution and the Nature of Science, [National Academy Press, 1998], 5) 9C.1.3.3.1 (L)
● Know A law is defined as —a descriptive generalization about how some aspect of the natural world behaves under stated circumstances‖ and that carries the weight of scientific evidence (National Academy of Sciences, Teaching About Evolution and the Nature of Science, [National Academy Press, 1998], 5) 9C.1.3.3.1 (L)
● Know that matter consists of extremely tiny particles that cannot be seen with a light microscope, that are constantly in motion, and the interactions between these particles explains the states of matter and how matter changes with temperature. (H)
  ● Every substance can exist in a variety of states depending on temperature and pressure.
  ● When matter gets cold enough, particles lock in place in a more or less orderly state as solids.
  ● Increasing the temperature means increasing the average energy of motion of the particles.
  ● As the temperature is increased, the particles become more agitated and usually move slightly further apart causing the material to expand.
  ● At higher temperatures, the particles are more agitated and can slide past each other while remaining loosely bound as a liquid.
  ● At still higher temperatures, the agitation of the particles overcomes the attractions between them and they can move around freely, interacting only when they happen to come very close, usually bouncing off one another as a gas. (Science for All Americans - pp. 47-48)
	Reasoning - Students will:
	● Use chemical principles to explain the political, societal, economic and environmental impact of chemical products and technologies. 9C.1.3.3.1 (L)
	● Use kinetic molecular theory to explain how changes in energy content affect the state of matter (solid, liquid and gaseous phases). 9C.2.1.4.1 (M)
	Skills - Students will:
	● Identify phases of matter based on relative particle movement or diagrams.(H)
	● Be able to explain how chemistry has affected politics, society, the economy, and environment. (L)
	● Identify a substance as a pure substance or mixture.(L)
	● Identify a mixture as heterogeneous or homogeneous. (L)

Common Misunderstandings ● Chemistry isn't important. ● Nobody does chemistry except for chemists. ● Students tend to look for or accept evidence that is consistent with their prior beliefs, and either distort or fail to generate evidence that is inconsistent with these beliefs. These deficiencies tend to mitigate over time and with experience (Schauble, 1990, Atlas, Project 2061). ● Scientists don't need to study Language Arts. ● Scientists cannot/will not communicate with the general public.	**Essential new vocabulary** ● Chemistry ● Engineering ● Paradigm ● Atom ● Element ● Compound ● Mixture ● Pure Substance ● Heterogeneous ● Homogeneous ● Separation ● Filtration ● Solid ● Liquid ● Gas ● Kinetic Molecular Theory