Course: Chemistry 11

Teacher Name: Murray Bulger, Stephanie Strandt

Contact information: mbulger@sd44.ca; sstrandt@sd44.ca

Website Information: M. Bulger: https://my44.sd44.ca/class/lqwqefs/Pages/default.aspx

Course Description:

Chemistry 11 is an introduction into the field of chemistry that focusses primarily on the nature of matter. Throughout the course, students will learn the fundamental skills related to chemical reactions, atomic theory, solution chemistry, and the mole. Much of the course material is calculation based, and a good working knowledge of the chemistry topics covered in Science 8, 9, and 10 will be essential to success. The nature of chemistry is sequential; that is, students build on concepts learned previously.

Inquiry Questions:

- Can we debate on the pros and cons of Thorium nuclear reactors?
- What are the solutions to industrial waste water in an aquatic ecosystem?
- How do essential oils positively or negatively affect human health and well-being?
- How can we reduce greenhouse gases emissions in your local area?
- How do chemical processes — personal, local, or global — affect your life?

Summer Learning Beliefs:

Summer Learning provides an engaging learning environment where all students can challenge themselves academically and fulfill their learning goals. To ensure this, students will:

- abide by the student Code of Conduct
- adhere to the Academic Honesty Policy
- adhere to the Summer Learning Student Engagement policy
- respect themselves and others
- attend every class and be punctual
- inquire, think, and participate to the best of their ability
- access technology in class when instructed to do so and for learning purposes only
- challenge themselves and have fun learning

All Summer Learning policies can be accessed at:
https://www.sd44.ca/school/summer/policies/Pages/default.

Course Syllabus:

Curricular Competencies	What the students will do: Questioning and predicting • Demonstrate a sustained intellectual curiosity about a scientific topic or problem of personal, local, or global interest • Make observations aimed at identifying their own questions, including increasingly abstract ones, about the natural world • Formulate multiple hypotheses and predict multiple outcomes Planning and conducting • Collaboratively and individually plan, select, and use appropriate investigation methods to collect reliable data • Use appropriate SI units and appropriate equipment, including digital technologies, to systematically and accurately collect and record data • Apply the concepts of accuracy and precision to experimental procedures and data: significant figures, uncertainty, and scientific notation Processing and analyzing data and information • Experience and interpret the local environment • Apply First Peoples perspectives and knowledge, other ways of knowing, and local knowledge as sources of information Seek and analyze patterns, trends, and connections in data, including describing relationships between variables, performing calculations, and identifying inconsistencies • Construct, analyze, and interpret graphs, models, and/or diagrams • Use knowledge of scientific concepts to draw conclusions that are consistent with evidence • Analyze cause-and-effect relationships Evaluating • Evaluate their methods and experimental conditions, including identifying sources of error or uncertainty, confounding variables, and possible alternative explanations and conclusions • Describe specific ways to improve their investigation methods and the quality of their data • Evaluate the validity and limitations of a model or analogy in relation to the phenomenon modelled • Demonstrate an awareness of assumptions, question information given, and identify bias in their own work and in primary and secondary sources • Exercise a healthy, informed skepticism and use scientific knowledge and findings to form their own investigations to evaluate claims in primary and secondary sources • Consider social, ethical, and environmental implications of the findings from their own and others' investigations

Summative Assessments	What the students will understand: • Students will understand the concept of measurement and scale while performing a variety of mole conversions using lab and theoretical data. • Students will model atoms and molecules of varying complexity and understand how bonding takes a role in their formation • Students will analyze and explain trends found of the periodic table. Students will gain extensive knowledge regarding chemical reactions and predict how certain species will react as shown by theoretical calculations and lab work. • Students will research and create a visual presentation connecting pollution impacts on society and environmental chemistry/solution chemistry (green chemistry). • Students will correctly and accurately display their knowledge of chemistry in the form final exam

Content	What the students will know:
	
	• The significance and use of the mole
	• Stoichiometric calculations (using significant figures) involving:
	  ○ Atomic mass, molecular mass, molar mass
	  ○ Molar quantities of gases at STP, SATP
	  ○ Molecular and empirical formulas to identify a substance
	• Model of the atom
	  ○ Subatomic structure of atoms, ions and isotopes
	  ○ Electron configuration
	  ○ Lewis structures
	  ○ Quantum mechanical model
	• Periodic table
	  ○ Chemical and physical properties of the elements
	  ○ Periodicity
	  ○ Trends in the properties of elements
	• Chemical bonding
	• The rearrangement of the atoms as bonds are broken and new bonds are formed
	• Formula equations:
	  ○ Balancing
	  ○ Predicting products and reactants
	  ○ Energy changes
	• Stoichiometric calculations
	  ○ Mass
	  ○ Number of molecules
	  ○ Gas volumes
	  ○ Molar quantities

	○ Excess and limiting reactants • Solubility of molecular and ionic compounds • Dissociation of ions • Polarity of water and other solvents • Properties of solutions • Solubility tables and predicting precipitates • Stoichiometric calculations involving: ○ Molarity ○ Concentration of ions in solution • Local and other chemical processes • Green chemistry

Grade Boundaries:

An "A" student will/can….
Produce high-quality, frequently innovative work. Communicate scientific ideas to connect and synthesize concepts and skills learned over time. Consistently demonstrate sophisticated critical and creative thinking. Collect, present, and (correctly) transform experimental data. Interpret, analyze and critique scientific findings and experimental data. Frequently transfers knowledge and skills and use concepts to solve non-routine problems.

A "B" student will /can …
Sometimes produces high-quality, innovative work. Communicate scientific ideas to compare and critique concepts and skills learned over time. Consistently demonstrate a degree of critical and creative thinking. Collect and present scientific data in an appropriate manner. Assess, interpret, and revise scientific findings and experimental data. Transfer knowledge and skills and use concepts to consistently solve routine problems correctly with few mistakes.

A "C" student will /can …
Produce work of an acceptable quality. Communicate a basic understanding of scientific concepts and operate superficially within a scientific contextual framework. Display an emergent level of application when it comes to critical thinking skills. Collect scientific data in an appropriate manner. Be inflexible in the use of knowledge and skills, requiring support even in familiar classroom situations. Make attempts to use knowledge, skills and scientific concepts to solve routine problems, with occasional mistakes.

Celebration of learning:

The 2019 Celebration of Learning is shaped around "Connections".

In Science and Chemistry, specifically, it is important and relevant to make connections between theory, lab skills and everyday life and our communities. As well it is valuable to learn how to effectively communicate scientific ideas, concepts and experimental results. Students will be asked to keep a learning journal to reflect on their on-going learning and its application to their own life (synthesis) and make connections between chemistry and other parts of society and everyday life. Based on their learning journals the students will fill out a celebration of learning card to be shared with a sister class at a later time. In addition students maybe asked to prepare and presents an in-class presentation of their personal learning experience.

Resources:

Hebden Chemistry 11: A Workbook for Students