

Course: Chemistry 11

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Course Description:

Chemistry 11 is an introduction into the field of applied chemistry that focuses primarily on the nature of matter. Throughout the course, students will learn the fundamental skills related to the gravimetric analysis of chemical reactions, atomic theory, solution chemistry, and the mole. Much of the course material is laboratory and problem based, with a significant mathematical component, therefore a sound working knowledge of the chemistry topics covered in science 10 as well as a strong standing in mathematics 10 will be essential to success. The goal of this course is to provide students with the knowledge of chemistry by giving them the skills they need to conceptualize rather than memorize chemistry.

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 engage 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:

Unit	Essential Questions	Content	Curricular Competencies	Assessment Task
The Mathematical Toolkit	How does mathematics inform our practice as chemists, and allow us to justify process decisions?	dimensional analysis: factor-label method (unit-analysis method), calculation of mass and molar quantities (using significant figures).	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	This is not a stand-alone unit, it will be evaluated throughout the course.

	How would you estimate the uncertainty in a measurement, and how does using significant figures communicate uncertainty?		<p>experimental procedures and data, including significant figures, uncertainty and scientific notation.</p> <p>Evaluate methods and experimental conditions, including identifying sources of error or uncertainty, confounding variables, and possible alternative explanations and conclusions.</p>	
The Nature of Matter	How does the quantum mechanical model extend our understanding of the atom?	<p>Electron configuration molecular geometry, valence shell electron pair repulsion (VSEPR) theory.</p> <p>Chemical bonding Lewis structures of compounds, polarity, covalent and hydrogen bonding, intra- and intermolecular forces, impact on properties.</p>	<p>Use knowledge of scientific concepts to draw conclusions that are consistent with evidence.</p> <p>Construct, analyze, and interpret graphs of electronegativity, atomic radii, and ionic radii.</p> <p>Collaboratively and individually plan, select, and use appropriate investigation methods, including field work and lab experiments, to collect reliable data (qualitative and quantitative).</p>	Laboratory activities, solo and collaborative work, summative assessments.
The Mole	How has the mole as a quantity made chemical analysis more elegant, and attainable?	The mole as the fundamental unit of reaction analysis.	<p>Analyze cause-and-effect relationships.</p> <p>Formulate physical or mental theoretical models to describe a phenomenon.</p> <p>Collaboratively and individually plan, select, and use appropriate investigation methods, including field work and lab experiments, to collect</p>	Summative, laboratory and formative assessments. The mole is a fundamental concept and you will see it throughout the course.

			<p>reliable data (qualitative and quantitative).</p> <p>Collaboratively and individually plan, select, and use appropriate investigation methods, including field work and lab experiments, to collect reliable data (qualitative and quantitative)</p>	
Chemical Reactions	<p>How would you measure negative and positive impacts of chemical reactions on human health, society or the environment in your local community?</p> <p>Why do some materials dissolve in water or other liquids, but others do not?</p>	<p>Reactions predicting products, reactants and energy changes (ΔH)</p> <p>Chemical processes First Peoples traditional practices (e.g., tanning hides; preparation of food, soap, and natural bleach), smelting, pulp and paper production, food chemistry, photosynthesis and cellular respiration, development of petrochemical smog. Green chemistry development of sustainable processes and technologies that reduce negative impacts on the environment (e.g., reducing toxicity, designing benign solvents, increasing energy efficiency). Solubility: dissociation of ions, dissociation equations.</p>	<p>Formulate physical or mental theoretical models to describe a phenomenon.</p> <p>Use knowledge of scientific concepts to draw conclusions that are consistent with evidence.</p> <p>Analyze cause-and-effect relationships.</p> <p>Collaboratively and individually plan, select, and use appropriate investigation methods, including field work and lab experiments, to collect reliable data (qualitative and quantitative).</p>	
Stoichiometry	<p>What variables affect solubility, concentration (molarity), and conductivity?</p>	<p>Stoichiometric calculations using significant figures, mass, number of molecules, gas volumes, molar quantities,</p>	<p>Formulate physical or mental theoretical models to describe a phenomenon.</p> <p>Seek and analyze patterns, trends, and connections in</p>	

	How could you use solution chemistry analysis techniques to investigate local water or soil samples?	excess and limiting reactants. Stoichiometric calculations in aqueous solutions: Molarity, dilution effect, concentration of ions in solution when two, solutions are mixed. Analysis techniques: e.g., dissolved oxygen, pH, nitrates, phosphorus.	data, including describing relationships between variables, performing calculations, and identifying inconsistencies.	
Organic Chemistry	How do organic compounds differ in structure and properties? How do the structure and geometry of organic compounds contribute to their usefulness in medicine, and other applications? Using knowledge shared by First Peoples, explore the uses of traditional medicines. What medicines have been used? Which particular health conditions are/were they used for?	Organic compounds names, structures, geometry. Applications of organic chemistry First Peoples traditional practices (e.g., medicines), pharmaceuticals, petrochemicals, polymers, cosmetics, metabolism, agriculture, food, biotechnology.	Demonstrate an awareness of assumptions, question information given, and identify bias in their own work and in primary and secondary sources. Consider social, ethical, and environmental implications of the findings from their own and others' investigations. Use knowledge of scientific concepts to draw conclusions that are consistent with evidence.	

Grade Descriptors:

“A” quality evidence of learning....

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. Mistakes made are not reflective of gaps or deficiencies in mastery.

“B” quality evidence of learning....

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 some mistakes sometimes indicative of gaps in mastery.

“C” quality evidence of learning....

Produce work of an acceptable, and inconsistent 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 frequent mistakes indicative of gaps in mastery.

Resources:

Resources
Hebden: Chemistry 11-A Workbook for Students

We would like to thank the Coast Salish people, specifically the Skwxwú7mesh Nation and Tsleil-Waututh Nation, on whose unceded traditional territory the North Vancouver School District resides. We value the opportunity to learn, share and grow on this traditional territory.