

This is a DRAFT form of the document

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| Subject: CHEMISTRY | Updated: August, 2017 |
| Time: 4 -4 ½ weeks | |
| Unit/Theme: Unit 1 Fundamentals, part 1 | |
| Goals/Big Ideas/Learning Focus/Essential Questions: <ul style="list-style-type: none"> • Apply the Science and Engineering Practices • Overview of study of chemistry <ul style="list-style-type: none"> ○ Study of chemistry is a dynamic process ○ Scientific inquiry relies on objectivity and repeatability ○ Define and appropriately use basic vocabulary • Identify and appropriately use laboratory equipment • Explain the main ideas of chemistry and how they fit together to understand matter and energy <ul style="list-style-type: none"> ○ Macroscopic diversity of matter is explained by the microscopic ideas of atoms, elements, and compounds ○ Use Avogadro’s number and moles | Academic Vocabulary: measurement, mass, weight, kilogram, gram, volume, liter, milliliter, graduated cylinder, density, pressure, force, pascal (Pa), atmosphere (atm), accuracy, precision, significant figures, scientific notation, exponent, conversion factor, dimensional analysis, natural laws, inquiry, theory, hypothesis, experiment, variable, experimental variable, control variable, error, average, conclusion, significant difference, objective, repeatable, procedure, matter, phases, energy, law of conservation of energy, substance, mixture, physical and chemical properties, physical and chemical changes, chemical reaction, macroscopic, microscopic, element, element symbol, atomic number, period, group, atomic mass unit (amu), mole, Avogadro’s number, molecule, compound, chemical formula, ionic compound, ion, formula mass, homogeneous and heterogeneous mixtures, solution, solvent, solute, dissolved, concentration, dilute, concentrated, solubility, molarity, molar volume, STP, Dalton’s law of partial pressures |

NOTE about Standards:

**Chemistry standard not tested on Grade 11 Science Content assessment*

***Physical Science standard tested on Grade 11 Science Content assessment*

| Content | Standards | Skills | Assessments | Resources |
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| <ul style="list-style-type: none"> Scientific Inquiry Matter | <p>None (introduction to the practices)</p> <p>HS-PS1-1: Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms</p> | <ul style="list-style-type: none"> Ask questions/define problems Develop and use models Plan and carry out investigations Analyze and interpret data Use mathematics and computational thinking Construct explanations/design solutions Engage in argumentation from evidence Obtain, evaluate, and communicate information Practice safety procedures Classify matter Identify and describe physical properties Identify and describe chemical properties Differentiate between physical and chemical changes Determine basic information about atoms from the periodic table Solve problems with moles Identify and calculate solution concentration using various methods | <p>Daily work: problems, questions, note-taking, class discussions, POGIL activities, develop/use models Lab investigations</p> <p>Formative assessments (various formats will be utilized)</p> <p>Summative assessments (chapter and/or unit)</p> | <ul style="list-style-type: none"> <u>A Natural Approach to Chemistry</u>, 2016; chap. 1-2 Students have been given online access to the textbook <u>POGIL Activities for High School Chemistry</u> Labs (this is a list of <i>possible</i> labs to be completed during the unit/chapter) <ul style="list-style-type: none"> ↳ Investigation 1A: Inquiry & Scientific Evidence ↳ Investigation 1B: Volume & Chemistry ↳ Investigation 1C: Mass in Chemistry ↳ Investigation 1D: Dimensional Analysis ↳ Investigation 2C: One in a Million |

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| Subject: CHEMISTRY | Updated: August, 2017 |
| Time: 3 weeks | |
| Unit/Theme: Unit 2 Energy | |
| Goals/Big Ideas/Learning Focus/Essential Questions: <ul style="list-style-type: none"> • Describe the relationship between matter, energy, temperature, and heat • Compare radioactive decay processes • Explain the concept of nuclear energy and describe positive and negative aspects of this type of energy | Academic Vocabulary |

| Content | Standards | Skills | Assessments | Resources |
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| | <p>*HS-PS1-4: Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy</p> <p>*HS-PS1-8: Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay</p> <p>HS-PS3-3: Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy</p> <p>HS-PS3-4: Plan and conduct an investigation to provide evidence that the transfer of energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (2nd law of thermodynamics)</p> | <ul style="list-style-type: none"> • Describe relationship between temperature and kinetic energy • Define absolute zero • Measure temperature; convert between Fahrenheit, Celsius and Kelvin scales • Explain how heat flows • Apply the principles of the 1st and 2nd laws of thermodynamics • Explain the concept of specific heat; calculate specific heat • Explain the concept of phase change • Describe types nuclear reactions; contrast with chemical reactions • Understand the concept of nuclear energy, including its pros and cons | <p>Daily work: problems, questions, note-taking, class discussions, POGIL activities, develop/use models Lab investigations</p> <p>Formative assessments (various formats will be utilized)</p> <p>Summative assessments (chapter and/or unit)</p> | <ul style="list-style-type: none"> • A Natural Approach to Chemistry, 2016; chap. 3 & 20 Students have been given online access to the textbook • POGIL Activities for High School Chemistry • Labs (this is a list of <i>possible</i> labs to be completed during the unit/chapter) <ul style="list-style-type: none"> ↳ Investigation 3A: Heat & Temperature ↳ Investigation 3B: Specific Heat ↳ |

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| Subject: CHEMISTRY | Updated: August, 2017 |
| Time: 1 ½ weeks | |
| Unit/Theme: Unit 3 Fundamentals, part 2 | |
| Goals/Big Ideas/Learning Focus/Essential Questions: <ul style="list-style-type: none"> • Explain the difference between chemical and physical changes • Describe how energy changes when a new substance is formed in a chemical reaction • Create models to represent conservation of matter | Academic Vocabulary |

| Content | Standards | Skills | Assessments | Resources |
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| | <p>HS-PS1-2: Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, knowledge of the patterns of chemical properties, and formation of compounds</p> <p>*HS-PS1-4: see pg. 4</p> <p>HS-PS1-7: Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction</p> <p>**HS-PS3-1: Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known</p> <p>**HS-PS3-2: Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as either motions of particles or energy stored in fields</p> | <ul style="list-style-type: none"> • Define chemical change; give examples • Define physical change; give examples • Compare the strength of interatomic and intermolecular forces • Define covalent and ionic bond • Use the periodic table to predict type of bond • Describe the part of a chemical equation • Balance simple chemical equations | <p>Daily work: problems, questions, note-taking, class discussions, POGIL activities, develop/use models Lab investigations</p> <p>Formative assessments (various formats will be utilized)</p> <p>Summative assessments (chapter and/or unit)</p> | <ul style="list-style-type: none"> • <u>A Natural Approach to Chemistry</u>, 2016; chap. 4 Students have been given online access to the textbook • <u>POGIL Activities for High School Chemistry</u> • Labs (this is a list of <i>possible</i> labs to be completed during the unit/chapter) |

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| Subject: CHEMISTRY | Updated: August, 2017 |
| Time: 4 weeks | |
| Unit/Theme: Unit 4 Atomic Structure & the Periodic Table | |
| Goals/Big Ideas/Learning Focus/Essential Questions: <ul style="list-style-type: none"> • Use models to describe basic atomic structure • Explain the history of the atomic theory • Apply quantum theory • Describe the electromagnetic spectrum • Recognize that each element has a unique, signature emission spectrum | Academic Vocabulary |

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| | <p>HS-PS1-1: see pg. 2 HS-PS1-2: see pg. 6 HS-PS4-1: Use mathematical representations to describe the relationship among the frequency, wavelength, and speed of waves *HS-PS4-3: Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other</p> | | <p>Daily work: problems, questions, note-taking, class discussions, POGIL activities, develop/use models Lab investigations</p> <p>Formative assessments (various formats will be utilized)</p> <p>Summative assessments (chapter and/or unit)</p> | <ul style="list-style-type: none"> • A Natural Approach to Chemistry, 2016; chap. 5-6 Students have been given online access to the textbook • POGIL Activities for High School Chemistry • Labs (this is a list of <i>possible</i> labs to be completed during the unit/chapter) |

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| Subject: CHEMISTRY | Updated: August, 2017 |
| Time: 2 weeks | |
| Unit/Theme: Unit 5 Chemical Bonding | |
| Goals/Big Ideas/Learning Focus/Essential Questions: <ul style="list-style-type: none"> • Differentiate between ionic and covalent bonding • Explain how valence electrons are responsible for bonding patterns and molecular geometries • Model covalent bonding • Use molecular formula to determine bond type, draw Lewis structure or Lewis dot equation, determine molecular geometry and molecular polarity | Academic Vocabulary |

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| | <p>*HS-PS1-3: Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles</p> <p>*HS-PS2-6: Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials</p> <p>**HS-PS3-2: see pg. 6</p> <p>**HS-PS4-4: Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter</p> | | <p>Daily work: problems, questions, note-taking, class discussions, POGIL activities, develop/use models Lab investigations</p> <p>Formative assessments (various formats will be utilized)</p> <p>Summative assessments (chapter and/or unit)</p> | <ul style="list-style-type: none"> • A Natural Approach to Chemistry, 2016; chap. 7 Students have been given online access to the textbook • POGIL Activities for High School Chemistry • Labs (this is a list of <i>possible</i> labs to be completed during the unit/chapter) |

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| Subject: CHEMISTRY | Updated: August, 2017 |
| Time: 5-5 ½ weeks | |
| Unit/Theme: Unit 6 Matter and Its Interactions | |
| Goals/Big Ideas/Learning Focus/Essential Questions: <ul style="list-style-type: none">• Compare/contrast properties (including interatomic bonding and intermolecular forces), of ionic and molecular (covalent) compounds• Write chemical formulas for ionic and molecular compounds• From a chemical formula, name the compound• Calculate percent composition or determine empirical and molecular formulas from given data• Discuss solutions in terms of concentration and solubility• Calculate solution concentration• Solve colligative property problems | Academic Vocabulary |

| Content | Standards | Skills | Assessments | Resources |
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| | <p>HS-PS1-2: see pg. 6 HS-PS1-3: see pg. 10</p> | | <p>Daily work: problems, questions, note-taking, class discussions, POGIL activities, develop/use models Lab investigations</p> <p>Formative assessments (various formats will be utilized)</p> <p>Summative assessments (chapter and/or unit)</p> | <ul style="list-style-type: none"> • <u>A Natural Approach to Chemistry</u>, 2016; chap. 8-9 Students have been given online access to the textbook • <u>POGIL Activities for High School Chemistry</u> • Labs (this is a list of <i>possible</i> labs to be completed during the unit/chapter) |

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| Subject: CHEMISTRY | Updated: August, 2017 |
| Time: 6 weeks | |
| Unit/Theme: Unit 7 Chemical Reactions | |
| Goals/Big Ideas/Learning Focus/Essential Questions: <ul style="list-style-type: none"> • Revisit balancing equations • Identify types of reactions • Predict products and write complete balanced equations • Revisit energy changes associated with chemical reactions • Solve stoichiometry problems, including those involving a limiting reactant • Calculate percent yield • Discuss factors affecting reaction rates, including catalysts and enzymes • Apply Le Chatelier’s principle | Academic Vocabulary |

| Content | Standards | Skills | Assessments | Resources |
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| | <p>HS-PS1-2: see pg. 6 *HS-PS1-4: see pg. 4 HS-PS1-5: Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs *HS-PS1-6: Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium HS-PS1-7: see pg. 6 *HS-PS2-6: see pg. 10</p> | | <p>Daily work: problems, questions, note-taking, class discussions, POGIL activities, develop/use models Lab investigations</p> <p>Formative assessments (various formats will be utilized)</p> <p>Summative assessments (chapter and/or unit)</p> | <ul style="list-style-type: none"> • A Natural Approach to Chemistry, 2016; chap. 10-12 Students have been given online access to the textbook • POGIL Activities for High School Chemistry • Labs (this is a list of <i>possible</i> labs to be completed during the unit/chapter) |

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| Subject: CHEMISTRY | Updated: August, 2017 |
| Time: 2 ½ weeks | |
| Unit/Theme: Unit 8 Macroscopic Chemistry: Acids and Bases | |
| Goals/Big Ideas/Learning Focus/Essential Questions: <ul style="list-style-type: none"> • Describe properties of acids and bases • Solve problems involving pH concentration and titration | Academic Vocabulary |

| Content | Standards | Skills | Assessments | Resources |
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| | <p>HS-PS1-5: see pg. 14</p> | | <p>Daily work: problems, questions, note-taking, class discussions, POGIL activities, develop/use models Lab investigations</p> <p>Formative assessments (various formats will be utilized)</p> <p>Summative assessments (chapter and/or unit)</p> | <ul style="list-style-type: none"> • <u>A Natural Approach to Chemistry</u>, 2016; chap. 13 Students have been given online access to the textbook • <u>POGIL Activities for High School Chemistry</u> • Labs (this is a list of <i>possible</i> labs to be completed during the unit/chapter) |

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| Subject: CHEMISTRY | Updated: August, 2017 |
| Time: 2 ½ weeks | |
| Unit/Theme: Unit 9 Macroscopic Chemistry: Gases | |
| Goals/Big Ideas/Learning Focus/Essential Questions: <ul style="list-style-type: none"> • Explain how kinetic molecular theory is used to explain the behavior of gases • Solve problems involving gas laws | Academic Vocabulary |

| Content | Standards | Skills | Assessments | Resources |
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| | <p>*HS-PS1-3: see pg. 10 HS-PS1-5: see pg. 14 *HS-PS1-6: see pg. 14 **HS-PS3-1: see pg. 6</p> | | <p>Daily work: problems, questions, note-taking, class discussions, POGIL activities, develop/use models Lab investigations</p> <p>Formative assessments (various formats will be utilized)</p> <p>Summative assessments (chapter and/or unit)</p> | <ul style="list-style-type: none"> • <u>A Natural Approach to Chemistry</u>, 2016; chap. 14 Students have been given online access to the textbook • <u>POGIL Activities for High School Chemistry</u> • Labs (this is a list of <i>possible</i> labs to be completed during the unit/chapter) |