**Area of Learning: SCIENCE — Chemistry Grade 12**

**BIG IDEAS**

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| Reactants must collide to react, and the **reaction rate** is dependent on the surrounding conditions. |  | **Dynamic equilibrium** can be shifted by changes to the surrounding conditions. |  | **Saturated solutions** are systems in equilibrium. |  | **Acid or base strength** depends on the degree of ion dissociation. |  | **Oxidation and reduction** are complementary processes that involve the gain or loss of electrons. |

**Learning Standards**

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| **Curricular Competencies** | **Content** |
| *Students are expected to be able to do the following:*  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, including field work and lab experiments, to collect reliable data (qualitative and quantitative) * Assess risks and address ethical, cultural, and/or environmental issues associated  with their proposed methods * 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   + scientific notation   Processing and analyzing data and information   * Experience and interpret the local environment | *Students are expected to know the following:*   * **reaction rate** * **collision theory** * **energy change** during a chemical reaction * **reaction mechanism** * **catalysts** * **dynamic nature of chemical equilibrium** * **Le Châtelier’s principle and equilibrium shift** * **equilibrium constant (Keq)** * saturated solutions and **solubility product (Ksp)** * **relative strength** of acids and bases in solution * water as an equilibrium system * **weak acids and weak bases** * **titration** * **hydrolysis of ions in salt solutions** * **applications of acid-base reactions** * **the oxidation-reduction process** * **electrochemical cells** * **electrolytic cells** * **quantitative relationships** |

**Area of Learning: SCIENCE — Chemistry Grade 12**

**Learning Standards (continued)**

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| **Curricular Competencies** | **Content** |
| * 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 * Consider the changes in knowledge over time as tools and technologies  have developed * Connect scientific explorations to careers in science * Exercise a healthy, informed skepticism and use scientific knowledge and findings to form their own investigations to evaluate claimsin primary and secondary sources * Consider social, ethical, and environmental implications of the findings from their  own and others’ investigations * Critically analyze the validity of information in primary and secondary sources  and evaluate the approaches used to solve problems * Assess risks in the context of personal safety and social responsibility |  |

**Area of Learning: SCIENCE — Chemistry Grade 12**

**Learning Standards (continued)**

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| **Curricular Competencies** | **Content** |
| Applying and innovating   * Contribute to care for self, others, community, and world through individual  or collaborative approaches * Cooperatively design projects with local and/or global connections and applications * Contribute to finding solutions to problems at a local and/or global level  through inquiry * Implement multiple strategies to solve problems inreal-life, applied, and  conceptual situations * Consider the role of scientists in innovation   Communicating   * Formulate physical or mental theoretical models to describe a phenomenon * Communicate scientific ideas and information, and perhaps a suggested course of action, for a specific purpose and audience, constructing evidence-based arguments and using appropriate scientific language, conventions, and representations * Express and reflect on a variety of experiences, perspectives, and worldviews  through **place** |  |