**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**
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**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
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**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**
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