

## BIG IDEAS

### Atoms and Molecules

- Atoms and molecules are the fundamental building blocks of matter.
- Chemical bonds are the result of electrostatic forces.
- Periodicity can be explained by atomic structure.

### The Mole

- The mole is a convenient way to express quantities of particles

### Chemical Reactions

- The rearrangement of atoms in chemical reactions is predictable.
- Matter and energy are conserved in chemical reactions.
- Chemical reactions and their applications have significant implications for human health, society, and the environment

### Solution Chemistry

- Solubility within a solution is determined by the nature of the solute and the solvent.
- Solution chemistry and its applications have significant implications for human health, society, and the environment

## MODULE YOU MAY CHOOSE TO INCLUDE

### Organic Chemistry

- Carbon's ability to form four bonds, with itself and other elements, results in a wide variety of organic compounds.
- Organic chemistry and its applications have significant implications for human health, society, and the environment.

## Learning Standards

Curricular Competencies	Content
<p><i>Students are expected to be able to do the following:</i></p> <p><b>Questioning and predicting</b></p> <ul style="list-style-type: none"> <li>• Demonstrate a sustained intellectual curiosity about a scientific topic or <b>problem of personal, local, or global interest</b></li> <li>• Make observations aimed at identifying their own questions, including increasingly abstract ones, about the natural world</li> <li>• Formulate multiple hypotheses and predict multiple outcomes</li> </ul> <p><b>Planning and conducting</b></p> <ul style="list-style-type: none"> <li>• Collaboratively and individually <b>plan, select, and use appropriate investigation methods</b>, including field work and lab experiments, to collect reliable data (qualitative and quantitative)</li> <li>• Assess risks and address ethical, cultural, and/or environmental issues associated with their proposed methods</li> <li>• Use appropriate SI units and appropriate equipment, including digital technologies, to systematically and accurately collect and record data</li> <li>• Apply the concepts of accuracy and precision to experimental procedures and data:               <ul style="list-style-type: none"> <li>– significant figures</li> <li>– <b>uncertainty</b></li> <li>– scientific notation</li> </ul> </li> </ul> <p><b>Processing and analyzing data and information</b></p> <ul style="list-style-type: none"> <li>• Experience and interpret the local environment</li> <li>• Apply First Peoples perspectives and knowledge, other ways of knowing, and local knowledge as sources of information</li> <li>• Seek and analyze <b>patterns, trends</b>, and connections in data, including describing <b>relationships between variables</b>, performing calculations, and identifying inconsistencies</li> <li>• Construct, <b>analyze, and interpret graphs</b>, models, and/or diagrams</li> <li>• Use knowledge of scientific concepts to draw conclusions that are consistent with evidence</li> <li>• Analyze cause-and-effect relationships</li> </ul>	<p><b>This course comprises four modules and one module (organic chemistry), which teachers may choose to include.</b></p> <p><i>Students are expected to know the following:</i></p> <p><b>Atoms and Molecules</b></p> <ul style="list-style-type: none"> <li>• <b>classification of matter</b></li> <li>• <b>model of the atom</b></li> <li>• the subatomic structures of atoms, ions, and <b>isotopes</b></li> <li>• quantum mechanical model</li> <li>• <b>electron configuration</b></li> <li>• Lewis structures</li> <li>• <b>periodic table:</b> <ul style="list-style-type: none"> <li>– chemical and physical properties of the elements</li> <li>– periodicity</li> <li>– the similarities and trends in the properties of elements</li> </ul> </li> <li>• <b>chemical bonding</b></li> </ul> <p><b>The Mole</b></p> <ul style="list-style-type: none"> <li>• the significance and use of the mole</li> <li>• Avogadro's hypothesis</li> <li>• stoichiometric calculations (using significant figures) involving:               <ul style="list-style-type: none"> <li>– atomic mass, molecular mass, molar mass</li> <li>– molar quantities of <b>gases</b> at STP, SATP</li> <li>– molecular and empirical formulae to identify a substance</li> </ul> </li> </ul>

Learning Standards (continued)

Curricular Competencies	Content
<p><b>Evaluating</b></p> <ul style="list-style-type: none"> <li>Evaluate their methods and experimental conditions, including identifying sources of error or <b>uncertainty</b>, confounding variables, and possible alternative explanations and conclusions</li> <li>Describe specific ways to improve their investigation methods and the quality of the data</li> <li>Evaluate the validity and limitations of a model or analogy in relation to the phenomenon modelled</li> <li>Demonstrate an awareness of assumptions, question information given, and identify bias in their own work and in primary and secondary sources</li> <li>Consider the <b>changes in knowledge over time</b> as tools and technologies have developed</li> <li>Connect scientific explorations to careers in science</li> <li>Exercise a healthy, informed skepticism and use scientific knowledge and findings to form their own investigations to evaluate claims in primary and secondary sources</li> <li>Consider social, ethical, and environmental implications of the findings from their own and others' investigations</li> <li>Critically analyze the validity of information in primary and secondary sources and evaluate the approaches used to solve problems</li> <li>Assess risks in the context of personal safety and social responsibility</li> </ul> <p><b>Applying and innovating</b></p> <ul style="list-style-type: none"> <li>Contribute to care for self, others, community, and world through individual or collaborative approaches</li> <li>Co-operatively design projects with local and/or global connections and applications</li> <li><b>Contribute to finding solutions</b> to problems at a local and/or global level through inquiry</li> <li><b>Implement multiple strategies to solve problems in real-life</b>, applied, and conceptual situations</li> <li>Consider the role of scientists in innovation</li> </ul>	<p><b>Chemical Reactions</b></p> <ul style="list-style-type: none"> <li>physical and chemical change</li> <li>the rearrangement of the atoms as bonds are broken and new bonds are formed</li> <li><b>formula equations:</b> <ul style="list-style-type: none"> <li><b>balancing</b></li> <li>predicting products and reactants</li> <li>energy changes: <math>\Delta H</math></li> </ul> </li> <li>stoichiometric calculations (using significant figures) involving:           <ul style="list-style-type: none"> <li>mass</li> <li>number of molecules</li> <li>gas volumes</li> <li>molar quantities</li> <li>excess and limiting reactants</li> </ul> </li> <li><b>practical applications</b>, including local chemical processes</li> </ul> <p><b>Solution Chemistry</b></p> <ul style="list-style-type: none"> <li>solubility of molecular and ionic compounds</li> <li><b>dissociation of ions</b></li> <li>polarity of water and other solvents</li> <li><b>properties</b> of solutions</li> <li>solubility tables and predicting precipitates</li> <li>stoichiometric calculations (using significant figures) involving:           <ul style="list-style-type: none"> <li>molarity</li> <li><b>concentration of ions</b> in solution</li> </ul> </li> <li><b>analysis techniques</b></li> <li>environmental impacts of <b>non-metal oxide solutions</b></li> </ul>

Learning Standards (continued)

Curricular Competencies	Content
<p><b>Communicating</b></p> <ul style="list-style-type: none"> <li>• Formulate physical or mental theoretical models to describe a phenomenon</li> <li>• Communicate scientific ideas, information, and perhaps a <b>suggested course of action</b>, for a specific purpose and audience, constructing evidence-based arguments and using appropriate scientific language, conventions, and representations</li> <li>• Express and reflect on a variety of experiences, perspectives, and worldviews through place</li> </ul>	<p><b>You may choose to include:</b></p> <p><b>Organic Chemistry</b></p> <ul style="list-style-type: none"> <li>• features and common applications of organic chemistry</li> <li>• <b>bonds/forces</b> in organic compounds</li> <li>• names, structures, and geometry of <b>simple organic compounds</b></li> <li>• common <b>functional groups</b></li> <li>• an <b>organic synthesis</b></li> </ul>