

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>Questioning and predicting</p> <ul style="list-style-type: none"> • 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 <p>Planning and conducting</p> <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> – significant figures – uncertainty – scientific notation <p>Processing and analyzing data and information</p> <ul style="list-style-type: none"> • Experience and interpret the local environment • 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 	<p>This course comprises four modules and one module (organic chemistry), which teachers may choose to include.</p> <p><i>Students are expected to know the following:</i></p> <p>Atoms and Molecules</p> <ul style="list-style-type: none"> • classification of matter • model of the atom • the subatomic structures of atoms, ions, and isotopes • quantum mechanical model • electron configuration • Lewis structures • periodic table: <ul style="list-style-type: none"> – chemical and physical properties of the elements – periodicity – the similarities and trends in the properties of elements • chemical bonding <p>The Mole</p> <ul style="list-style-type: none"> • the significance and use of the mole • Avogadro's hypothesis • stoichiometric calculations (using significant figures) involving: <ul style="list-style-type: none"> – atomic mass, molecular mass, molar mass – molar quantities of gases at STP, SATP – molecular and empirical formulae to identify a substance

Learning Standards (continued)

Curricular Competencies	Content
<p>Evaluating</p> <ul style="list-style-type: none"> 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 the 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 claims in 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 <p>Applying and innovating</p> <ul style="list-style-type: none"> Contribute to care for self, others, community, and world through individual or collaborative approaches Co-operatively 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 in real-life, applied, and conceptual situations Consider the role of scientists in innovation 	<p>Chemical Reactions</p> <ul style="list-style-type: none"> physical and chemical change the rearrangement of the atoms as bonds are broken and new bonds are formed formula equations: <ul style="list-style-type: none"> balancing predicting products and reactants energy changes: ΔH stoichiometric calculations (using significant figures) involving: <ul style="list-style-type: none"> mass number of molecules gas volumes molar quantities excess and limiting reactants practical applications, including local chemical processes <p>Solution Chemistry</p> <ul style="list-style-type: none"> solubility of molecular and ionic compounds dissociation of ions polarity of water and other solvents properties of solutions solubility tables and predicting precipitates stoichiometric calculations (using significant figures) involving: <ul style="list-style-type: none"> molarity concentration of ions in solution analysis techniques environmental impacts of non-metal oxide solutions

Learning Standards (continued)

Curricular Competencies	Content
<p>Communicating</p> <ul style="list-style-type: none"> • Formulate physical or mental theoretical models to describe a phenomenon • Communicate scientific ideas, 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 	<p>You may choose to include:</p> <p>Organic Chemistry</p> <ul style="list-style-type: none"> • features and common applications of organic chemistry • bonds/forces in organic compounds • names, structures, and geometry of simple organic compounds • common functional groups • an organic synthesis