

MCS IB Chemistry SL Year 1 Subject Group Overview

Unit Name	Atoms and Periodicity	From Models to Materials	Reaction Stoichiometry	Energetics and Kinetics
Time Frame	6 weeks	12 weeks	8 weeks	10 weeks
Standards/ IB Topics	S1.2, S1.3, S3.1	S2.1, S2.2, S2.3, S2.4, S3.2	S1.1, S1.4, S1.5, R2.1	R1.1, R1.2, R1.3, R2.2, R2.3
Content Specific Information (texts, documents, methods)	<p>Statement of Inquiry: The fundamental principles that shape the behavior and properties of elements enable scientists to develop and use predictive models across scientific disciplines.</p> <p>Phenomenon: Isotopes are used in medical imaging to diagnose and monitor a wide variety of conditions through the interactions that they have with electrons in the human body.</p> <p>Crosscutting Concepts</p> <ul style="list-style-type: none"> • Systems and System Models • Patterns • Cause and Effect <p>CORE IDEAS</p> <ul style="list-style-type: none"> • Parts of the atom and counting subatomic particles • Isotopes, abundance of isotopes, and relative atomic mass • Properties of light • Continuous and line spectra • Line emission spectrum of hydrogen • Energy levels and sublevels • Electron configuration • Organization of the periodic table • Periodicity (atomic radius, ionic radius, ionization energy, electron affinity, electronegativity, metallic character, oxidation state) 	<p>Statement of Inquiry: The underlying principles governing the structure, behavior, and applications of diverse substances foster innovations in material science and engineering.</p> <p>Phenomenon: Shape memory polymers and alloys can “remember” and return to their original shape after being deformed through the use of external stimuli such as heat and pressure.</p> <p>Crosscutting Concepts</p> <ul style="list-style-type: none"> • Systems and System Models • Structure and Function <p>CORE IDEAS</p> <ul style="list-style-type: none"> • Bonding triangles • Metallic bonding and properties • Alloys • Ionic bonding, nomenclature, and polyatomic ions • Three-dimensional lattice structures and lattice enthalpy • Covalent bonding and nomenclature • Nature, length and strength of single, double, and triple bonds • Coordination bonds • VSEPR theory • Bond and molecular polarity • Covalent network structures • Intermolecular forces • Chromatography • Formulas of organic compounds • Functional groups, homologous series, and nomenclature • Structural isomerism • Addition polymers and properties of polymers 	<p>Statement of Inquiry: The quantitative aspects of chemical transformations enable scientists to design and optimize chemical processes across a multitude of applications.</p> <p>Phenomenon: Precise control over reactant quantities dictates the size, shape, and properties of nanoparticles, contributing to advancements for applications ranging from drug delivery to catalysis.</p> <p>Crosscutting Concepts</p> <ul style="list-style-type: none"> • Scale, Proportion, and Quantity <p>CORE IDEAS</p> <ul style="list-style-type: none"> • Classification of matter • Separation techniques • Kinetic molecular theory, states of matter, and changes of state • Temperature • Ideal and real gases • Moles and Avogadro’s number • Relative formula mass and relative atomic mass • Molar mass • Empirical/molecular formulas • Molar concentration and dilution • Molar volume, Avogadro’s Law, ideal gas equation, combined gas law • Writing and balancing chemical equations • Mole ratios • Stoichiometric calculations • Limiting and excess reactants • Percentage yield and atom economy 	<p>Statement of Inquiry The underlying factors influencing reaction pathways allow for the development of novel strategies for energy conversion and chemical synthesis across scientific disciplines and technological applications.</p> <p>Phenomenon: Utilizing bioethanol in internal combustion engines showcases the renewable and carbon-neutral nature of biofuels, providing a cleaner and more sustainable alternative to fossil fuels.</p> <p>Crosscutting Concepts</p> <ul style="list-style-type: none"> • Systems and System Models • Energy and Matter • Stability and Change • Cause and Effect <p>CORE IDEAS</p> <ul style="list-style-type: none"> • System and surroundings • Energy transfer, endothermic, exothermic • Relative stability • Standard enthalpy change, heat, and temperature • Average bond enthalpy • Hess’s law • Combustion and incomplete combustion • Fossil fuels, biofuels, and fuel cells • Rate of reaction and collision theory • Factors influencing rate of reaction and catalysts • Activation energy • Dynamic equilibrium • Equilibrium constant • Le Chatelier’s principle

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Level Specific Differentiation	Marietta City Schools teachers provide specific differentiation of learning experiences for all students. Details for differentiation for learning experiences are included on the district unit planners.			
Resources	<p>Resources for 2025 Syllabus:</p> <ul style="list-style-type: none"> ● Chemistry for the IB Diploma Third Edition, Hodder Education ● IB Chemistry Guide First Assessment 2025 ● InThinking IB subject site for Chemistry ● IB Chemistry Schoology Course 			