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)	**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. **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. **Crosscutting Concepts** ● Systems and System Models ● Patterns ● Cause and Effect **CORE IDEAS** ● 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)	**Statement of Inquiry:** The underlying principles governing the structure, behavior, and applications of diverse substances foster innovations in material science and engineering. **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. **Crosscutting Concepts** ● Systems and System Models ● Structure and Function **CORE IDEAS** ● 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	**Statement of Inquiry:** The quantitative aspects of chemical transformations enable scientists to design and optimize chemical processes across a multitude of applications. **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. **Crosscutting Concepts** ● Scale, Proportion, and Quantity **CORE IDEAS** ● 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	**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. **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. **Crosscutting Concepts** ● Systems and System Models ● Energy and Matter ● Stability and Change ● Cause and Effect **CORE IDEAS** ● 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	Resources for 2025 Syllabus: ● 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			