MCS IB Chemistry Year 1 Subject Group Overview

Unit Name	Kinetic Molecular Theory	From Models to Materials	Electrochemical Cells	Energetics
Time Frame	9 weeks	9 weeks	9 weeks	9 weeks
Standards/ IB Topics	S1.5, S1.1, S1.2, S1.3, S1.4	S2.4, S3.1, S2.3, S2.1, S2.2, S3.2	R3.2, R2.1	R1.3, R1.1, R1.2
Content Specific Information (texts, documents, methods)	**Statement of Inquiry** The Kinetic Molecular Theory helps us understand how the behavior of molecules at the microscopic level influences the macroscopic properties of matter. **Phenomenon:** The molar mass of butane gas can be experimentally determined using the model of ideal gas behavior, shedding light on the specific properties and characteristics of this volatile compound. **Crosscutting Concepts** ● Scale, Proportion, and Quantity ● Structure and Function ● Systems and System Models **CORE IDEAS** ● Ideal and real gases ● Classification of matter ● Separation techniques ● States of matter and changes of state ● Temperature ● Parts of the atom and counting subatomic particles ● Isotopes and relative atomic mass ● Properties of light ● Line emission spectrum of hydrogen ● Electron configuration ● Moles and Avogadro's number ● Empirical/molecular formulas ● Molar concentration and dilution ● Avogadro's Law	**Statement of Inquiry** Bonding principles enable the design and development of materials with specific properties, functionality, and applications in materials science. **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** ● Patterns ● Structure and Function ● Systems and System Models **CORE IDEAS** ● Bonding triangles ● Alloys and polymers ● Periodic table and periodicity ● Metallic bonding and properties ● Ionic bonding, properties, and nomenclature ● Covalent bonding and properties ● VSEPR theory ● Intermolecular forces ● Polarity ● Covalent network structures ● Organic molecular models ● Organic functional groups and nomenclature ● Structural isomerism	**Statement of Inquiry** Redox reactions and electrochemical cells allow us to understand the dynamic exchange of electrons leading to the generation of electrical energy or powering chemical transformations in various systems. **Phenomenon:** Wearable energy harvesting devices utilize electrochemical cells to capture and store energy from body movements or the environment. **Crosscutting Concepts** ● Stability and Change ● Energy and Matter ● Structure and Function **CORE IDEAS** ● Writing and balancing chemical equations ● Stoichiometric calculations ● Limiting and excess reactants ● Percentage yield and atom economy ● Oxidation and reduction ● Oxidizing and reducing agents ● Oxidation state ● Redox half-equations ● Redox titrations ● Activity series ● Voltaic cells ● Rechargeable cells ● Electrolytic cells ● Oxidation and reduction of organic molecules	**Statement of Inquiry** Energetics allows us to investigate the exchange and transformation of energy within chemical reactions, leading to a deeper understanding of the factors influencing enthalpy changes and their applications in real-world processes. **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** ● Energy and Matter ● Systems and System Models ● Stability and Change **CORE IDEAS** ● Complete and incomplete combustion ● Fossil fuels and the greenhouse effect ● Biofuels and fuel cells ● Heat and temperature ● Endothermic and exothermic ● Calorimetry ● Bond enthalpy ● Hess's Law and energy cycles

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Common Assessments/ Major Projects	**SEP** ● Asking Questions and Defining Problems ● Developing & Using Models ● Carry out Investigations ● Constructing Explanations ● Planning and Carrying out investigations ● Analyzing & interpreting data ● Use mathematics and computational thinking ● Engage in Argument from Evidence ● Obtaining, evaluating and communicating information **Assessments/Projects** ● Formative assessment on each subtopic ● Tool and Inquiry assessment ● Summative assessment using questions from IB Papers 1 & 2	**SEP** ● Asking Questions and Defining Problems ● Developing & Using Models ● Carry out Investigations ● Constructing Explanations ● Planning and Carrying out investigations ● Analyzing & interpreting data ● Use mathematics and computational thinking ● Engage in Argument from Evidence ● Obtaining, evaluating and communicating information **Assessments/Projects** ● Formative assessment on each subtopic ● Tool and Inquiry assessment ● Summative assessment using questions from IB Papers 1 & 2	**SEP** ● Asking Questions and Defining Problems ● Developing & Using Models ● Carry out Investigations ● Constructing Explanations ● Planning and Carrying out investigations ● Analyzing & interpreting data ● Use mathematics and computational thinking ● Engage in Argument from Evidence ● Obtaining, evaluating and communicating information **Assessments/Projects** ● Formative assessment on each subtopic ● Tool and Inquiry assessment ● Summative assessment using questions from IB Papers 1 & 2	**SEP** ● Asking Questions and Defining Problems ● Developing & Using Models ● Carry out Investigations ● Constructing Explanations ● Planning and Carrying out investigations ● Analyzing & interpreting data ● Use mathematics and computational thinking ● Engage in Argument from Evidence ● Obtaining, evaluating and communicating information **Assessments/Projects** ● Formative assessment on each subtopic ● Tool and Inquiry assessment ● Summative assessment using questions from IB Papers 1 & 2
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 "New" Syllabus ● Textbook TBD – pending evaluation of resources ● IB Chemistry Guide First Assessment 2025 ● InThinking IB subject site for Chemistry ● IB Chemistry Schoology Course Resources for 2016 "Old" Syllabus ● Murphy et al. *Oxford IB Diploma Programme: Chemistry Course Companion*, 2014 edition. ● Brown and Ford. *Pearson Baccalaureate Standard Level Chemistry*, 2nd edition. ● Hodder Study and Revision Guide for the IB Diploma ● Hodder IA Internal Assessment for Chemistry			

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Resources, materials, assessments not linked to SGO or unit planner will be reviewed at the local school level.