International Baccalaureate
Baccalauréat International
Bachillerato Internacional

MYP/3D Science Unit Planner

Marietta City Schools

MARIETTA CITY SCHOOLS

Grade & Course: 9-12 Chemistry	**Topic:** Periodic Table	**Duration:** 3 weeks

Georgia Standards and Content:

SC1. Obtain, evaluate, and communicate information about the use of the modern atomic theory and periodic law to explain the characteristics of atoms and elements.

b. Construct an argument to support the claim that the proton (and not the neutron or electron) defines the element's identity.
d. Construct an explanation that relates the relative abundance of isotopes of a particular element to the atomic mass of the element.
e. Construct an explanation of light emission and the movement of electrons to identify elements.
f. Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms (i.e. including atomic radii, ionization energy, and electronegativity).
g. Develop and use models, including electron configuration of atoms and ions, to predict an element's chemical properties.

Narrative / Background Information

Prior Student Knowledge: (REFLECTION – PRIOR TO TEACHING THE UNIT)

S8P1. Obtain, evaluate, and communicate information about the structure and properties of matter.

e. Develop models (e.g., atomic-level models, including drawings, and computer representations) by analyzing patterns within the periodic table that illustrate the structure, composition, and characteristics of atoms (protons, neutrons, and electrons) and simple molecules.

Year-Long Anchoring Phenomena: (LEARNING PROCESS)

Changes to the measurement of chemicals added to Flint Michigan's water supply created dangerous levels of lead contamination in the drinking water.

Unit Phenomena (LEARNING PROCESS)

Within the last five years, new elements were discovered and added to the Periodic Table.

MYP Inquiry Statement:

The chemical and physical properties of an element can be determined by its placement on the periodic table.

MYP Global Context:

Scientific and Technical Innovation (Systems, models, methods, products, processes and solutions)

Approaches to Learning Skills:

Obtaining, evaluating, and communicating information
Analyzing and interpreting data
Make guesses, ask what if questions and generate testable hypotheses Research Skills
Thinking Skills
Communication Skills

Disciplinary Core Ideas: (KNOWLEDGE & SKILLS)

History of the Periodic Table
Atomic Radius
Electronegativity
Ionization
Energy Group
Properties
Reactivity

Crosscutting Concepts: (KNOWLEDGE & SKILLS)

Patterns
Energy & Matter
Systems & System Models

MYP Key and Related Concepts:

Key Concept: Change
Related Change: Patterns & Energy

Possible Preconceptions/Misconceptions: (REFLECTION – PRIOR TO TEACHING THE UNIT)

- Particles possess the same properties as the materials they compose. For example, atoms of copper are “orange and shiny,” gas molecules are transparent, and solid molecules are hard.
- Particles are viewed as mini-versions of the substances they comprise.
- Particles are often misrepresented in sketches. No differentiation is made between atoms and molecules.
- Particles misrepresented and undifferentiated in concepts involving elements, compounds, mixtures, solutions and substances. Particles cannot be “seen”, so they do not need to exist in a functioning model to explain the behavior of matter.
- Particles are in constant random motion. Students may have a hard time realizing this concept applies to atoms.
- Space between particles is "empty". Novick and Nussbaum (1978, 1981) investigated this notion in studies involving Israeli 13-14 year olds and 10-20 year old Americans. They showed that the notion that empty space exists between particles causes students considerable difficulties.

Key Vocabulary: (KNOWLEDGE & SKILLS)

Microscopic
Macroscopic
Sub-microscopic
c Group
Period
Electron configuration
Orbital Notation
Diagram Shells
Valence shell
Valence electron
Electron cloud
Periodicity
Periodic trends
Ionization
energy Atomic
radius
Electronegativity
Noble Gas Notation
Monatomic (atomic)
element Diatomic element
Atomic theory of matter
Dalton’s atomic theory
Heisenberg’s Principle
Pauli exclusion Principle
Aufbau Principle
Hund’s Rule

Inquiry Questions:

Factual -
What makes the seven diatomic molecules unique?
What postulates of Dalton’s atomic theory support the current atomic theory?
How is the Aufbau Principle related to the structure of the Periodic Table of Elements?

Conceptual -
Why are elements with similar properties within the same family?
Why does atomic radius decrease across energy levels?
How do chemists use the Periodic Table of Elements to predict reactions?

Debatable -
Should society have control/approval over nuclear fusion research?

Unit Objectives:

Learning Activities and Experiences	Inquiry & Obtain: (LEARNING PROCESS)	Evaluate: (LEARNING PROCESS)	Communicate: (LEARNING PROCESS)
Week 1:	**Phenomenon** No other element on planet Earth will have the same number of protons as another element. **Gathering** Aufbau's Principle, Hund's Rule, and the Pauli Exclusion Principle PowerPoint Electron Configuration POGIL Activity Electron Configuration Gizmo /Simulation Orbital Notation Khan Academy Noble Gas Notation Activity	Formative Assessment #1 - Socrative Quiz	Atomic Theory Timeline Project CER - Orbital Notation or Noble Gas Notation which is best to effectively show the arrangement-distribution of electrons within energy levels?
Week 2:	**Phenomenon** Within the last five years, new elements were discovered and added to the Periodic Table. **Gathering** Review Formative Assessment #1 with Instructor Periodic Trends cK12 Activity Electron Dot Notation Activity	Formative Assessment # 2 - Schoology AMP	Atomic Theory Timeline Presentations
Week 3:	**Phenomenon** When electrons are excited and fall back to their ground state some emit distinguishable colors of visible light. **Gathering** Review Formative Assessment #2 with Instructor Flame Test Lab	Summative Assessment: Schoology AMP	Criterion D - Essay Highlights

Resources (hyperlink to model lessons and/or resources):
Discovery Education Science Techbook
Gizmo
Simulation
Rutherford Scattering
POGIL
Noble Gas Notation Practice
Aufbau, Pauli, Hund Rules
Periodic Trends Activity

Reflection: Considering the planning, process and impact of the inquiry

Prior to teaching the unit	During teaching	After teaching the unit