WAUCONDA SCHOOL DISTRICT 118
UNIT PLANNING ORGANIZER

Subject: Storyline 1: Atoms, Elements, and Molecules

Grade Level or Course: 10th Grade

Unit: One

Pacing: 31 days

STAGE 1 – DESIRED RESULTS

Anchoring Phenomenon:

I. **What distinguishes the minerals in this mountain?**
   - ☐ Students apply what they learn about atoms and their properties, and the bonds within and between molecules, to explain what distinguishes one mineral from another.

Investigative Phenomenon:

1. **What causes the colors in a fireworks display?**
   - Students relate the properties of atoms to the differences in mineral properties, and the atomic emission spectra of elements to light emitted by fireworks.
2. **Why are elements in pure form so rare?**
   - Students explain the periodic trends of elements in relation to the differences in minerals.
3. **Why do gems have different properties than metals?**
   - Students explain how differences in bonding produce differences in properties of gems and metals and apply the knowledge to explain how minerals are distinguished from one another.

NGSS Performance Standards:

- HS-PS1-1: Valence Electrons and Properties of Elements: 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.
- HS-PS1-2: Simple Chemical Reactions: Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.
- HS-PS1-3: Electrical Forces and Bulk Scale Structure: Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles. (Patterns)
- HS-PS1-7: Conservation of Atoms in Chemical Reactions: Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. (Energy and Matter)
- HS-PS2-4: Gravitational and Electrostatic Forces Between Objects: Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects. (Patterns)
- HS-PS3-5: Energy Change Due to Interacting Fields: Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction. (Cause and Effect)

NGSS - Science and Engineering Practices:

- **Developing and Using Models**: Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds.
- **Constructing Explanations**: Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.
- **Using Mathematics and Computational Thinking**: Mathematical and computational thinking in 9- 12 builds on K-8 experiences and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions.

NGSS - Disciplinary Core Ideas:

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NGSS - Cross-Cutting Concepts:

- **Patterns**: Students observe patterns in systems at different scales and cite patterns as empirical evidence for causality in supporting their explanations of phenomena. They recognize classifications or explanations used at one scale may not be useful or need revision using a different scale; thus requiring improved investigations and experiments. They use mathematical representations to identify certain patterns and analyze patterns of performance in order to reengineer and improve a designed system.
- **Structure and Function**: Students investigate systems by examining the properties of different materials, the structures of different components, and their interconnections to reveal the system's function and/or solve a problem. They infer the functions and properties of natural and designed objects and systems from their overall structure, the way their components are shaped and used, and the molecular substructures of their various materials.
- **Systems and System Models**: Students can investigate or analyze a system by defining its boundaries and initial conditions, as well as its inputs and outputs. They can use models (e.g., physical, mathematical, computer models) to simulate the flow of energy, matter, and interactions within and between systems at different scales. They can also use models and simulations to predict the behavior of a system, and recognize that these predictions have limited precision and reliability due to the assumptions and approximations inherent in the models. They can also design systems to do specific tasks.
- **Cause and Effect**: Students understand that empirical evidence is required to differentiate between cause and correlation and to make claims about specific causes and effects. They suggest cause and effect relationships to explain and predict behaviors in complex natural and designed systems. They also propose causal relationships by examining what is known about smaller-scale mechanisms within the system. They recognize changes in systems may have various causes that may not have equal effects.

STAGE 2 – EVIDENCE

Concepts (Big Ideas and Themes)	Performance Tasks (What students will be able to do)	21st Century Skills - Science and Engineering Practices

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Common Summative Assessments:

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Common Formative Assessments:

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Modified Summative Assessments:

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Modified Formative Assessments:

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STAGE 3 – LEARNING PLAN (INSTRUCTIONAL PLANNING)

Suggested Resources/Materials/Informational Texts

Suggested Research-based Effective Instructional Strategies

Academic Vocabulary/ Word Wall	Enrichment/Extensions/ Modifications	Interdisciplinary Connection
Essential Vocabulary:		