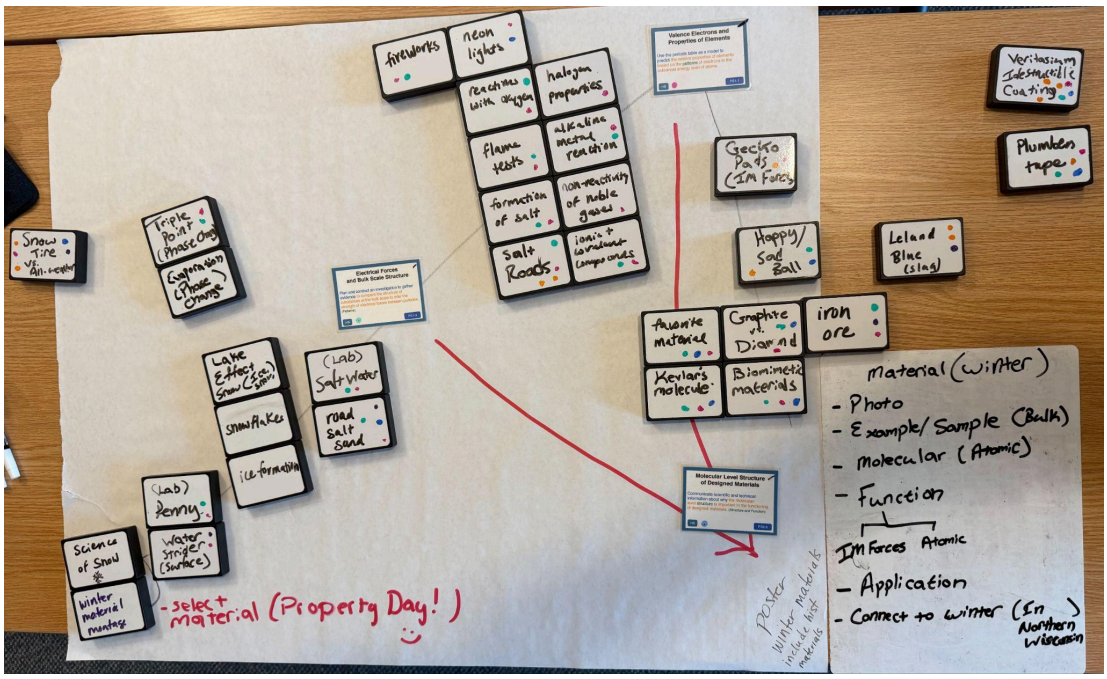
Storyline Unit Design

Understanding by Design (UbD) Template*

Unit	**Storyline 1:**	Course(s)	**Chemistry**
Designed by	**Morgen, Eli, Paul, Anna, Katie**	Time Frame	**6-8 Weeks**

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Anchor Model







*UbD Unit Planner is from Wiggins, Grant and McTighe, Jay. Understanding by Design Guide to Creating High-Quality Units. Alexandria, VA: Association for Supervision and Curriculum Development. 2011.

Stage 1: Desired Results

Performance Expectations

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-PS1-3: 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-PS2-6: Molecular-Level Structure of Designed Materials
Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials. (Structure and Function)

Anchoring Phenomenon

Anchoring Phenomenon Worksheet

Enduring Understandings	Essential Questions

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Stage 2: Assessments

HS-PS1-1 - Ordering Reactivity
HS-PS1-3 - Testing SmartKlean's Claims
HS-PS2-6 - The Most Prescribed Drugs in the World

Assessment Screening Tool Slides

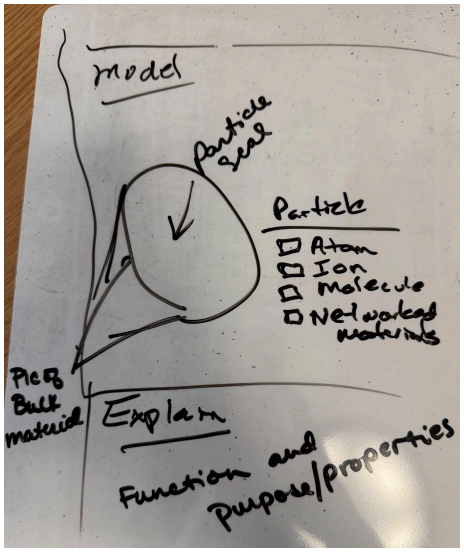
Backward Design Elements

What new skills (practices) will students need to learn?	What thinking concepts will students need to learn?	What science concepts will students need to learn?
HS-PS1-1 Use the periodic table as a model (atomic logistics) HS-PS1-3 Plan and conduct an investigation Number trials Data table HS-PS2-6	HS-PS1-1 Patterns in Periodic Table - patterns at the macroscopic level can be understood at by patterns at the atomic level HS-PS1-3 Patterns - patterns at the bulk-structure level can be understood at by patterns at the atomic level HS-PS2-6 Structure & Function	HS-PS1-1 Vocabulary: Atoms Bonds (ionic, covalent, metallic) Bond number Nucleus (positively-charged) - Protons - Neutrons Electrons (negatively-charged) Valence electrons Periodic table Elements Elemental properties (e.g. reactivity of metals, types of bonds formed, number of bonds formed, reactions with oxygen) Reactivity Ions Patterns HS-PS1-3 The structure and interactions of matter at the bulk scale are determined by electrical forces within and between atoms. Vocabulary: Bulk scale structure Electrical forces between particles Particles (e.g. ions, atoms, molecules, and networked materials) Bulk properties (e.g. melting point and boiling point, vapor pressure, and surface tension) Thermal (kinetic) energy Patterns HS-PS2-6 Attraction and repulsion between

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Obtain and Communicate Information orally and written	Structure is the atomic structure and polarity, all charges in the material. Function is how it reacts, transforms, interacts	electric charges at the atomic scale explain the structure, properties, and transformations of matter, as well as the contact forces between material objects Designed materials Electric charges Intermolecular forces (attractive and repulsive) Electrons (e.g. delocalized in metals) Molecular-level structure Macroscopic properties (e.g., material strength, conductivity, reactivity, state of matter, durability) Structure and Function

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Stage 3: Learning Plan			
Phenomenon or Problem	Learning Performance - What will they do? The three dimensions woven together into a single learning performance.	Why is this important? How does this activity help build understanding of the anchoring phenomenon.	Learning Experience - How will they do it? Graphic organizers, protocols, scaffolds, labs, mini-lesson, student discourse, etc.
Property Day - Student show and tell (1 day)	Students will ask questions about the function of various winter survival materials. Students will analyze patterns in the properties of various winter survival materials.	Hook for the Storyline.	Students bring in winter related materials Mini lesson properties (science content) Card sorts of prepared materials of winter survival materials (ie road salt, sand, tires, down feathers, wool, moccasins, hot hands, gortex, ski wax, vaseline, fleece, Muk boots, yak tracks, sled, ice skates)
Formative Assessment - What information are you collecting to know that they met the target?			
Salt, water, graphite, plumber's tape, helium (1 day)	Students use models to explain patterns of particle models of various matter.	Introducing the idea of particles. Prepare for research on candidate materials	Mini lesson on what a model is. Components, relationships, explanations. Give particle models to look at patterns. 
Formative Assessment - What information are you collecting to know that they met the target?			
Property Day - Student show and tell (1 day)	Students will obtain information about various materials at the particle scale.	Students choose up to 3-5 candidates for their material. Introducing the importance of	Mini-lesson on particles (define particles as ions (sodium chloride), atoms (helium), molecules (water), networked materials (graphite).

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	Students will develop particle models of various materials. (scale)	materials having structures.	Teacher example (ski wax) mini-lesson
Formative Assessment - What information are you collecting to know that they met the target?			
Water on Penny (2-3 days)	Students will carryout an investigation to determine the effect of different intermolecular forces on surface tension. Students will use models as evidence to construct explanations for the effects of different intermolecular forces on surface tension.	Introducing both experiments and inter molecular forces structure is related to function	Mini lesson on investigation (lab design) Penny lab Analyze results of penny lab Mini-lesson on intermolecular forces (ie gecko feet, ski wax) Update particle models to show intermolecular forces that explain the results of the lab. Use a model to make predictions about properties of an unknown substance. Discussion on lab results
Formative Assessment - What information are you collecting to know that they met the target?			
Happy Sad Ball	Students ask questions about patterns in the phenomenon (solid). Students develop particle models to explain the effect of the phenomenon (solid).		As a class collaboratively
Formative Assessment - What information are you collecting to know that they met the target?			
Happy Sad Ball	Students will collaboratively plan and carry out an investigation to determine the effects of different additives on boiling points of water.		
Formative Assessment - What information are you collecting to know that they met the target?			
Happy Sad Ball	Students will update particle models based on evidence collected from the investigation		
Formative Assessment - What information are you collecting to know that they met the target?			

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Different boiling points of water with additives Or Boiling points of different liquids (3-4 days)	Students will collaboratively plan and carry out an investigation to determine the effects of different additives on boiling points of water.		Additives - salt, sugar, sand, calcium carbonate Evaluate investigation Liquids - alcohol, water, WIth lab partners
Formative Assessment - What information are you collecting to know that they met the target?			
Results of of investigation (1 day)	Students will engage in argumentation from evidence of structure of the additives on the boiling point of water.	Different intermolecular forces have different properties. Helps them have a better understanding that their material will have different im forces because they have different properties.	
Formative Assessment - What information are you collecting to know that they met the target?			
Sand, salt sugar melting (3-4 days)	**HS-PS1-3** 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)		1 day to plan 1 day to carry-out 1 day to analyze 1 day as a buffer
Formative Assessment - What information are you collecting to know that they met the target?			
Property Day - Student show and tell (1 day)	Students will communicate which winter material will be their focus for the material poster.		Select material Add forces to the particle model of the winter material chosen for their project
Formative Assessment - What information are you collecting to know that they met the target?			
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Formative Assessment - What information are you collecting to know that they met the target?			
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Materials / Resources

Vocabulary

HS-PS1-1
Atoms
Nucleus (positively-charged)
- Protons
- Neutrons

Electrons (negatively-charged)
Valence electrons
Periodic table
Elements
Elemental properties (e.g. reactivity of metals, types of bonds formed, number of bonds formed, reactions with oxygen)
Reactivity
Patterns

HS-PS2-6
Designed materials
Electric charges
Intermolecular forces (attractive and repulsive)
Electrons (e.g. delocalized in metals)
Molecular-level structure
Macroscopic properties (e.g., material strength, conductivity, reactivity,
state of matter, durability)
Structure and Function

HS-PS1-3
Bulk scale structure
Electrical forces between particles
Particles (e.g. ions, atoms, molecules, and networked materials)
Bulk properties (e.g. melting point and boiling point, vapor pressure, and surface tension)
Thermal (kinetic) energy
Patterns

Mini Lessons
Patterns Level 7 - Causal Patterns at Varying Scale

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Patterns Level 7 - Causal Patterns at Varying Scale Thinking Slides
Structure & Function Level 5 - Molecular-Level Structures
Structure & Function Level 5 - Molecular-Level Structures Thinking Slides

Graphic Organizers
Phenomena Observation Graphic Organizer
Questioning Graphic Organizer
Modeling Graphic Organizer
Planning an Investigation Organizer - Experimental
Planning an Investigation Organizer - Observational
Investigation Evidence Organizer
Engaging in Argumentation Organizer

Differentiation / Modifications

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Phenomenon Worksheet

Back to Stage 1

◁ **HS-PS1-1 - Valence Electrons and Properties of Elements**
◁ **HS-PS1-3 - Electrical Forces and Bulk Scale Structure**
◁ **HS-PS2-6 - Molecular-Level Structure of Designed Materials**
◁ **Local**
◁ **Favorite**
◁
◁

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