

Chemistry GSE Learning Map

Prioritized Standard: SC1.a Obtain, evaluate, and communicate information about the use of the modern atomic theory and periodic law to explain the characteristics of atoms and elements. Evaluate the merits and limitations of different models of the atom in relation to relative size, charge, and position of protons, neutrons, and electrons in the atom. *Chemistry*

| | Proficiency Scale |
|-----|--|
| 4.0 | <p>In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught. For example, the student will:</p> <p><u>Learning Target 1:</u> Evaluate the components and the merits of the most recent atomic theory</p> |
| 3.5 | In addition to score 3.0 performance, partial success at score 4.0 content |
| 3.0 | <p>The student will</p> <p><u>Learning Target 1:</u> Evaluate the merits and limitations of different models of the atom in relation to relative size, charge, and position of protons, neutrons, and electrons in the atom</p> <p>The student exhibits no major errors or omissions.</p> |
| 2.5 | No major errors or omissions regarding score 2.0 content and partial success at score 3.0 |
| 2.0 | <p>There are no major errors or omissions regarding the simpler details and processes.</p> <p>The student will recognize or recall specific vocabulary:</p> <p><u>Learning Target 1:</u> proton, electron, neutron, nucleus, electron cloud, plum pudding, nuclear model, billiard ball model</p> <p>The student will perform basic processes:</p> <p><u>Learning Target 2:</u> Describe locations and charges of all subatomic particles, nucleus, and the electron cloud <u>Learning Target 3:</u> Explain how models first featuring the electron, nucleus, neutron, and proton were developed <u>Learning Target 4:</u> Describe how each model of the atom (Dalton, Thomson, Rutherford, Bohr, Chadwick, and Schrodinger) improved upon features of the previous model</p> <p>However, the student exhibits major errors or omissions regarding the more complex ideas and processes.</p> |
| 1.5 | Partial success at score 2.0 content and major errors or omissions regarding score 3.0 content |
| 1.0 | With help, partial success at score 2.0 and score 3.0 |
| 0.5 | With help, partial success at score 2.0 content but not at score 3.0 content |
| 0.0 | Even with help, no success |

Chemistry GSE Learning Map

Prioritized Standard: SC1.f Obtain, evaluate, and communicate information about the use of the modern atomic theory and periodic law to explain the characteristics of atoms and 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 (including atomic radii, ionization energy, and electronegativity of various elements). *Chemistry*

| Proficiency Scale | |
|-------------------|---|
| 4.0 | <p>In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught. For example, the student will:</p> <p><u>Learning Target 1:</u> Explore more advanced trends of the periodic table, e.g., predict how first and second ionization energies vary, research ionic radii trends, understand the roles of the shielding effect and effective nuclear charge in the listed trends, OR recognize anomalous properties among d-block and f-block elements</p> |
| 3.5 | In addition to score 3.0 performance, partial success at score 4.0 content |
| 3.0 | <p>The student will</p> <p><u>Learning Target 1:</u> 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 (including atomic radii, ionization energy, and electronegativity of various elements)</p> <p><u>Learning Target 2:</u> Construct an explanation for why noble gases exhibit no/minimal electronegativity</p> <p>The student exhibits no major errors or omissions.</p> |
| 2.5 | No major errors or omissions regarding score 2.0 content and partial success at score 3.0 |
| 2.0 | <p>There are no major errors or omissions regarding the simpler details and processes.</p> <p>The student will recognize or recall specific vocabulary:</p> <p><u>Learning Target 1:</u> ionization, ionization energy, period, group, electronegativity, atomic radius</p> <p>The student will perform basic processes:</p> <p><u>Learning Target 2:</u> Determine how many valence electrons each group possesses</p> <p><u>Learning Target 3:</u> Determine the trends across periods and down groups</p> <p><u>Learning Target 4:</u> Be able to predict the properties of atoms and ions based on their locations on the periodic table</p> <p>However, the student exhibits major errors or omissions regarding the more complex ideas and processes.</p> |
| 1.5 | Partial success at score 2.0 content and major errors or omissions regarding score 3.0 content |
| 1.0 | With help, partial success at score 2.0 and score 3.0 |
| 0.5 | With help, partial success at score 2.0 content but not at score 3.0 content |
| 0.0 | Even with help, no success |

Chemistry GSE Learning Map

Prioritized Standard: SC2.d Obtain, evaluate, and communicate information about the chemical and physical properties of matter resulting from the ability of atoms to form bonds. Develop and use models to evaluate bonding configurations from nonpolar covalent to ionic bonding. (Clarification statement: VSEPR bonding theory is not addressed in this element.) Chemistry

| Proficiency Scale | |
|-------------------|---|
| 4.0 | <p>In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught. For example, the student will:</p> <p><u>Learning Target 1:</u> Demonstrate in-depth inferences and applications that go beyond what was taught. For example, the student will investigate and explain electronic and molecular geometries of covalent compounds up to and including six regions of electron density using the VSEPR model and application to real-world examples (e.g., enzyme model, lock and key), including bond angles and hybrid orbitals</p> |
| 3.5 | In addition to score 3.0 performance, partial success at score 4.0 content |
| 3.0 | <p>The student will</p> <p><u>Learning Target 1:</u> Develop and use models to evaluate bonding configurations from nonpolar covalent to ionic bonding</p> <p>The student exhibits no major errors or omissions.</p> |
| 2.5 | No major errors or omissions regarding score 2.0 content and partial success at score 3.0 |
| 2.0 | <p>There are no major errors or omissions regarding the simpler details and processes.</p> <p>The student will recognize or recall specific vocabulary:</p> <p><u>Learning Target 1:</u> Lewis structure/electron dot diagram, covalent, ionic, charge, oxidation number</p> <p>The student will perform basic processes:</p> <p><u>Learning Target 2:</u> Distinguish between covalent and ionic compound formulas <u>Learning Target 3:</u> Draw a Lewis structure for an element <u>Learning Target 4:</u> Identify the three types of bonds (nonpolar covalent, polar covalent, and ionic) and their atomic composition <u>Learning Target 5:</u> Deduce the type of bonding from a substance's chemical (reactivity) and physical (e.g., melting and boiling points) properties</p> <p>However, the student exhibits major errors or omissions regarding the more complex ideas and processes.</p> |
| 1.5 | Partial success at score 2.0 content and major errors or omissions regarding score 3.0 content |
| 1.0 | With help, partial success at score 2.0 and score 3.0 |
| 0.5 | With help, partial success at score 2.0 content but not at score 3.0 content |
| 0.0 | Even with help, no success |

Chemistry GSE Learning Map

Prioritized Standard: SC2.e Obtain, evaluate, and communicate information about the chemical and physical properties of matter resulting from the ability of atoms to form bonds. Ask questions about chemical names to identify patterns in IUPAC nomenclature in order to predict chemical names for ionic (binary and ternary), acidic, and inorganic covalent compounds. *Chemistry*

| Proficiency Scale | |
|-------------------|--|
| 4.0 | <p>In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught. For example, the student will:</p> <p><u>Learning Target 1:</u> Demonstrates in-depth inferences and applications that go beyond what was taught. The student will investigate IUPAC naming of alkanes, alkenes, and alkynes and be able to name unfamiliar representatives of each category</p> |
| 3.5 | In addition to score 3.0 performance, partial success at score 4.0 content |
| 3.0 | <p>The student will</p> <p><u>Learning Target 1:</u> Ask questions about chemical names to identify patterns in IUPAC nomenclature in order to predict chemical names for ionic (binary and ternary), acidic, and inorganic covalent compounds</p> <p>The student exhibits no major errors or omissions.</p> |
| 2.5 | No major errors or omissions regarding score 2.0 content and partial success at score 3.0 |
| 2.0 | <p>There are no major errors or omissions regarding the simpler details and processes.</p> <p>The student will recognize or recall specific vocabulary:</p> <p><u>Learning Target 1:</u> ionic, covalent, acidic, electronegativity, binary, oxyacid, polyatomic ion</p> <p>The student will perform basic processes:</p> <p><u>Learning Target 2:</u> Describe the criteria for determining whether a compound is covalent, ionic, or acidic</p> <p><u>Learning Target 3:</u> Identify the prefixes for numbers 1-10 for covalent compounds</p> <p><u>Learning Target 4:</u> Determine the category to which a formula belongs</p> <p><u>Learning Target 5:</u> Apply knowledge of monatomic and polyatomic ions to name ionic compounds</p> <p><u>Learning Target 6:</u> Utilize a table of prefixes and suffixes to name unfamiliar acid</p> <p>However, the student exhibits major errors or omissions regarding the more complex ideas and processes.</p> |
| 1.5 | Partial success at score 2.0 content and major errors or omissions regarding score 3.0 content |
| 1.0 | With help, partial success at score 2.0 and score 3.0 |
| 0.5 | With help, partial success at score 2.0 content but not at score 3.0 content |
| 0.0 | Even with help, no success |

Chemistry GSE Learning Map

Prioritized Standard: SC3.a Obtain, evaluate, and communicate information about how the Law of Conservation of Matter is used to determine chemical composition in compounds and chemical reactions. Use mathematics and computational thinking to balance chemical reactions (i.e., synthesis, decomposition, single replacement, double replacement, and combustion) and construct 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. *Chemistry*

| Proficiency Scale | |
|-------------------|--|
| 4.0 | <p>In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught. For example, the student will:</p> <p><u>Learning Target 1:</u> Plan an investigation that identifies the products of one of the following subtypes of chemical reactions: carbonate decomposition, hydroxide decomposition, chlorate decomposition, or electrolysis, OR</p> <p><u>Learning Target 2:</u> Be able to write a balanced total equation as well as derive the associated complete ionic and net ionic equations</p> |
| 3.5 | In addition to score 3.0 performance, partial success at score 4.0 content |
| 3.0 | <p>The student will</p> <p><u>Learning Target 1:</u> Use mathematics and computational thinking to balance chemical reactions (i.e., synthesis, decomposition, single replacement, double replacement, and combustion) and</p> <p><u>Learning Target 2:</u> Construct 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</p> <p>The student exhibits no major errors or omissions.</p> |
| 2.5 | No major errors or omissions regarding score 2.0 content and partial success at score 3.0 |
| 2.0 | <p>There are no major errors or omissions regarding the simpler details and processes.</p> <p>The student will recognize or recall specific vocabulary:</p> <p><u>Learning Target 1:</u> synthesis, decomposition, single replacement, double replacement, combustion, Conservation of Matter</p> <p>However, the student exhibits major errors or omissions regarding the more complex ideas and processes.</p> |
| 1.5 | Partial success at score 2.0 content and major errors or omissions regarding score 3.0 content |
| 1.0 | With help, partial success at score 2.0 and score 3.0 |
| 0.5 | With help, partial success at score 2.0 content but not at score 3.0 content |
| 0.0 | Even with help, no success |

Chemistry GSE Learning Map

Prioritized Standard: SC3.b Obtain, evaluate, and communicate information about how the Law of Conservation of Matter is used to determine chemical composition in compounds and chemical reactions. Plan and carry out investigations to determine that a new chemical has formed by identifying indicators of a chemical reaction (specifically precipitate formation, gas evolution, color change, water production, and changes in energy to the system should be investigated). *Chemistry*

| | Proficiency Scale |
|-----|--|
| 4.0 | <p>In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught. For example, the student will:</p> <p><u>Learning Target 1:</u> Predict the products of a type of reaction that was not studied (e.g., redox reactions)</p> |
| 3.5 | In addition to score 3.0 performance, partial success at score 4.0 content |
| 3.0 | <p>The student will</p> <p><u>Learning Target 1:</u> Plan and carry out investigations to determine indicators of a chemical reaction. (Clarification statement: Specifically precipitate formation, gas evolution, color change, water production, and changes in energy to the system should be investigated)</p> <p>The student exhibits no major errors or omissions.</p> |
| 2.5 | No major errors or omissions regarding score 2.0 content and partial success at score 3.0 |
| 2.0 | <p>There are no major errors or omissions regarding the simpler details and processes.</p> <p>The student will recognize or recall specific vocabulary:</p> <p><u>Learning Target 1:</u> precipitate, exothermic, endothermic</p> <p>The student will perform basic processes:</p> <p><u>Learning Target 2:</u> Recognize each of the five general types of reactions <u>Learning Target 3:</u> Use observation to describe and inference to interpret the data produced from chemical reactions <u>Learning Target 4:</u> Determine whether a double replacement reaction will result in precipitation, neutralization, or no reaction <u>Learning Target 5:</u> Construct an activity series using experimental data from a series of reactions <u>Learning Target 6:</u> Predict whether a reaction will produce a gas <u>Learning Target 7:</u> Determine whether heat is absorbed or released during a chemical reaction</p> <p>However, the student exhibits major errors or omissions regarding the more complex ideas and processes.</p> |
| 1.5 | Partial success at score 2.0 content and major errors or omissions regarding score 3.0 content |
| 1.0 | With help, partial success at score 2.0 and score 3.0 |
| 0.5 | With help, partial success at score 2.0 content but not at score 3.0 content |
| 0.0 | Even with help, no success |

Chemistry GSE Learning Map

Prioritized Standard: SC3.c Obtain, evaluate, and communicate information about how the Law of Conservation of Matter is used to determine chemical composition in compounds and chemical reactions. Use mathematics and computational thinking to apply concepts of the mole and Avogadro's number to conceptualize and calculate

- percent composition
- empirical/molecular formulas
- mass, moles, and molecules relationships
- molar volumes of gases *Chemistry*

| Proficiency Scale | |
|-------------------|--|
| 4.0 | <p>In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught. For example, the student will:</p> <p>Learning Target 1: Determine the empirical formula of a hydrate experimentally or using experimental data</p> |
| 3.5 | In addition to score 3.0 performance, partial success at score 4.0 content |
| 3.0 | <p>The student will</p> <p>Learning Target 1: Use mathematics and computational thinking to apply concepts of the mole and Avogadro's number to conceptualize and calculate percent composition</p> <p>Learning Target 2: Use mathematics and computational thinking to apply concepts of the mole and Avogadro's number to conceptualize and calculate empirical/molecular formulas</p> <p>Learning Target 3: Use mathematics and computational thinking to apply concepts of the mole and Avogadro's number to conceptualize and calculate mass, moles, and molecules relationships</p> <p>Learning Target 4: Use mathematics and computational thinking to apply concepts of the mole and Avogadro's number to conceptualize and calculate molar volumes of gases</p> <p>The student exhibits no major errors or omissions.</p> |
| 2.5 | No major errors or omissions regarding score 2.0 content and partial success at score 3.0 |
| 2.0 | <p>There are no major errors or omissions regarding the simpler details and processes.</p> <p>The student will recognize or recall specific vocabulary:</p> <p>Learning Target 1: Avogadro's number, percent composition, percent by mass, empirical formula, molecular formula, mole, molecule, molar mass</p> <p>The student will perform basic processes:</p> <p>Learning Target 2: Use dimensional analysis to cancel like units</p> <p>Learning Target 3: Apply significant figures to addition, subtraction, multiplication, and division</p> <p>Learning Target 4: Understand the mole as a key component of multiple conversion factors for different variables: a mole map may be a useful tool for this objective</p> <p>Learning Target 5: Use the periodic table to determine molar mass</p> <p>However, the student exhibits major errors or omissions regarding the more complex ideas and processes.</p> |
| 1.5 | Partial success at score 2.0 content and major errors or omissions regarding score 3.0 content |
| 1.0 | With help, partial success at score 2.0 and score 3.0 |
| 0.5 | With help, partial success at score 2.0 content but not at score 3.0 content |

Chemistry GSE Learning Map

Prioritized Standard: SC3.c Obtain, evaluate, and communicate information about how the Law of Conservation of Matter is used to determine chemical composition in compounds and chemical reactions. Use mathematics and computational thinking to apply concepts of the mole and Avogadro's number to conceptualize and calculate

- percent composition
- empirical/molecular formulas
- mass, moles, and molecules relationships
- molar volumes of gases *Chemistry*

| Proficiency Scale | |
|-------------------|----------------------------|
| 0.0 | Even with help, no success |

Chemistry GSE Learning Map

Prioritized Standard: SC3.d Obtain, evaluate, and communicate information about how the Law of Conservation of Matter is used to determine chemical composition in compounds and chemical reactions. Use mathematics and computational thinking to identify and solve different types of reaction stoichiometry problems (i.e., mass to moles, mass to mass, moles to moles, and percent yield) using significant figures. (Clarification statement for elements c and d: Emphasis is on use of mole ratios to compare quantities of reactants or products and on assessing students' use of mathematical thinking and is not on memorization and rote application of problem-solving techniques.) *Chemistry*

| Proficiency Scale | |
|-------------------|---|
| 4.0 | <p>In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught. For example, the student will:</p> <p>Learning Target 1: In-depth inferences and applications that go beyond what was taught. Experimentally and mathematically determine limiting and excess reactants in a chemical reaction</p> |
| 3.5 | In addition to score 3.0 performance, partial success at score 4.0 content |
| 3.0 | <p>The student will</p> <p>Learning Target 1: Use mathematics and computational thinking to identify and solve different types of reaction stoichiometry problems (i.e., mass to moles, mass to mass, moles to moles, and percent yield) using significant figures (Clarification statement for elements c and d: Emphasis is on use of proportional relationships in the reactants and the products and on assessing students use of mathematical thinking and is not on memorization and rote application of problem-solving techniques)</p> <p>The student exhibits no major errors or omissions.</p> |
| 2.5 | No major errors or omissions regarding score 2.0 content and partial success at score 3.0 |
| 2.0 | <p>There are no major errors or omissions regarding the simpler details and processes.</p> <p>The student will recognize or recall specific vocabulary:</p> <p>Learning Target 1: stoichiometry, theoretical yield, predicted yield, percent yield, Avogadro's number, percent composition, percent by mass, empirical formula, molecular formula</p> <p>The student will perform basic processes:</p> <p>Learning Target 2: Determine the role of mole-mole ratios of selected compounds in balanced chemical equations</p> <p>Learning Target 3: Utilize the different conceptual approaches of dimensional analysis and charts to solve stoichiometry problems, including limiting/excess reactant problems</p> <p>Learning Target 4: Identify several reasons actual yield rarely equals theoretical yield</p> <p>However, the student exhibits major errors or omissions regarding the more complex ideas and processes.</p> |
| 1.5 | Partial success at score 2.0 content and major errors or omissions regarding score 3.0 content |
| 1.0 | With help, partial success at score 2.0 and score 3.0 |
| 0.5 | With help, partial success at score 2.0 content but not at score 3.0 content |
| 0.0 | Even with help, no success |

Chemistry GSE Learning Map

Prioritized Standard: SC4.a Obtain, evaluate, and communicate information about how to refine the design of a chemical system by applying engineering principles to manipulate the factors that affect a chemical reaction. Plan and carry out an investigation to provide evidence of the effects of changing concentration, temperature, and pressure on chemical reactions. (Clarification statement: Pressure should not be tested experimentally.) Chemistry

| Proficiency Scale | |
|-------------------|---|
| 4.0 | <p>In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught. For example, the student will:</p> <p><u>Learning Target 1:</u> In-depth inferences and applications that go beyond what was taught. The student will investigate Le Chatelier's principle and design an experiment to change the concentration of products at equilibrium</p> |
| 3.5 | In addition to score 3.0 performance, partial success at score 4.0 content |
| 3.0 | <p>The student will</p> <p><u>Learning Target 1:</u> Plan and carry out an investigation to provide evidence of the effects of changing concentration, temperature, and pressure on chemical reactions</p> <p>The student exhibits no major errors or omissions.</p> |
| 2.5 | No major errors or omissions regarding score 2.0 content and partial success at score 3.0 |
| 2.0 | <p>There are no major errors or omissions regarding the simpler details and processes.</p> <p>The student will recognize or recall specific vocabulary:</p> <p><u>Learning Target 1:</u> pressure, concentration, strength, collision rate, disorder, reaction rate</p> <p>The student will perform basic processes:</p> <p><u>Learning Target 2:</u> Describe how disorder and collisions contribute to the progress of a chemical reaction <u>Learning Target 3:</u> Recognize that increases in surface area promote the progress of a chemical reaction <u>Learning Target 4:</u> Understand that reaction rates depend upon multiple factors <u>Learning Target 5:</u> Explain the relationships between reaction rate and gas pressure, temperature, and concentration</p> <p>However, the student exhibits major errors or omissions regarding the more complex ideas and processes.</p> |
| 1.5 | Partial success at score 2.0 content and major errors or omissions regarding score 3.0 content |
| 1.0 | With help, partial success at score 2.0 and score 3.0 |
| 0.5 | With help, partial success at score 2.0 content but not at score 3.0 content |
| 0.0 | Even with help, no success |

Chemistry GSE Learning Map

Prioritized Standard: SC5.a Obtain, evaluate, and communicate information about the Kinetic Molecular Theory to model atomic and molecular motion in chemical and physical processes. Plan and carry out an investigation to calculate the amount of heat absorbed or released by chemical or physical processes. (Clarification statement: Calculation of the enthalpy, heat change, and Hess's Law are addressed in this element.) Chemistry

| Proficiency Scale | |
|-------------------|---|
| 4.0 | <p>In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught. For example, the student will:</p> <p>Learning Target 1: In-depth inferences and applications that go beyond what was taught. Design an experiment to use Hess's Law to determine the heat released by a reaction that is not able to be experimentally determined in the high school setting. For example, two reactions could be performed and enthalpy tables used to derive the heat of a third reaction in order to calculate the heat released from sparkler combustion</p> |
| 3.5 | In addition to score 3.0 performance, partial success at score 4.0 content |
| 3.0 | <p>The student will</p> <p>Learning Target 1: Plan and carry out an investigation to calculate the amount of heat absorbed or released by chemical or physical processes</p> <p>The student exhibits no major errors or omissions.</p> |
| 2.5 | No major errors or omissions regarding score 2.0 content and partial success at score 3.0 |
| 2.0 | <p>There are no major errors or omissions regarding the simpler details and processes.</p> <p>The student will recognize or recall specific vocabulary:</p> <p>Learning Target 1: exothermic, endothermic, specific heat, phase change, enthalpy of fusion, enthalpy of vaporization, freezing point, melting point, condensation, deposition, sublimation, melting, freezing, vaporization, calorimeter</p> <p>The student will perform basic processes:</p> <p>Learning Target 2: Contrast phase change and temperature change and correctly determine which affect potential or kinetic energy</p> <p>Learning Target 3: Use heat-related conversions (mass-mole, joule-kilojoule) in dimensional analysis</p> <p>Learning Target 4: Recognize that chemical reactions fulfill conservation of energy</p> <p>Learning Target 5: Determine if phase changes, temperature changes, or both phenomena will occur during the process</p> <p>Learning Target 6: Use a calorimeter to calculate energy change</p> <p>Learning Target 7: Utilize the three basic formulas ($q = m \times c \times \Delta T$, $q = \text{enthalpy of fusion} \times \text{mass}$, $q = \text{enthalpy of vaporization} \times \text{mass}$) for calculating release or absorption of heat</p> <p>However, the student exhibits major errors or omissions regarding the more complex ideas and processes.</p> |
| 1.5 | Partial success at score 2.0 content and major errors or omissions regarding score 3.0 content |
| 1.0 | With help, partial success at score 2.0 and score 3.0 |
| 0.5 | With help, partial success at score 2.0 content but not at score 3.0 content |
| 0.0 | Even with help, no success |

Chemistry GSE Learning Map

Prioritized Standard: SC5.b Obtain, evaluate, and communicate information about the Kinetic Molecular Theory to model atomic and molecular motion in chemical and physical processes. Construct an explanation using a heating curve as evidence of the effects of energy and intermolecular forces on phase changes. *Chemistry*

| Proficiency Scale | |
|-------------------|--|
| 4.0 | <p>In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught. For example, the student will:</p> <p><u>Learning Target 1:</u> In-depth inferences and applications that go beyond what was taught. Research the characteristics and applications of supercritical fluids</p> |
| 3.5 | In addition to score 3.0 performance, partial success at score 4.0 content |
| 3.0 | <p>The student will</p> <p><u>Learning Target 1:</u> Construct an explanation using a heating curve as evidence of the effects of energy and intermolecular forces on phase changes</p> <p>The student exhibits no major errors or omissions.</p> |
| 2.5 | No major errors or omissions regarding score 2.0 content and partial success at score 3.0 |
| 2.0 | <p>There are no major errors or omissions regarding the simpler details and processes.</p> <p>The student will perform basic processes:</p> <p><u>Learning Target 1:</u> Identify the units and location of the temperature and energy axes on the heating curve <u>Learning Target 2:</u> Understand the basis for the shape of each segment of the graph <u>Learning Target 3:</u> Relate strength of intermolecular forces to state of matter <u>Learning Target 4:</u> Explain how intermolecular forces change during a phase change</p> <p>However, the student exhibits major errors or omissions regarding the more complex ideas and processes.</p> |
| 1.5 | Partial success at score 2.0 content and major errors or omissions regarding score 3.0 content |
| 1.0 | With help, partial success at score 2.0 and score 3.0 |
| 0.5 | With help, partial success at score 2.0 content but not at score 3.0 content |
| 0.0 | Even with help, no success |

Chemistry GSE Learning Map

Prioritized Standard: SC5.c Obtain, evaluate, and communicate information about the Kinetic Molecular Theory to model atomic and molecular motion in chemical and physical processes. Develop and use models to quantitatively, conceptually, and graphically represent the relationships between pressure, volume, temperature, and number of moles. *Chemistry*

| Proficiency Scale | |
|-------------------|---|
| 4.0 | <p>In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught. For example, the student will:</p> <p><u>Learning Target 1:</u> In-depth inferences and applications that go beyond what was taught. Investigate the uses of a manometer in commercial settings</p> |
| 3.5 | In addition to score 3.0 performance, partial success at score 4.0 content |
| 3.0 | <p>The student will</p> <p><u>Learning Target 1:</u> Develop and use models to quantitatively, conceptually, and graphically represent the relationships between pressure, volume, temperature, and number of moles</p> <p>The student exhibits no major errors or omissions.</p> |
| 2.5 | No major errors or omissions regarding score 2.0 content and partial success at score 3.0 |
| 2.0 | <p>There are no major errors or omissions regarding the simpler details and processes.</p> <p>The student will recognize or recall specific vocabulary:</p> <p><u>Learning Target 1:</u> solids, liquids, gases, pressure, Kelvin temperature, manometer, barometer, ideal gas constant, molar volume, Kinetic Molecular theory</p> <p>The student will perform basic processes:</p> <p><u>Learning Target 2:</u> Apply the Kinetic Molecular Theory model to solids, liquids, and gases</p> <p><u>Learning Target 3:</u> Experimentally derive molar volume of a gas (e.g., by reacting magnesium with hydrochloric acid)</p> <p><u>Learning Target 4:</u> Utilize the following laws to explain gas behavior: Boyle's, Charles', Gay-Lussac's, Combined, Ideal, and Dalton's Law of Partial Pressure</p> <p>However, the student exhibits major errors or omissions regarding the more complex ideas and processes.</p> |
| 1.5 | Partial success at score 2.0 content and major errors or omissions regarding score 3.0 content |
| 1.0 | With help, partial success at score 2.0 and score 3.0 |
| 0.5 | With help, partial success at score 2.0 content but not at score 3.0 content |
| 0.0 | Even with help, no success |

Chemistry GSE Learning Map

Prioritized Standard: SC6.c Obtain, evaluate, and communicate information about the properties that describe solutions and the nature of acids and bases. Use mathematics and computational thinking to evaluate commercial products in terms of their concentrations (i.e., molarity and percent by mass). Chemistry

| Proficiency Scale | |
|-------------------|--|
| 4.0 | <p>In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught. For example, the student will:</p> <p>Learning Target 1: In-depth inferences and applications that go beyond what was taught. Apply the concept of molarity to prepare a dye-based dilution series and assess his/her work using spectrophotometry, correlating absorbance with concentration</p> |
| 3.5 | In addition to score 3.0 performance, partial success at score 4.0 content |
| 3.0 | <p>The student will</p> <p>Learning Target 1: Use mathematics and computational thinking to evaluate commercial products in terms of their concentrations (i.e., molarity and percent by mass)</p> <p>The student exhibits no major errors or omissions.</p> |
| 2.5 | No major errors or omissions regarding score 2.0 content and partial success at score 3.0 |
| 2.0 | <p>There are no major errors or omissions regarding the simpler details and processes.</p> <p>The student will recognize or recall specific vocabulary:</p> <p>Learning Target 1: molarity, moles</p> <p>The student will perform basic processes:</p> <p>Learning Target 2: Calculate molarity from mass, moles, and volume Learning Target 3: Calculate mass or moles of solute from molarity Learning Target 4: Use percent by mass (e.g., vinegar solution, ammonia, or Lysol toilet bowl cleaner) to calculate molarity Learning Target 5: Use molarity to calculate moles of solute in stock solutions of chemicals (e.g., acids)</p> <p>However, the student exhibits major errors or omissions regarding the more complex ideas and processes.</p> |
| 1.5 | Partial success at score 2.0 content and major errors or omissions regarding score 3.0 content |
| 1.0 | With help, partial success at score 2.0 and score 3.0 |
| 0.5 | With help, partial success at score 2.0 content but not at score 3.0 content |
| 0.0 | Even with help, no success |

Chemistry GSE Learning Map

Prioritized Standard: SC6.f Obtain, evaluate, and communicate information about the properties that describe solutions and the nature of acids and bases. Use mathematics and computational thinking to compare, contrast, and evaluate the nature of acids and bases in terms of percent dissociation, hydronium ion concentration, and pH. (Clarification statement: Understanding of the mathematical relationship between negative logarithm of the hydrogen concentration and pH is not expected in this element. Only a conceptual understanding of pH as related to acid/basic conditions is needed.) *Chemistry*

| | Proficiency Scale |
|-----|---|
| 4.0 | <p>In addition to score 3.0 performance, the student demonstrates in-depth inferences and applications that go beyond what was taught. For example, the student will:</p> <p>Learning Target 1: In-depth inferences and applications that go beyond what was taught. Identify and devise a solution to a case study of an acidic body of water, proposing and justifying an environmentally sound, effective, and economically feasible neutralization strategy</p> |
| 3.5 | In addition to score 3.0 performance, partial success at score 4.0 content |
| 3.0 | <p>The student will</p> <p>Learning Target 1: Use mathematics and computational thinking to compare, contrast, and evaluate the nature of acids and bases in terms of percent dissociation, hydronium ion concentration, and pH. (Clarification statement: Emphasize conceptual understanding of pH, not mathematical.)</p> <p>The student exhibits no major errors or omissions.</p> |
| 2.5 | No major errors or omissions regarding score 2.0 content and partial success at score 3.0 |
| 2.0 | <p>There are no major errors or omissions regarding the simpler details and processes.</p> <p>The student will recognize or recall specific vocabulary:</p> <p>Learning Target 1: dissociation, logarithm, hydronium ion, hydroxide ion, pH, pOH, strong, weak, concentrated, dilute, neutral, salt</p> <p>The student will perform basic processes:</p> <p>Learning Target 2: Calculate logarithms Learning Target 3: Complete a graphical organizer detailing the relationships between pH, pOH, hydronium ion concentration, and hydroxide ion concentration Learning Target 4: Understand that when hydronium ion concentration and hydroxide ion concentration are equal, pH is neutral Learning Target 5: Contrast dissociation with ionization Learning Target 6: Contrast strong/weak with concentrated/dilute Learning Target 7: Relate pH differences to powers of 10 and common household substances Learning Target 8: Relate molarity of acids and bases to pH Learning Target 9: Connect hydronium ion concentration to the acidity and basicity of a solution Learning Target 10: Know that the product of hydronium ion concentration and hydroxide ion concentration equates to $1 \times 10^{-14}M$</p> <p>However, the student exhibits major errors or omissions regarding the more complex ideas and processes.</p> |
| 1.5 | Partial success at score 2.0 content and major errors or omissions regarding score 3.0 content |
| 1.0 | With help, partial success at score 2.0 and score 3.0 |
| 0.5 | With help, partial success at score 2.0 content but not at score 3.0 content |
| 0.0 | Even with help, no success |