Portfolio Planning Worksheet: Chemistry

This resource is designed to support districts implementing portfolios as a student growth measure for one or more of their teacher categories. It focuses on portfolios for Chemistry but may be used as a template for any subject and/or grade level. Additionally, it is meant to be used in tandem with the *Portfolio Planning and Implementation Webinar*.

PART A: CURRICULAR CONTENT FOCUS

1. What are the most important skills I develop in students through this course?

   The most important skills that I developed in students through this course are the ability to conduct laboratory experiments, use of critical thinking, logical reasoning, and scientific method to understand atomic structure, analyze the properties of matter, and understand the characteristics of ionic, covalent, and metallic bonding forces.

2. How will I assess my students to understand where they are in respect to these skills upon entering and then leaving my class?

   Upon entering my class students should have some understanding of the scientific method and laboratory best practices. Most of the students will have little understanding of the chemical properties of matter, ionic and covalent bonds, and the periodic table of elements. An assessment will be given at the beginning of the year to ascertain student skill levels. Students will be evaluated using a rubric based on their assessment results.

3. Based on where my students are with these skills, where should they be at the end of the course if I provide effective instruction?
   If I provide effective instruction my students should be able to conduct laboratory experiments using safe, controlled, and ethical methods and practices, use the scientific method to answer testable questions about chemistry, and use critical thinking, and logical reasoning in order to make sound decisions inside and outside the classroom, know the characteristics of matter and analyze the properties of this matter, understand the historical development of the Periodic Table and its significance, understand the historical development of atomic theory and its implications on the world today, understand and

identify the characteristics of ionic, covalent, metallic bonding and the forces that hold the types of bonds together, and differentiate among acid-base reactions, precipitation reactions, and oxidation-reduction reactions;

PART B: TEKS SELECTION AND JUSTIFICATION

1. **List the TEKS** to include in student portfolios to measure their growth. Include those that persist throughout the course and have transferability – the knowledge and skills that lead to success in the current course that have lifelong application.

2. **Explain the importance of these TEKS**. How do these skills persist or transfer to other life experiences?

List of TEKS

TEKS	§112.43 Chemistry (One Credit), Adopted 2020
1(C) Chemistry	(C) use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards;
5(C) Chemistry	(C) analyze and interpret elemental data, including atomic radius, atomic mass, electronegativity, ionization energy, and reactivity to identify periodic trends.
8(A-D) Chemistry	(8) Science concepts. The student understands how matter is accounted for in chemical substances. The student is expected to: (A) define mole and apply the concept of molar mass to convert between moles and grams; (B) calculate the number of atoms or molecules in a sample of material using Avogadro's number; (C) calculate percent composition of compounds; and (D) differentiate between empirical and molecular formulas.

6(E) Chemistry	(E) construct models to express the arrangement of electrons in atoms of representative elements using electron configurations and Lewis dot structures.
7(D) Chemistry	(D) analyze the properties of ionic, covalent, and metallic substances in terms of intramolecular and intermolecular forces.
9(B) Chemistry	(B) differentiate among acid-base reactions, precipitation reactions, and oxidation-reduction reactions;

Explanation of the Importance of TEKS Used

High School Chemistry is specifically designed to offer insight into the fundamentals of chemistry and prepare students for college-level chemistry courses. The TEKS selected will not only provide the technical knowledge on acids-bases, interpreting elemental data, and an understanding of a matter and its relation to chemistry, atomic structure, and chemical bonds but also the required safety and laboratory skills required to conduct experiments.

PART C: TEKS BREAKDOWN & PLANNING FOR RUBRIC ASSIGNMENTS, PROJECTS, AND/OR PERFORMANCES

In column 1, list the TEKS again, and for each one, describe in your own words the actions students are asked to perform. In column 2, list what assignments, projects, and/or performances you will have students complete to demonstrate their skill level with these TEKS. Include examples of the artifacts or evidence that you will include in the portfolio to demonstrate the knowledge and skill.

EXAMPLE: §112.43 Chemistry (One Credit), Adopted 2020

TEKS BREAKDOWN

TEKS for Portfolio *What students need to be able to do demonstrate the knowledge and skill*	**Planned Projects, Assignments, and/or Performances** *What and how you will use as evidence*
1(C) use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards;	Student Project: Students will take an assessment on Chemical Hazards and proper use of Safety Data Sheets (SDS) at BOY before being able to conduct laboratory experiments. Students will submit SDS for every lab conducted. Evidence: Student assessment on Chemical Hazards and SDS submitted for each lab.

5(C) analyze and interpret elemental data, including atomic radius, atomic mass, electronegativity, ionization energy, and reactivity to identify periodic trends.	Student Project: Students will determine where the fictional metal "Mithril" would be placed on the periodic table based on its physical and chemical properties. What would Mithril's electron configuration be? Atomic structure? What would be its elemental symbol? Evidence: Student submitted analysis detailing electron configuration, Nuclear Symbol, Atomic Number, Mass Number, Number of Protons, and Neutrons. *Note students need to defend their argument using properties of matter that can be identified in the real world.
8(A-D) (8) Science concepts. The student understands how matter is accounted for in chemical substances. The student is expected to: (A) define mole and apply the concept of molar mass to convert between moles and grams; (B) calculate the number of atoms or molecules in a sample of material using Avogadro's number; (C) calculate percent composition of compounds;	Student Project: Determine the average amount of water needed for a kernel of corn to pop. Students will calculate the mass of water in popcorn, convert to moles, calculate the number of molecules, and determine the percent composition of water in popcorn. Evidence: Student submitted lab "Percentage of Water in Popcorn"
6(E) construct models to express the arrangement of electrons in atoms of representative elements using electron configurations and Lewis dot structures.	Student Project: Students will create a model for an assigned molecule. Evidence: Student submitted projects. Students' models must portray the relative atomic radii, valence electrons, and be constructed in a sturdy manner for display.
7(D) analyze the properties of ionic, covalent, and metallic substances in terms of intramolecular and intermolecular forces.	Student Project: Students will conduct a lab consisting of 4 different compounds and determine if they are held together by ionic or covalent bonds. Evidence: Student: Student submitted lab sheets with a hypothesis, SDS, observations, and conclusions.
9(B) differentiate among acid-base reactions, precipitation reactions, and oxidation-reduction reactions;	Student Project: Students will conduct a lab consisting of Performing reactions using various household substances and then writing out the equations, filling in the observation sheet, Safety Data Sheets(SDS), predicting the products, and identifying the type of reaction. Evidence: Student submitted lab sheets with a hypothesis, SDS, observations, and conclusions.

PART D: PORTFOLIO RUBRIC DESIGN AND SAMPLE RUBRIC

Rubric Design

Standard & Project	Significantly Limited Proficiency	Limited Proficiency	Partial Proficiency	Proficient	Advanced
Place your *standard* and *project* in this box.	**Detailed** description of **identifiable** performance characteristics reflecting a **beginning** level of performance	**Detailed** description of **identifiable** performance characteristics reflecting a **developing** level of performance	**Detailed** description of **identifiable** performance characteristics reflecting a **somewhat proficient** level of performance	**Detailed** description of **identifiable** performance characteristics reflecting a **proficient** level of performance	**Detailed** description of **identifiable** performance characteristics reflecting an **advanced** level of performance

Sample Hight School Chemistry Rubric

Standard & Project	Significantly Limited Proficiency	Limited Proficiency	Partial Proficiency	Proficient	Advanced
1(C) Student Project: Students will take an assessment on Chemical Hazards and proper use of Material Safety Data Sheets (SDS) at BOY before being able to conduct laboratory experiments. Students will submit SDS for every lab conducted.	Student did not pass assessment on lab safety during initial first 6-weeks grading period. And/or student did not submit SDS for 5 or more of the 15 labs conducted throughout the semester.	Student passed initial assessment during first 6-weeks period. Student submitted SDS for 6-12 of the 15 labs conducted throughout the school year. A majority of the SDS were missing details on: substances encountered, flammability, incompatible substances, storage procedures, spill clean-up procedures, safety	Student passed initial assessment during first 6-weeks period. Student submitted SDS for 12-15 of the 15 labs conducted throughout the school year. Half of the SDS were missing details on: substances encountered, flammability, incompatible substances, storage procedures, spill clean-up procedures, safety equipment used, and	Student passed initial assessment during first 6-weeks period. Student submitted SDS for 15 of the 15 labs conducted throughout the school year. Two or three of the SDS were missing details on: substances encountered, flammability, incompatible substances, storage procedures, spill clean-up procedures, safety	Student passed initial assessment during first 6-weeks period. Student submitted SDS for 15 of the 15 labs conducted throughout the school year. none of the SDS were missing details on: substances encountered, flammability, incompatible substances, storage procedures, spill clean-up procedures, safety equipment used, and special precautions taken).

Standard & Project	Significantly Limited Proficiency	Limited Proficiency	Partial Proficiency	Proficient	Advanced
		equipment used, and special precautions taken).	special precautions taken).	equipment used, and special precautions taken).	
5(C) Student Project: Students will determine where the fictional metal "Mithril" would be placed on the periodic table based on its physical and chemical properties. What would Mithril's electron configuration be? Atomic structure? What would be its elemental symbol?	Student submitted analysis did not make a coherent argument and is missing details on 2 or more of the following: electron configuration, Nuclear Symbol, Atomic Number, Mass Number, Number of Protons, and Neutrons.	Student submitted analysis did not make a coherent argument and is missing details on 1 of the following: electron configuration, Nuclear Symbol, Atomic Number, Mass Number, Number of Protons, and Neutrons.	Student submitted analysis made a coherent argument and provides adequate details on all the following: electron configuration, Nuclear Symbol, Atomic Number, Mass Number, Number of Protons, and Neutrons.	Student submitted analysis made a coherent argument and provides an exceptional level of detail on all of the following: electron configuration, Nuclear Symbol, Atomic Number, Mass Number, Number of Protons, and Neutrons.	Student submitted analysis made a coherent argument and provides an exceptional level of detail, including illustrations/graphs/charts to support their thesis on all the following: electron configuration, Nuclear Symbol, Atomic Number, Mass Number, Number of Protons, and Neutrons.
8(A-D) Student Project: Lab; Determine the percentage of water needed for a kernel of corn to meet maximum popping expansion. Students will use molar conversion, Avogadro's number to determine the number of molecules and	Student did not use molar conversion or Avogadro's number to determine the number of molecules and composition of the compound. Student submitted lab was missing 2 or more of the following: SDS, Hypothesis,	Student incorrectly used molar conversion or Avogadro's number to determine the number of molecules and composition of the compound. Student submitted lab was missing 1 of the following: SDS, Hypothesis,	Student correctly used molar conversion or Avogadro's number to determine the number of molecules and composition of the compound. Student submitted lab included all the following: SDS, Hypothesis, Observations, and Conclusions.	Student correctly used molar conversion or Avogadro's number to determine the number of molecules and composition of the compound. Student submitted lab included a significant level of detail for all the following: SDS, Hypothesis,	Student correctly used molar conversion or Avogadro's number to determine the number of molecules and composition of the compound. Student submitted lab included a significant level of detail for all the following: SDS, Hypothesis, Observations, and Conclusions. Student

Standard & Project	Significantly Limited Proficiency	Limited Proficiency	Partial Proficiency	Proficient	Advanced
calculate the composition of the compound.	Observations, and Conclusions.	Observations, and Conclusions.		Observations, and Conclusions.	conducted the lab more than once to confirm their observations.
6(E) Student Project: Students will make a model on an assigned molecule.	Model displayed 2 or fewer of the following: formula, bond angles, and relative atomic radii, and constructed in a sturdy manner for display.	Model displayed 2 or fewer of the following: formula, bond angles, and relative atomic radii, and constructed in a sturdy manner for display.	Model displayed all the following: formula, bond angles, and relative atomic radii, and constructed in a sturdy manner for display.	Model displayed all the following: formula, bond angles, relative atomic radii, and molecular polarity, and constructed in a sturdy manner for display.	Model displayed all the following: formula, bond angles, relative atomic radii, molecular polarity, and electronegativity calculations and constructed in a sturdy manner for display.
7(D) Student Project: Students will conduct a lab consisting of 4 different compounds and determine if they are held together by ionic or covalent bonds.	Student is unable to identify if a compound has Ionic or Covalent bonds. Student did not create a table to record their observations and/or did not follow experiment procedures. Student submitted lab was missing 2 or more of the following: SDS, Hypothesis, Observations, and Conclusions.	Student is able to identify if a compound has Ionic or Covalent bonds. Student did not create a table to record their observations and/or did not follow experiment procedures. Student submitted lab was missing 1 of the following: SDS, Hypothesis, Observations, and Conclusions.	Student is able to identify if a compound has Ionic or Covalent bonds. Student created a table to record their observations and followed experiment procedures. Student submitted lab consisted of the following: SDS, Hypothesis, Observations, and Conclusions.	Student is able to identify if a compound has Ionic or Covalent bonds. Student created a table to record their observations and followed experiment procedures. Student submitted lab included a significant level of detail for all the following: SDS, Hypothesis, Observations, and Conclusions.	Student is able to identify if a compound has Ionic or Covalent bonds. Student created a table to record their observations and followed experiment procedures. Student submitted lab included a significant level of detail for all of the following: SDS, Hypothesis, Observations, and Conclusions. Student conducted the lab more than once to confirm their observations.

Standard & Project	Significantly Limited Proficiency	Limited Proficiency	Partial Proficiency	Proficient	Advanced
9(B) Student Project: Students will conduct a lab consisting of Performing reactions using various household substances and then writing out the equations, filling in the observation sheet, Safety Data Sheets(SDS), predicting the products, and identifying the type of reaction.	Student did not complete 2 or more of the following in their procedure: writing out equations, identifying the type of reaction and/or Student submitted lab was missing 2 or more of the following: SDS, Hypothesis, Observations, and Conclusions.	Student did not complete 1 of the following in their procedure: writing out equations, identifying the type of reaction and/or Student submitted lab was missing 1 of the following: SDS, Hypothesis, Observations, and Conclusions.	Student completed all the following procedure: writing out equations, identifying the type of reaction and/or Student submitted lab was missing 1 of the following: SDS, Hypothesis, Observations, and Conclusions.	Student completed all the following procedures: writing out equations, identifying the type of reaction and/or Student submitted lab was missing 1 of the following: SDS, Hypothesis, Observations, and Conclusions. Student-submitted lab includes a significant level of detail around chemical reactions observed.	Student completed all the following procedures: writing out equations, identifying the type of reaction and/or Student submitted lab was missing 1 of the following: SDS, Hypothesis, Observations, and Conclusions. Student-submitted lab includes a significant level of detail around chemical reactions observed. Student conducted lab more than once to confirm results.