Honors Chemistry - Unit 1 - The Structure of Chemistry

Unit Focus

Students will begin their study of honors chemistry by describing matter on the macroscopic scale. Students will perform laboratory investigations and observe demonstrations of chemical phenomena in order to describe matter both qualitatively and quantitatively. Students will classify matter, describe chemical and physical properties of matter, and learn how to make precise measurements. Students will solve problems using dimensional analysis, a problem-solving method that will be used throughout the year. Students will apply proper laboratory skills as they perform laboratory investigations involving separation techniques and the use of a calibration curve to predict the sugar content of beverages.

Stage 1: Desired Results - Key Understandings

Standard(s)

Next Generation Science
High School Physical Sciences: 9 - 12

- Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. *HS-PS1-7*

Next Generation Science Standards (DCI)
Science: 11

- The fact that atoms are conserved, together with knowledge of the chemical properties of the elements involved, can be used to describe and predict chemical reactions. *PS1.9.B3*

NGSS/NSTA Science & Engineering Practices
NGSS Science & Engineering Practices: 9-12

- Apply ratios, rates, percentages, and unit conversions in the context of complicated measurement problems involving quantities with derived or compound units (such as mg/mL, kg/m3, acre-feet, etc.). *SE.9-12.5.6*
- Make a quantitative and/or qualitative claim regarding the relationship between dependent and independent variables. *SE.9-12.6.1*

Transfer

T1 Analyze qualitative and quantitative data to interpret patterns, draw conclusions, and/or make predictions.
T2 Make precise measurements.

Meaning

Understanding(s)	Essential Question(s)
U1 A physical change does not change the identity of a substance, but a chemical change does change the identity of a substance. **U2** Compounds are composed of elements bonded together and their structure can only be changed through chemical means. **U3** Mixtures may be separated based on the physical property differences of the components of the mixture. **U4** Scientific numeracy includes the ability to use universal mathematical operations and procedures to calculate, analyze and present scientific data and ideas.	**Q1** What changes have occurred here based on my observations? What conclusions can I draw about the nature of that change? **Q2** What is the composition of this sample? How can the composition be determined? **Q3** How does a scientist communicate the degree of uncertainty in a measured or calculated value? **Q4** How can multiple units be used to express the same quantity, and how can proportional relationships be used to understand how quantities are related?

Acquisition of Knowledge and Skill

Knowledge	Skill(s)
K1 Macroscopic vs. microscopic domain **K2** How to separate mixtures **K3** Pure substances have definite proportions **K4** Compounds can only be broken down chemically **K5** Indicators of chemical reaction	**S1** Differentiate between compounds and elements (pure) and mixtures **S2** Identify chemical and physical changes and properties **S3** Apply both precision and accuracy in recording experimental data.

Stage 1: Desired Results - Key Understandings		
Madison Public Schools Profile of a Graduate *Critical Thinking* • Analyzing: Examining information/data/evidence from multiple sources to identify possible underlying assumptions, patterns, and relationships in order to make inferences. (POG.1.2) *Collaboration/Communication* • Collective Intelligence: Working respectfully and responsibly with others, exchanging and evaluating ideas to achieve a common objective. (POG.3.1)	**K6** Significant figures in a measurement include all known digits plus one estimated digit. **K7** Significant figures rules govern how to round off an answer to a calculation. **K8** Density is the ratio of mass to volume for a given substance. **K9** Vocabulary: heterogeneous, homogeneous, pure substance, element, compound, mixture, solution, endothermic, exothermic.	**S4** Use significant figures in measurements and calculations. **S5** Solve problems using dimensional analysis.