Chemistry - Unit 1 - Classification and Properties of Matter

Unit Focus

Students are introduced to Chemistry through the study and classification of matter and its properties at the macroscopic level. Students will deepen their understanding of the changes matter undergoes by performing laboratory investigations and observation of chemical phenomena which will allow the students to distinguish between chemical and physical changes. Students will also become familiar with the language of the course and the elements of the Periodic Table, which are the fundamental building blocks of all matter. Since all chemical changes involve energy, students are introduced to the concept that there is a single quantity called energy. Students will further investigate and learn through laboratory investigation that a system's total energy is conserved, and within the system, energy is continually transferred from one object to another and between its various possible forms.

Stage 1: Desired Results - Key Understandings

Standard(s)

Next Generation Science
High School Physical Sciences: 9 - 12

- Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known. *HS-PS3-1*

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*
- Energy is a quantitative property of a system that depends on the motion and interactions of matter and radiation within that system. That there is a single quantity called energy is due to the fact that a system's total energy is conserved, even as, within the system, energy is continually transferred from one object to another and between its various possible forms. *PS3.9.A2*

Madison Public Schools Profile of a Graduate
Analyzing: Examining information/data/evidence from multiple sources to identify possible underlying assumptions, patterns, and relationships in order to make inferences. (POG.1.2)

Transfer

Students will be able to independently use their learning to...
T1 Analyze qualitative and quantitative data to interpret patterns, draw conclusions, and/or make predictions.
T2 Use the scientific process to generate evidence that addresses the original questions.

Meaning

Understanding(s)	Essential Question(s)
Students will understand that... **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.	*Students will keep considering...* **Q1** When an object changes, can it be changed back? **Q2** How can you demonstrate that atoms are conserved during a chemical reaction? **Q3** How can I quantify the heat change in a given scenario?

Acquisition of Knowledge and Skill

Knowledge	Skill(s)
Students will know... **K1** Macroscopic vs. microscopic domain **K2** How to separate mixtures **K3** Pure substances have definite proportions	*Students will be skilled at...* **S1** Differentiate between compounds and elements (pure) and mixtures

Stage 1: Desired Results - Key Understandings		
Collective Intelligence: Working respectfully and responsibly with others, exchanging and evaluating ideas to achieve a common objective. (POG.3.1)	**K4** Compounds can only be broken down chemically **K5** Indicators of chemical reaction **K6** Chemical and physical changes can absorb or release heat energy.	**S2** Identify chemical and physical changes and properties **S3** Calculate the change in energy, temperature, or other relevant variables for a physical change using calorimetry data.