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**Coal City Unit District #1**  
**Chemistry**  
**Science Curriculum**

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**SC.C:1      Students will be able to science and engineering practices to study chemistry. (NGSS SEPs)**

- SC.C:1-1      Ask questions that are able to be investigated to better understand phenomena.
- SC.C:1-2      Define criteria and constraints for a successful solution to a problem.
- SC.C:1-3      Develop models/illustrations to show explanations for non-observable phenomena.
- SC.C:1-4      Analyze a system using a model to make predictions or improvements.
- SC.C:1-5      Analyzing data to identify the significant features and patterns in the data.
- SC.C:1-6      Explain a phenomena using scientific theories and laws, a model, experimental evidence, and/or real world examples.
- SC.C:1-7      Design solutions to a problem that fits the criteria and constraints for success.
- SC.C:1-8      Defend an explanation of a phenomena using collected data, research, and collaboration.
- SC.C:1-9      Obtain relevant information from credible sources.
- SC.C:1-10     Evaluate the scientific validity and credibility of information obtained.
- SC.C:1-11     Effectively communicate scientific information.(Could include lab reports, debates, essays, verbal communication, etc.)

**SC.C:2      Students will be able to use the periodic table to make predictions about the structure and properties of atoms. (HS.PS1-1) (PS1.A) Model Models Patterns**

- SC.C:2-1      Select the relevant information from the periodic table to determine an atom's atomic number and atomic mass. (PS1.A)
- SC.C:2-2      Identify the quantities of subatomic particles within a given atom. (PS1.A)
- SC.C:2-3      Identify an element using its emission spectrum. (PS4.B)
- SC.C:2-4      Develop a model of the periodic table using data about elements. (PS1.A)
- SC.C:2-5      Interpret patterns within the periodic table. (PS1.A)
- SC.C:2-6      Contrast ionic and covalent bonds. (PS1.A)
- SC.C:2-7      Evaluate whether a bond is ionic or covalent using the periodic table. (PS1.A)

**SC.C:3**      **Students will be able to explain the function of a material based on its molecular structure using provided or experimental data. (HS.PS2-6\*) (PS1.A) Lab Report, Engineering Report Plan and Carry Out, Obtain Evaluate and Communicate Information Patterns, Structure and Function**

- SC.C:3-1      Contrast the structural differences between simple ionic compounds, simple molecular compounds, and extended structures. (PS1.A)
- SC.C:3-2      Classify properties as extensive or intensive. (PS1.A)
- SC.C:3-3      Explain how atomic and molecular structures lead to the physical properties of a substance. (PS1.A)
- SC.C:3-4      Plan and conduct an experiment to study the properties of bulk scale materials. [Properties can include, but are not limited to melting point, boiling point, surface tension, hardness, and conductivity.] (HS.PS1-3)
- SC.C:3-5      Infer the relationship between bulk scale properties and forces between particles. (HS.PS1-3)
- SC.C:3-6      Justify the choice of material(s) used in a situation based on the structure and function of that material. (HS.PS2-6\*)

**SC.C:4**      **Students will be able to predict the outcome of a chemical reaction based on conservation of mass, bond properties, and periodic trends. (HS.PS1-2) (PS1.B) CER, Math Constructing Explanations, Math Patterns, Energy & Matter**

- SC.C:4-1      Differentiate between physical and chemical properties and changes. (PS1.B)
- SC.C:4-2      Classify reactions by type. (PS1.B)
- SC.C:4-3      Predict the reactants or products of a chemical reaction using the patterns of reaction types. (PS1.B)
- SC.C:4-4      Illustrate the conservation of atoms at the molecular level. (PS1.B)
- SC.C:4-5      Illustrate the conservation of mass at the macroscopic level. (PS1.B)
- SC.C:4-6      Analyze a chemical reaction to balance the reactants and products. (PS1.B)
- SC.C:4-7      Calculate moles, mass, and particles using stoichiometry. (HS.PS1-7)
- SC.C:4-8      Calculate percent yield using stoichiometry and collected data. (PS1.B)

**SC.C:5**      **Students will be able to analyze chemical systems using conservation of energy and the second law of thermodynamics. (PS1.B, PS3.A, PS3.B, PS3.D) Model, Math, Lab Report, Engineering Report Models, Math, Plan & Carry Out, Designing Solutions Energy & Matter, Systems, Systems, Energy & Matter**

- SC.C:5-1      Analyze data or observations to determine if a chemical reaction is endothermic or exothermic. (PS1.B)
- SC.C:5-2      Illustrate the macroscopic energy changes in a chemical reaction system. (PS3.B)
- SC.C:5-3      Illustrate the energy changes as bonds change in a chemical reaction. (HS.PS1-4)
- SC.C:5-4      Apply the conservation of energy to endothermic and exothermic reactions. (PS3.B)
- SC.C:5-5      Explain why systems naturally become more stable if no energy is added. (PS3.B)
- SC.C:5-6      Calculate unknowns using the specific heat equation. (HS.PS3-1)
- SC.C:5-7      Plan and conduct an experiment to determine an unknown substance from its specific heat. (HS.PS3-4)
- SC.C:5-8      Recognize that potential energy can be stored in and released from chemical bonds. (PS3.A)
- SC.C:5-9      Justify the benefits of food and fuel because of their ability to store and release chemical energy. (PS3.D)
- SC.C:5-10     Relate chemical energy and chemical reactions to life and earth sciences. (PS3.D)
- SC.C:5-11     Design a device to convert chemical energy to perform a task. (HS.PS3-3\*)
- SC.C:5-12     Refine a device to convert chemical energy to perform a task. (HS.PS3-3\*)

**SC.C:6**      **Students will be able to explain the effects that changes in temperature and concentration have on reaction rates of chemical reactions. (HS.PS1-5) (PS1.B) CER, Engineering Report Constructing Explanations, Constructing Explanations Patterns, Stability and Change**

- SC.C:6-1      Analyze data to determine qualitative reaction rates. (PS1.B)
- SC.C:6-2      Illustrate reaction rates with changes in thermal energy (temperature) at the microscopic scale. (PS1.B).
- SC.C:6-3      Illustrate reaction rates with changes in concentration at the microscopic scale. (PS1.B)
- SC.C:6-4      Explain the concept of an equilibrium reaction. (PS1.B)
- SC.C:6-5      Illustrate the forward and reverse reactions of an equilibrium system. (PS1.B)
- SC.C:6-6      Apply Le Châtelier's principle to make predictions about changes in an equilibrium system. (PS1.B)
- SC.C:6-7      Refine an equilibrium system to produce additional product. (HS.PS1-6\*)