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

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

**SC.HC: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)**

- SC.HC:2-1 Select the relevant information from the periodic table to determine an atom's atomic number and atomic mass. (PS1.A)
- SC.HC:2-2 Identify the quantities of subatomic particles within a given atom. (PS1.A)
- SC.HC:2-3 Identify an element using its emission spectrum. (PS4.B)
- SC.HC:2-4 Develop a model of the periodic table using data about elements. (PS1.A)
- SC.HC:2-5 Interpret patterns within the periodic table. (PS1.A)
- SC.HC:2-6 Contrast ionic and covalent bonds. (PS1.A)
- SC.HC:2-7 Evaluate whether a bond is ionic or covalent using the periodic table. (PS1.A)
- SC.HC:2-8 Evaluate if a covalent bond will be polar or nonpolar.
- SC.HC:2-9 Generate various types of electron structure diagrams like electron configuration, orbital diagrams, and lewis dot structures.
- SC.HC:2-10 Explain loopholes in the periodic table trends using electron structures.
- SC.HC:2-11 Predict the number of bonds an atom will make using a lewis dot structure.

**SC.HC: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)**

- SC.HC:3-1 Contrast the structural differences between simple ionic compounds, simple molecular compounds, and extended structures. (PS1.A)
- SC.HC:3-2 Classify properties as extensive or intensive. (PS1.A)
- SC.HC:3-3 Explain how atomic and molecular structures lead to the physical properties of a substance. (PS1.A)
- SC.HC: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.HC:3-5 Infer the relationship between bulk scale properties and forces between particles. (HS.PS1-3)
- SC.HC: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.HC: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)**

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

**SC.HC: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)**

- SC.HC:5-1 Analyze data or observations to determine if a chemical reaction is endothermic or exothermic. (PS1.B)
- SC.HC:5-2 Illustrate the macroscopic energy changes in a chemical reaction system. (PS3.B)
- SC.HC:5-3 Illustrate the energy changes as bonds change in a chemical reaction. (HS.PS1-4)
- SC.HC:5-4 Apply the conservation of energy to endothermic and exothermic reactions. (PS3.B)
- SC.HC:5-5 Explain why systems naturally become more stable if no energy is added. (PS3.B)
- SC.HC:5-6 Calculate unknowns using the specific heat equation. (HS.PS3-1)
- SC.HC:5-7 Analyze the energy in a system using heat of fusion and heat of vaporization.
- SC.HC:5-8 Predict if a reaction will be exothermic or endothermic based off of the total bond energy for broken and formed bonds.
- SC.HC:5-9 Plan and conduct an experiment to determine an unknown substance from its specific heat. (HS.PS3-4)
- SC.HC:5-10 Recognize that potential energy can be stored in and released from chemical bonds. (PS3.A)
- SC.HC:5-11 Justify the benefits of food and fuel because of their ability to store and release chemical energy. (PS3.D)
- SC.HC:5-12 Relate chemical energy and chemical reactions to life and earth sciences. (PS3.D)
- SC.HC:5-13 Design a device to convert chemical energy to perform a task. (HS.PS3-3\*)
- SC.HC:5-14 Refine a device to convert chemical energy to perform a task. (HS.PS3-3\*)

**SC.HC: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)**

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