

**Colorado High School Science
Science Contents Standards Mapping**

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PHYSICAL SCIENCE	Boardworks High School Chemistry Presentations
Observe, explain, and predict natural phenomena governed by Newton's laws of motion, acknowledging the limitations of their application to very small or very fast objects	
1. Newton's laws of motion and gravitation describe the relationships among forces acting on and between objects, their masses, and changes in their motion – but have limitations	
a. Gather, analyze and interpret data and create graphs regarding position, velocity and acceleration of moving objects	*
b. Develop, communicate and justify an evidence-based analysis of the forces acting on an object and the resultant acceleration produced by a net force	*
c. Develop, communicate and justify an evidence-based scientific prediction regarding the effects of the action/reaction force pairs on the motion of two interacting objects	*
d. Examine the effect of changing masses and distance when applying Newton's law of universal gravitation to a system of two bodies	*
e. Identify the limitations of Newton's laws in extreme situations	*
Apply an understanding of atomic and molecular structure to explain the properties of matter, and predict outcomes of chemical and nuclear reactions	
2. Apply an understanding of atomic and molecular structure to explain the properties of matter, and predict outcomes of chemical and nuclear reactions	
a. Develop, communicate, and justify an evidence-based scientific explanation supporting the current model of an atom	Atomic Structure Introducing Atoms
b. Gather, analyze and interpret data on chemical and physical properties of elements such as density, melting point, boiling point, and conductivity	–
c. Use characteristic physical and chemical properties to develop predictions and supporting claims about elements' positions on the periodic table	Patterns of Behavior Electron Structure and the Periodic Table The Periodic Table
d. Develop a model that differentiates atoms and molecules, elements and compounds, and pure substances and mixtures	Compounds
3. Matter can change form through chemical or nuclear reactions abiding by the laws of conservation of mass and energy	

a. Recognize, analyze, interpret, and balance chemical equations (synthesis, decomposition, combustion, and replacement) or nuclear equations (fusion and fission)	Combustion Extracting Aluminium Neutralization Nuclear Fission Nuclear Fusion Thermal Decomposition Reacting Masses Redox Reactions
b. Predict reactants and products for different types of chemical and nuclear reactions	Combustion Extracting Aluminium Neutralization Nuclear Fission Nuclear Fusion Thermal Decomposition Reacting Masses Redox Reactions
c. Predict and calculate the amount of products produced in a chemical reaction based on the amount of reactants	Conservation of Mass
d. Examine, evaluate, question, and ethically use information from a variety of sources and media to investigate the conservation of mass and energy	Conservation of Mass
4. Atoms bond in different ways to form molecules and compounds that have definite properties	
a. Develop, communicate, and justify an evidence-based scientific explanation supporting the current models of chemical bonding	Covalent Bonding Ionic Bonding Comparing Bonding Metallic Bonding Why do atoms form bonds?
b. Gather, analyze, and interpret data on chemical and physical properties of different compounds such as density, melting point, boiling point, pH, and conductivity	Ionic Compounds Giant Covalent Compounds Metallic Bonding pH and Indicators
c. Use characteristic physical and chemical properties to develop predictions and supporting claims about compounds' classification as ionic, polar or covalent	Electronegativity

	Bonds and Activation Energy Covalent Bonding Electron Configuration Ionic Bonding Comparing Bonding Metallic Bonding Why do atoms form bonds?
d. Describe the role electrons play in atomic bonding	
e. Predict the type of bonding that will occur among elements based on their position in the periodic table	Patterns of Behavior Why do atoms form bonds?
Apply an understanding that energy exists in various forms, and its transformation and conservation occur in processes that are predictable and measurable	
5. Energy exists in many forms such as mechanical, chemical, electrical, radiant, thermal, and nuclear, that can be quantified and experimentally determined	
a. Develop, communicate, and justify an evidence-based scientific explanation regarding the potential and kinetic nature of mechanical energy	*
b. Use appropriate measurements, equations and graphs to gather, analyze, and interpret data on the quantity of energy in a system or an object	Enthalpy Change
c. Use direct and indirect evidence to develop predictions of the types of energy associated with objects	*
d. Identify different energy forms, and calculate their amounts by measuring their defining characteristics	*
6. When energy changes form, it is neither created nor destroyed; however, because some is necessarily lost as heat, the amount of energy available to do work decreases	
a. Use direct and indirect evidence to develop and support claims about the conservation of energy in a variety of systems, including transformations to heat	*
b. Evaluate the energy conversion efficiency of a variety of energy transformations	*
c. Describe energy transformations both quantitatively and qualitatively	*
d. Differentiate among the characteristics of mechanical and electromagnetic waves that determine their energy	*
e. Examine, evaluate, question, and ethically use information from a variety of sources and media to investigate energy conservation and loss	*

* See Boardworks High School Physics for relevant presentations.