



## Forensic Science Standards and Benchmarks

### Standard 1: Understands and applies principles of scientific inquiry (con't)

*Power Benchmarks: Identifies questions and concepts that guide science investigations  
 Uses technology and mathematics to improve investigations and communications  
 Formulates and revises scientific explanations and models using logic and evidence  
 Recognizes and analyzes alternative explanations and models*

Course Level Benchmarks	Vocabulary	Knowledge	Skills	Classroom Resources
D. Demonstrates safe handling procedures	<ul style="list-style-type: none"> <li>• OSHA</li> <li>• EPA</li> <li>• MSDS</li> <li>• Right to Know</li> <li>• hazardous</li> <li>• safety procedures</li> </ul>	<ul style="list-style-type: none"> <li>• Knows appropriate safety procedures for a given situation</li> <li>• Knows where safety devices are located in the classroom</li> <li>• Understands the process of waste disposal</li> </ul>	<ul style="list-style-type: none"> <li>• Follows required safety procedures</li> <li>• Recognizes, reports, and corrects safety problems</li> <li>• Follows waste disposal procedures</li> </ul>	

## Forensic Science Standards and Benchmarks

<b>Standard 2: Understands and applies principles of physical science</b>				
<i>Power Benchmark: Understands and applies knowledge of the structure and properties of matter</i>				
<b>Course Level Benchmarks</b>	<b>Vocabulary</b>	<b>Knowledge</b>	<b>Skills</b>	<b>Classroom Resources</b>
A. Shows how periodicity of the elements relates to atomic structure	<ul style="list-style-type: none"> <li>• atom</li> <li>• atomic theory</li> <li>• electron</li> <li>• proton</li> <li>• neutron</li> <li>• nucleus</li> <li>• atomic number</li> <li>• isotope</li> <li>• isotopic symbols</li> <li>• hyphen name</li> <li>• mass number</li> <li>• atomic mass</li> <li>• periodic table</li> <li>• periodicity</li> <li>• main group elements</li> <li>• transition elements</li> <li>• group</li> <li>• period</li> <li>• ground state</li> <li>• excited state</li> <li>• line-emission spectrum</li> <li>• absorption</li> <li>• emission</li> <li>• orbital notation</li> </ul>	<ul style="list-style-type: none"> <li>• Knows the structure of the atom</li> <li>• Understands matter behaves in predictable and understandable ways</li> <li>• Understands the arrangement of the elements of the elements on the periodic table</li> <li>• Understands the structure of matter</li> <li>• Knows how the energy associated with individual atoms and molecules can be used to identify the substances they comprise</li> </ul>	<ul style="list-style-type: none"> <li>• Relates the position of elements in the periodic table to their atomic number and atomic mass (AP CHEM)</li> <li>• Recognizes metals, semimetals, and nonmetals by their position on the periodic table</li> <li>• Describes and interprets trends in properties of elements (AP CHEM)</li> <li>• Determines the number of electrons atoms have available for bonding</li> <li>• Relates the position of an element in the periodic table to its electron configuration</li> <li>• Evaluates the Bohr model of the atom, its significance and its contribution to the current model</li> <li>• Relates spectral lines to the transitions of electrons between energy levels</li> </ul>	Chemistry Curriculum Guide

## Forensic Science Standards and Benchmarks

### Standard 2: Understands and applies principles of physical science (con't)

*Power Benchmark: Understands and applies knowledge of the structure and properties of matter  
Understands and applies knowledge of chemical reactions*

Course Level Benchmarks	Vocabulary	Knowledge	Skills	Classroom Resources
B. Recognizes patterns in the properties of matter 1. <b>Forming Bonds</b>	<b>Forming Bonds</b> <ul style="list-style-type: none"> <li>• covalent bonding</li> <li>• ionic bonding</li> <li>• nonpolar-covalent bond</li> <li>• polar</li> <li>• polar-covalent bond</li> <li>• molecule</li> <li>• molecular compound</li> <li>• chemical formula</li> <li>• diatomic molecules</li> <li>• ionic compound</li> <li>• formula unit</li> <li>• metallic bonding</li> <li>• malleability</li> <li>• ductility</li> <li>• octet rule</li> <li>• electron-dot notation</li> <li>• shared pair</li> <li>• unshared pair</li> <li>• lone pair</li> <li>• Lewis structures</li> <li>• structural formula</li> <li>• single bond</li> <li>• double bond</li> <li>• triple bond</li> <li>• multiple bonds</li> <li>• ion</li> </ul>	<b>Forming Bonds</b> <ul style="list-style-type: none"> <li>• Knows atoms are made up of a positive nucleus surrounded by negative electrons</li> <li>• Knows an atom's electron configuration determines how the atom can interact with other atoms</li> <li>• Knows atoms form bonds to other atoms by transferring or sharing electrons</li> </ul>	<b>Forming Bonds</b> <ul style="list-style-type: none"> <li>• Categorizes bonds by type</li> <li>• Generates Lewis dot structures for various chemicals</li> <li>• Predicts the geometry of simple molecules (AP CHEM)</li> <li>• Explains why most atoms form chemical bonds (AP CHEM)</li> <li>• Illustrates ionic, covalent, and metallic bonding</li> <li>• Relates electronegativity and ionization energy to bond formation and bond polarity (AP CHEM)</li> <li>• Correlates the type of bond with the physical properties of the substance (AP CHEM)</li> </ul>	Chemistry Curriculum Guide

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<b>Standard 2: Understands and applies principles of physical science (con't)</b>				
<i>Power Benchmark: Understands and applies knowledge of the structure and properties of matter Understands and applies knowledge of chemical reactions</i>				
<b>Course Level Benchmarks</b>	<b>Vocabulary</b>	<b>Knowledge</b>	<b>Skills</b>	<b>Classroom Resources</b>
B. Recognizes patterns in the properties of matter (con't) 2. <b>Chemical Naming</b>	<b>Chemical Naming</b> <ul style="list-style-type: none"> <li>• subscript</li> <li>• nomenclature</li> <li>• numerical prefixes</li> <li>• coefficient</li> </ul>	<b>Chemical Naming</b> <ul style="list-style-type: none"> <li>• Knows symbolic statements can be combined to look for values of variables</li> </ul>	<b>Chemical Naming</b> <ul style="list-style-type: none"> <li>• Determines the formula or name of an ionic compound when given either</li> <li>• Determines the formula or name of a molecular compound when given either</li> </ul>	Chemistry Curriculum Guide

## Forensic Science Standards and Benchmarks

### Standard 2: Understands and applies principles of physical science (con't)

*Power Benchmark: Understands and applies knowledge of chemical reactions*

*Understands and applies knowledge of conservation of energy and increase in disorder*

Course Level Benchmarks	Vocabulary	Knowledge	Skills	Classroom Resources
<p>C. Verifies evidence that the conservation of atoms in chemical reactions leads to the principle of conservation of matter</p> <p>1. <b>Chemical Equations and Reaction Types</b></p>	<p><b>Chemical Equations and Reaction Types</b></p> <ul style="list-style-type: none"> <li>• chemical equation</li> <li>• precipitate</li> <li>• reversible reaction</li> <li>• word equation</li> <li>• combustion reaction</li> <li>• composition reaction</li> <li>• decomposition reaction</li> <li>• displacement reaction</li> <li>• double-replacement reaction</li> <li>• electrolysis</li> <li>• single-replacement reaction</li> <li>• synthesis reaction</li> <li>• activity series</li> </ul>	<p><b>Chemical Equations and Reaction Types</b></p> <ul style="list-style-type: none"> <li>• Knows electromagnetic forces exist within and between the atoms</li> <li>• Knows materials contain equal proportion of positive and negative charges</li> <li>• Understands chemical reactions either release or consume energy</li> </ul>	<p><b>Chemical Equations and Reaction Types</b></p> <ul style="list-style-type: none"> <li>• Recognizes and classifies reactions of various types</li> <li>• Describes chemical reactions with balanced chemical equations (AP CHEM)</li> <li>• Recognizes signs a reaction has taken place (light, heat change, color change, precipitant, gas released, etc.)</li> <li>• Uses the activity series to predict reaction or not (AP CHEM)</li> </ul>	<p>Chemistry Curriculum Guide</p>



## Forensic Science Standards and Benchmarks

### Standard 2: Understands and applies principles of physical science (con't)

*Power Benchmark: Understands and applies knowledge of conservation of energy and increase in disorder*

Course Level Benchmarks	Vocabulary	Knowledge	Skills	Classroom Resources
D. Uses the gas laws to explain the properties of gases	<ul style="list-style-type: none"> <li>• Kinetic Molecular Theory</li> <li>• ideal gas</li> <li>• elastic collision</li> <li>• kinetic energy</li> <li>• gas laws</li> <li>• pressure</li> <li>• volume</li> <li>• temperature</li> <li>• Standard Temperature and Pressure</li> <li>• constant</li> <li>• absolute zero</li> <li>• direct relationship</li> <li>• inverse relationship</li> </ul>	<ul style="list-style-type: none"> <li>• Understands matter behaves in predictable and understandable ways</li> <li>• Knows the total energy of the universe remains constant</li> </ul>	<ul style="list-style-type: none"> <li>• Summarizes the values and meanings of STP</li> <li>• Relates the temperature of a gas to the average kinetic energy of its particles</li> <li>• Applies the gas laws relationship between pressure, temperature, and volume of any amount of ideal gas (AP CHEM)</li> <li>• Solves problems using the ideal gas law, <math>PV=nRT</math></li> </ul>	Chemistry Curriculum Guide



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*Power Benchmark: Understands and applies knowledge of the structure and properties of matter*

Course Level Benchmarks	Vocabulary	Knowledge	Skills	Classroom Resources
E. Analyzes solutions and their behavior (con't) <b>3. Acids, Bases, and pH</b>	<b>Acids, Bases, and pH</b> <ul style="list-style-type: none"> <li>• acids</li> <li>• bases</li> <li>• neutralization</li> <li>• ionization</li> <li>• binary acids</li> <li>• oxyacids</li> <li>• strong/weak acids</li> <li>• alkaline</li> <li>• Arrhenius acids and bases</li> <li>• salt</li> <li>• acid rain</li> </ul>	<b>Acids, Bases, and pH</b> <ul style="list-style-type: none"> <li>• Knows the pH scale is a feature of the concentration of H<sup>+</sup> and OH<sup>-</sup> ions in solution</li> </ul>	<b>Acids, Bases, and pH</b> <ul style="list-style-type: none"> <li>• Relates the strength of acids and bases to their tendencies toward dissociation (AP CHEM)</li> <li>• Calculates pH from the hydrogen-ion concentration and interprets its meaning</li> </ul>	Chemistry Curriculum Guide