Chemistry

State Standard Number	State Standard Area / Description	Unit Name	Course Topic Description
SI	Science as Inquiry		
0	The Abilities Necessary to Do Scientific Inquiry		
SI.1	Write a testable question or hypothesis when given a topic		
SI.2	Describe how investigations can be observation, description, literature survey, classification, or experimentation		
SI.3	Plan and record step-by-step procedures for a valid investigation, select equipment and materials, and identify variables and controls		
SI.4	Conduct an investigation that includes multiple trials and record, organize, and display data appropriately		
SI.5	Utilize mathematics, organizational tools, and graphing skills to solve problems		
SI.6	Use technology when appropriate to enhance laboratory investigations and presentations of findings		
SI.7	Choose appropriate models to explain scientific knowledge or experimental results (e.g., objects, mathematical relationships, plans, schemes, examples, role-playing, computer simulations)		
SI.8	Give an example of how new scientific data can cause an existing scientific explanation to be supported, revised, or rejected		

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SI.9	Write and defend a conclusion based on logical analysis of experimental data		
SI.10	Given a description of an experiment, identify appropriate safety measures		
0	Understanding Scientific Inquiry		
SI.11	Evaluate selected theories based on supporting scientific evidence		
SI.12	Cite evidence that scientific investigations are conducted for many different reasons		
SI.13	Identify scientific evidence that has caused modifications in previously accepted theories		
SI.14	Cite examples of scientific advances and emerging technologies and how they affect society (e.g., MRI, DNA in forensics)		

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SI.15	Analyze the conclusion from an investigation by using data to determine its validity		
SI.16	Use the following rules of evidence to examine experimental results:		
SI.16.a	Can an expert's technique or theory be tested, has it been tested, or is it simply a subjective, conclusive approach that cannot be reasonably assessed for reliability?		
SI.16.b	Has the technique or theory been subjected to peer review and publication?		
SI.16.c	What is the known or potential rate of error of the technique or theory when applied?		
SI.16.d	Were standards and controls applied and maintained?		
SI.16.e	Has the technique or theory been generally accepted in the scientific community?		
PS	Physical Science		

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0	Measurement and Symbolic Representation		
PS.1	Convert metric system units involving length, mass, volume, and time using dimensional analysis (i.e., factor-label method)	The Scientific Method	Qualitative vs Quantitative
PS.2	Differentiate between accuracy and precision and evaluate percent error		
PS.3	Determine the significant figures based on precision of measurement for stated quantities	The Scientific Method	Accuracy and Precision Significant Figures
PS.4	Use scientific notation to express large and small numbers	The Scientific Method	Significant Figures
PS.5	Write and name formulas for ionic and covalent compounds	Ionic Compounds	Naming Ionic and Covalent Compounds
PS.6	Write and name the chemical formula for the products that form from the reaction of selected reactants	Chemical Reactions	Ways to Write Equations
PS.7	Write a balanced symbolic equation from a word equation	Chemical Reactions	Ways to Write Equations

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0	Atomic Structure		
PS.8	Analyze the development of the modern atomic theory from a historical perspective	Atoms/Periodic Table	The History of the Atom
PS.9	Draw accurate valence electron configurations and Lewis dot structures for selected molecules, ionic and covalent compounds, and chemical equations	Ionic Compounds	Formation of Ions Lewis Dot Structures
PS.10	Differentiate among alpha, beta, and gamma emissions	Nuclear Chemistry	Alpha Decay Beta Decay Gamma Decay
PS.11	Calculate the amount of radioactive substance remaining after a given number of half-lives has passed	Nuclear Chemistry	Radioactive Half-Life
PS.12	Describe the uses of radioactive isotopes and radiation in such areas as plant and animal research, health care, and food preservation	Nuclear Chemistry	Radioactive Half-Life
PS.13	Identify the number of bonds an atom can form given the number of valence electrons	Ionic Compounds	Covalent Bonds
0	The Structure and Properties of Matter		

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PS.14	Identify unknowns as elements, compounds, or mixtures based on physical properties (e.g., density, melting point, boiling point, solubility)	Chemistry Fundamentals	Classification of Matter
PS.15	Predict the physical and chemical properties of an element based only on its location in the periodic table	Atoms/Periodic Table	Organization of the Periodic Table Ionic and Covalent Bonding
PS.16	Predict the stable ion(s) an element is likely to form when it reacts with other specified elements	Ionic Compounds	Ionic and Covalent Bonding
PS.17	Use the periodic table to compare electronegativities and ionization energies of elements to explain periodic properties, such as atomic size	Atoms/Periodic Table	Organization of the Periodic Table Ionic and Covalent Bonding
PS.18	Given the concentration of a solution, calculate the predicted change in its boiling and freezing points	Water, Solutions, Acids and Bases	Colligative Properties
PS.19	Predict the conductivity of a solution		
PS.20	Express concentration in terms of molarity, molality, and normality		
PS.21	Design and conduct a laboratory investigation in which physical properties are used to separate the substances in a mixture		

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PS.22	Predict the kind of bond that will form between two elements based on electronic structure and electronegativity of the elements (e.g., ionic, polar, nonpolar)	Ionic Compounds	Ionic and Covalent Bonding
PS.23	Model chemical bond formation by using Lewis dot diagrams for ionic, polar, and nonpolar compounds	Ionic Compounds	Lewis Dot Structures
PS.24	Describe the influence of intermolecular forces on the physical and chemical properties of covalent compounds	Ionic Compounds	Properties of Covalent Molecules and Molecular Compounds
PS.25	Name selected structural formulas of organic compounds		
PS.26	Differentiate common biological molecules, such as carbohydrates, lipids, proteins, and nucleic acids by using structural formulas		
PS.27	Investigate and model hybridization in carbon compounds		
PS.28	Name, classify, and diagram alkanes, alkenes, and alkynes		
PS.29	Predict the properties of a gas based on gas laws (e.g., temperature, pressure, volume)	Solutions, Liquids, Gases	Understanding Gas Laws

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PS.30	Solve problems involving heat flow and temperature changes by using known values of specific heat and latent heat of phase change	Thermodynamics	Specific Heat Latent Heat and Phase Changes
0	Chemical Reactions		
PS.31	Describe chemical changes and reactions using diagrams and descriptions of the reactants, products, and energy changes	Chemical Reactions	Ways to Write Equations
PS.32	Determine the concentration of an unknown acid or base by using data from a titration with a standard solution and an indicator		
PS.33	Calculate pH of acids, bases, and salt solutions based on the concentration of hydronium and hydroxide ions	Water, Solutions, Acids and Bases	Measuring Acidity-pH
PS.34	Describe chemical changes by developing word equations, balanced formula equations, and net ionic equations	Chemical Reactions	Ways to Write Equations Balancing Chemical Equations
PS.35	Predict products (with phase notations) of simple reactions, including acid/base, oxidation/reduction, and formation of precipitates		
PS.36	Identify the substances gaining and losing electrons in simple oxidation-reduction reactions		

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PS.37	Predict the direction of a shift in equilibrium in a system as a result of stress by using LeChatalier's principle		
PS.38	Relate the law of conservation of matter to the rearrangement of atoms in a balanced chemical equation	Chemical Reactions	Law of Conservation of Mass Balancing Chemical Equations
PS.39	Conduct an investigation in which the masses of the reactants and products from a chemical reaction are calculated		
PS.40	Compute percent composition, empirical formulas, and molecular formulas of selected compounds in chemical reactions	Mole/Chemical Composition	Percent Composition and Empirical Formula Lab
PS.41	Apply knowledge of stoichiometry to solve mass/mass, mass/volume, volume/volume, and mole/mole problems	Chemical Reactions	Stoichiometry
PS.42	Differentiate between activation energy in endothermic reactions and exothermic reactions		
PS.43	Graph and compute the energy changes that occur when a substance, such as water, goes from a solid to a liquid state, and then to a gaseous state	Solids Liquids Gases	Changes of State
PS.44	Measure and graph energy changes during chemical reactions observed in the laboratory		

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PS.45	Give examples of common chemical reactions, including those found in biological systems		
0	Forces and Motion		
PS.46	Identify and compare intermolecular forces and their effects on physical and chemical properties		
0	Interactions of Energy and Matter		
PS.47	Assess environmental issues related to the storage, containment, and disposal of wastes associated with energy production and use		