



Chemistry

Chemistry Basics - Matter & Change

Competencies

Resources

Standards

HS.PS1-1 Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.

I can

I can distinguish between a mixture and a pure substance.

I can convert between units of length.

I can report calculated answers with an appropriate level of precision (appropriate number of significant digits).

I can calculate the density of a sample given the mass and volume of the sample.

I can determine the mass or volume of a sample given the density and the volume or mass of the sample.

Vocab

Content: Substance, mixture, element, compound, weight, mass, significant figures, scientific notation, density, volume, mass

Academic: distinguish, calculate



Chemistry

Measurement & Calculations

Competencies

Resources

Standards

I can

I can convert between units of length.

I can report calculated answers with an appropriate level of precision (appropriate number of significant figures).

I can calculate the density of a sample given the mass and volume of the sample.

I can determine the mass or volume of a sample given the density and the volume or mass of the sample.

Vocab

Content: precision, accuracy

Academic:



Chemistry

Atomic Structure

Competencies

Resources

Standards

IHS.PS1-1

Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.

I can

I can label parts of an atom.

I can find elements on the periodic table given the name or the symbol

I can convert between grams and moles of an element.

Vocab

Content: atom, nucleus, mole

Academic:



Chemistry

Electrons & the Periodic Table

Competencies

Resources

Standards

HS.PS1-1: Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.

HS.PS 1-2: Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.

HS.PS4-4: Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter.

I can

I can find elements on the periodic table given the name or the symbol.

I can identify an element as a metal, nonmetal or metalloid.

I can identify the number of valence electrons based on the element's group.

I can infer the reactivity of a metal based on its position on the periodic table.

I can construct a periodic table given only the atomic number, atomic mass, chemical symbol and element name.

I can identify the number of electrons in the valence shell.

I can estimate the effect of the absorption of light waves by matter based on relative and qualitative frequency on the electromagnetic spectrum.

Vocab

Content: periodic table, periodic trends, atomic number, mass number, atomic symbol

Academic: identify, construct



Chemistry

Chemical Bonding

Competencies

Resources

Standards

HS.PS1-1

Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.

HS.PS1-2

Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.

I can

I can find elements on the periodic table given the name or the symbol.

I can identify an element as a metal, nonmetal or metalloid.

I can identify the number of valence electrons based on the element's group.

I can infer the reactivity of a metal based on its position on the periodic table.

I can identify the number of electrons in the valence shell.

I can distinguish between an ionic and covalent compound.

I can explain why main group elements combine in simple ratios.

I can predict the formula of a covalent compound formed from main group elements.

I can predict the formula of an ionic compound formed from main group elements.

Vocab

Content: metal, nonmetal, metalloid, valence electron

Academic: infer, explain, predict



Chemistry

Chemical Formulas & Chemical Compounds

Competencies

Resources

Standards

HS.PS 1-1: Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.

HS.PS1-2: Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.

HS.PS1-3: Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.

HS.PS1-7: Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.

I can

I can calculate the molar mass for a given compound.

I can calculate the mass of a sample from the number of moles of that element or compound.

I can compare and contrast relative strengths of electrical forces between ionic and covalent compounds.

I can calculate the number of moles of an element or compound given the mass of the substance.

Vocab

Content: ionic, covalent, moles

Academic:



Chemistry

Chemical Equations & Reactions

Competencies

Resources

Standards

HS-PS1-2: Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.

HS-PS1-5: Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.

I can

I can construct a simple model of a chemical reaction that shows the energy changes of reactants as they become products.

I can balance a chemical reaction given correct chemical formulas for reactants and products.

Vocab

Content: reactants, products

Academic:



Chemistry

Stoichiometry

Competencies

Resources

Standards

HS.PS1-7

Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.

I can

I can balance a chemical reaction given correct chemical formulas for reactants and products.
I can create a presentation that incorporates a balanced chemical reaction and shows the calculation of the grams of a product based on the grams of a reactant.

Vocab

Content:

Academic:



Chemistry

States of Matter & Thermochemistry

Competencies

Resources

Standards

HS-PS1-3: Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.

HS-PS3-1 : Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component

HS-PS3-4: Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).

I can

I can interpret a heating or cooling curve graph for phases and phase changes

I can compare and contrast relative strengths of electric forces between ionic and covalent compounds.

I can graph a heating or cooling curve of a pure substance from experimental data.

I can design and conduct an experiment to study the change in temperature of a liquid when exposed to air.

I can design and execute an investigation into the resulting temperature of the combination of two liquids at differing temperatures in a closed system.

Vocab

Content: heating, curve, temperature, heat, calorimetry, calorie, joule

Academic:



Chemistry

Gases

Competencies

Resources

Standards

HS-PS1-3: Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.

HS-PS2-4: Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.

HS-PS3-2: Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative positions of particles (objects).

I can

I can understand the basis of gas laws and how to use those laws

I can measure and describe the pressure of a gas

I can describe the properties of gases.

I can use the kinetic-molecular theory to explain gas behavior

Vocab

Content: gas law, Boyles Law, Charles Law, combined gas law

Academic:



Chemistry Solutions

Competencies

Resources

Standards

HS-PS1-3: Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.

HS-PS1-5: Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.

I can

I can analyze solubility curves.

I can explain what adding solute particles to a solution will do to the freezing point, boiling point, and vapor pressure.

Understand and calculate molarity (M) and dilution problems.

I can define unsaturated, saturated, and supersaturated solutions.

Compare and contrast solutions, colloids, and suspensions.

Vocab

Content: soluble, insoluble, freezing point, boiling point, vapor pressure, molarity, saturated, unsaturated, supersaturated, solutions, colloids, suspension

Academic:



Chemistry

Acids & Bases

Competencies

Resources

Standards

HS.PS1-2: Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.

HS.PS1-7: Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.

I can

I can recognize acids and bases from their formulas.

I can describe the properties of acids and bases

I can calculate pH, pOH, $[H^+]$, and $[OH^-]$

I can describe laboratory methods that can be used to determine the pH of a substance

Vocab

Content:

Academic:



Chemistry

Nuclear Chemistry

Competencies

Resources

Standards

HS.PS1-8 : Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.

I can

I can define alpha particle, beta particle, and gamma ray.

I can compare and contrast the energy quantities released by nuclear processes and chemical processes.

I can differentiate nuclear fusion and nuclear fission.

I can create and present a diagram or model that explains the nuclear processes and radioactive decay for a product, natural phenomena, or an energy source.

Vocab

Content:

Academic: