Physical Science Learning Goals

Unit I: Matter

How long will we be learning this?

* ~ 1.5 weeks

By the end of this unit you should be able to:

* Differentiate between compounds, elements, mixtures and how they can be broken down
* Calculate and compare relative densities of objects
* Identify examples of physical and chemical properties and physical and chemical changes
* Conclude whether a change is chemical or physical given a scenario
* Explain the difference between a property and a change
* Explain and apply the Law of Conservation of Mass and Energy

This is the vocabulary you should know:

|  |  |  |
| --- | --- | --- |
| Matter | Compound | Element |
| Pure Substance  | Mixture | Homogeneous |
| Heterogeneous | Density | Physical Property |
| Physical Change | Chemical Property | Chemical Change |

Physical Science Learning Goals

Unit II: States of Matter

How long will we be learning this?

* ~ 1.5 weeks

By the end of this unit you should be able to:

* Describe the properties of the 4 states of matter
* Explain the relative motion of molecules based on the Kinetic Molecular Theory
* Construct and analyze a phase change diagram
* Explain and apply Fluid Principles like Bernoulli’s, Pascal’s, and Archimedes’
* Identify which variables can be changed in the gas laws (Boyles’, Charles’, Gay-Lussac’s)
* Predict how gases will change based on the relationships of the gas laws
* Calculate Gas Law Problems

This is the vocabulary you should know:

|  |  |  |
| --- | --- | --- |
| Solid | Liquid | Gas |
| Plasma | Fluid | Definite |
| Indefinite | Buoyant Force | Melting |
| Freezing | Evaporating | Vaporizing |
| Condensing | Boiling |  |

Physical Science Learning Goals

Unit III: The Atom

How long will we be learning this?

* ~2 weeks

By the end of this unit you should be able to:

* Identify major scientists’ contributions to the model of the atom (Bohr, Dalton, Chadwick, Rutherford, Thomson, Schrodinger)
* Identify and describe the differences between protons, neutrons, and electrons (charge, relative mass, location within the atom)
* Explain why an atom stays together based on charges
* Calculate the number of protons, neutrons, electrons, atomic mass, & atomic number of a given atom or isotope
* Calculate the average atomic mass of isotopes
* Calculate the molecular mass of compounds using the atomic mass from the periodic table
* Draw the Bohr Models for the first 2o elements on the periodic table

This is the vocabulary you should know:

|  |  |  |
| --- | --- | --- |
| Atom | Subatomic Particle | Proton |
| Neutron | Electron | Nucleus |
| Isotope | Atomic Number | Atomic Mass |

Physical Science Learning Goals

Unit IV: Periodicity

How long will we be learning this?

* ~1.5 weeks

By the end of this unit you should be able to:

* Identify the symbol and name common elements on the periodic table (1st 54, no order)
* Identify the location and describe the properties of the major groups on the periodic table (alkali metals, alkaline earth metals, transition metals, metalloids, halogens, and noble gases)
* Determine the number of valence electrons and electron shells for elements based on their position on the periodic table
* Explain the difference between a period and a group on the periodic table
* Identify elements as metals, non-metals, or metalloids given a periodic table
* Use the periodic table to identify an element’s symbol, atomic mass, and atomic number
* Draw Lewis Dot Structures using the number of valence electrons for non-transition metal elements
* Convert amounts of elements and compounds from grams to moles using dimensional analysis (\*Honors needs to be able to convert to molecules also)

This is the vocabulary you should know:

|  |  |  |
| --- | --- | --- |
| Periodic Table | Group | Period |
| Metal | Nonmetal | Metalloid |
| Stable | Unstable | Conductor |
| Malleable | Luster |  |

Physical Science Learning Goals

Unit V: Nomenclature

How long will we be learning this?

* ~2 weeks

By the end of this unit you should be able to:

* Identify a compound as ionic or covalent when given a periodic table
* Identify that in ionic compounds the metal is the cation, and the nonmetal is the anion
* Name binary ionic compounds and give their formulas when given a periodic table
* Name compounds and give formulas for ternary ionic compounds with polyatomic ions given a periodic table and polyatomic ion chart
* Name binary covalent compounds and give their formulas when given a periodic table
* \*\*\*Honors: Name ionic compounds and given their formulas when the transition metal is the cation

This is the vocabulary you should know:

|  |  |  |
| --- | --- | --- |
| Ionic bond | Covalent bond | Polyatomic ion |
| Binary | Ternary | Monatomic |
| Cation | Anion |  |

Physical Science Learning Goals

Unit VI: Chemical Bonding

How long will we be learning this?

* ~1.5 weeks

By the end of this unit you should be able to:

* Predict whether a compound will be ionic or covalent based on properties
* Distinguish between the three types of chemical bonds
* Explain why chemical bonds form and that only valence electrons participate in bonding
* Draw Lewis dot structures for compounds including single, double, and triple bonds using the NASL method
* Determine the number of electrons shared or transferred based on lewis dot structures
* Reduce molecular formulas into an empirical formula
* Predict possible molecular formulas when given the empirical formula
* \*\*\*Honors: Draw charged molecules lewis dot structures
* \*\*\*Honors: Calculate empirical and molecular formulas

This is the vocabulary you should know:

|  |  |  |
| --- | --- | --- |
| Ionic Bond | Covalent bond | Metallic Bond |
| Soluble | Double Bond | Single Bond |
| Triple Bond | Empirical Formula | Molecular Formula |

Physical Science Learning Goals

Unit VII: Chemical Reactions

How long will we be learning this?

* ~2 weeks

By the end of this unit you should be able to:

* Explain how a person knows a reaction has occurred
* Explain the difference between endothermic and exothermic reactions
* Identify where the reactants and products are in a reaction equation
* Identify the 5 major types of reactions and choose the type of reaction when given the chemical equation
* Write and Balance chemical equations that show the conservation of mass and energy
* Predict the products of basic chemical reactions when given the reactants

This is the vocabulary you should know:

|  |  |  |
| --- | --- | --- |
| Reactants | Products | Yield |
| Synthesis | Decomposition | Combustion |
| Single Replacement | Double Replacement | Endothermic |
| Exothermic |  |  |

Physical Science Learning Goals

Unit VIII: Solutions

How long will we be learning this?

* ~2 weeks

By the end of this unit you should be able to:

* Explain the differences between homogeneous and heterogeneous mixtures (particle size, particles settling, Tyndall effect)
* Identify that a solution is a homogeneous mixture
* Identify the solute and solvent in a solution
* Explain the term “like dissolves like” with polarity
* Identify that water is a polar molecule
* Differentiate between the terms weak, strong, concentrated, dilute
* Differentiate between the terms unsaturated, saturated, supersaturated
* Calculate the concentration of solutions using the molarity formula

This is the vocabulary you should know:

|  |  |  |
| --- | --- | --- |
| Homogeneous | Heterogeneous | Suspension |
| Colloid | Emulsion | Solution |
| Solute | Solvent | Polar |
| Non-Polar | Solubility | Insoluble |
| Soluble | Weak | Strong |
| Concentrated | Dilute | Concentration |
| Molarity | Saturated | Unsaturated |
| Supersaturated |  |  |

Physical Science Learning Goals

Unit IV: Acids & Bases

How long will we be learning this?

* ~2 weeks

By the end of this unit you should be able to:

* Define and identify a substance as acidic, basic or neutral based on definition, properties, or a given pH
* Measure pH using pH paper and litmus paper and identify substances as acid, base, or neutral
* Draw the pH scale from 0-14 and label sections of acidity, basicity, neutral, H+, OH-
* Calculate the pH of solutions given molarity
* Calculate the H+ concentration when given the pH
* Compare the relative strengths of substances when given the pH
* Identify an acid or base as weak or strong when given a picture of the ionization
* Compare the relative acidities of common chemicals
* Write, Balance, and predict the products of neutralization reactions
* Predict the pH range of a neutralization reaction
* \*\*\*HONORS: Identify the acid, base conjugate acid, and conjugate base of an acid-base reaction

This is the vocabulary you should know:

|  |  |  |
| --- | --- | --- |
| Acid | Base | Neutral |
| pH scale | Neutralization | Titration |
| Equivalent Point | Indicator |  |