Jasper City Schools Curriculum Map

CHEMISTRY

Course Name:	**Chemistry**
Unit Name:	**Unit 1 Methods, Measurement, and Matter (Ch 1-3, 13-3)**
Time Frame:	**2 weeks**
Unit Standards	**ALCOS:** 1) Differentiate among pure substances, mixtures, elements, and compounds • Distinguish between intensive and extensive properties of matter • Distinguishing between homogeneous and heterogeneous forms of matter 5) Use the kinetic theory to explain states of matter, phase changes, solubility, and chemical reactions 8) Distinguish among endothermic and exothermic physical and chemical changes **Quality Core/ACT:** I A 1 f: Safely use lab equipment and techniques when conducting scientific investigations I A 2 a: distinguish between precision and accuracy I A 2 b: use appropriate SI units I A 2 c: use the correct # of significant figures I A 2 d: use appropriate statistical methods in calculations I A 2 e: Express #s in scientific notation I A 2 f: Solve for the unknown quantities by manipulating variables I A 2 g: Use graphical, mathematical, and statistical models to express patterns and relationships I A 3 g: compare the definitions of fact, law, theory and give examples II A 1 a: Explain why mass is used as a quantity; differentiate between mass and weight II A 1 b: Explain density qualitatively and solve density problems applying understanding of the concept II B 1 a: Compare the definition of matter and energy and the laws of conservation of matter and energy II B 1 b: Describe how matter is classified by state of matter and by composition II B 1 c: Describe the phase and energy changes associated with boiling/condensing, melting/freezing, sublimation, crystallization (deposition) II B 1 d: Explain the difference between chemical and physical changes and demonstrate how these changes can be used to separate mixtures and compounds into their components II B 1 e: Define chemical and physical properties and compare them by providing examples IV A 1 a: Describe differences between solids, liquids, and gases at the atomic and molecular levels On-going: I A 1 a, b, c, d, e, f, g (scientific inquiry)
Unit Essential Questions	What is chemistry? What is the difference between mass and weight? What are the steps of the scientific method? What are some common lab equipment used in the chemistry lab? What safety rules are important in the chemistry lab? How can one convert between units using dimensional analysis? What is the correct method for rounding, counting significant figures, and using scientific notation? What is the difference between accuracy and precision? How does one calculate percent error? What are chemical and physical properties? How is matter classified? What does the Law of Conservation of Mass mean? How do the states of matter compare? How does one interpret a phase change diagram?

Unit Essential Vocabulary	Applied research, chemistry, conclusion, control, dependent variable, experiment, hypothesis, independent variable, mass, matter, model, pure research, qualitative data, quantitative data, scientific law, scientific method, technology, theory, weight, accuracy, base unit, conversion factor, density, derived unit, dimensional analysis, graph, kelvin, kilogram, liter, meter, percent error, precision, scientific notation, second, significant figure, S.I. units (system international), slope Lab equipment: beaker, pipet, burette, Erlenmeyer flask, scale, graduated cylinder, triple beam balance, ring stand, evaporating dish, watch glass, volumetric flask, utility clamp, crucible, mortar and pestle, test tube holder, crucible tongs, wash bottle, hot plate, Bunsen burner, well plate, forceps, wire brush, stoppers, safety goggles, wire gauze, micro pipets, thermometer, funnel Substance, physical property, extensive property, intensive property, chemical property, states of matter, solid, liquid, gas, vapor, plasma, fluidity, viscosity, cohesion, adhesion, meniscus, surface tension, compression, chemical change (reaction), physical change, phase change, law of conservation of mass, melting, freezing, vaporization, evaporation, sublimation, condensation, deposition, rusting, tarnishing, fermentation, combustion
Resources	Chemistry Textbook, chemicals, lab equipment, Alabama Science in Motion lab equipment, iPad
Assessment(s)	Chapter tests, unit test, formative assessments, lab techniques
Course Name:	**Chemistry**
Unit Name:	**Unit 2 Atomic Structure and the Periodic Table (Ch 4-6, 25)**
Time Frame:	**3 weeks**
Unit Standards	**ALCOS:** 3- Utilize benchmark discoveries to describe the historical development of atomic structure • Ex: Thompsons' cathode ray, Rutherford's gold foil, Millikan's oil drop, and Bohr's bright line spectra experiments • Calculate the number of protons, neutrons, electrons in an isotope • Use the periodic table to identify periodic trends, including atomic radii, ionization energy, electronegativity, and energy levels • Utilize electron configurations and Lewis dot structures, and orbital notations to write chemical formulas 9- Distinguish between chemical and nuclear reactions • Identify subatomic particles including mesons, quarks, tachyons, and baryons • Calculate half-life of radioactive isotopes • Identify types of radiation and their properties • Contrast fission and fusion • Describe carbon-14 decay as a dating method **Quality Core/ACT:** II A 2 c:: Compare characteristics of isotopes of the same element IV B 1 a: describe the importance of models for the study of atomic structure IV B 1 b: describe crucial contributions of scientists that led to the development of the modern atomic model IV B 1 c: Describe the characteristics of a wave such as wavelength, frequency, energy, and speed IV B 1 d: Describe role of probability in orbital theory IV B 1 e: Describe the atomic orbitals s, p, d, f IV B 1 f: Apply Hund's rule and the Aufbau process to specify the electron configurations of the elements

	IV B 2 a: Describe the historical development of the modern periodic table, including Mendeleev and Moseley IV B 2 b: Describe and explain the organization of elements into periods and groups in the periodic table IV B 2 c: use the periodic table to determine the atomic #, atomic mass, mass #, and # of protons, neutrons, and electrons in isotopes of atoms IV B 2 d: Calculate the weighted atomic mass of an element from isotope abundance given the atomic mass IV B 2 e: Identify regions of the periodic table and describe chemical characteristics of each IV B 2 f: Compare the periodic properties of the elements and how they relate to position IV B 2 g: use the periodic table to predict and explain the valence electron configurations of the elements, to identify members of configuration families, and to predict the common valences of the elements V E a: Describe alpha, beta, and gamma decay, half-life, and fission and fusion V E b: Write (recognize) nuclear decay reactions and describe how the nucleus changes
Unit Essential Questions	What important experiments led to the discovery of the modern atomic theory? What is the structure of an atom and its subatomic particles? What is the relationship between nuclear stability and radioactivity? How does light act like both a particle and a wave? How are electrons arranged in orbitals? How do the Aufbau principle, the Pauli exclusion theory, and Hund's rule apply to the arrangement of electrons? Why do elements in a group have similar properties? What are some obvious trends in the periodic table? What are the s, p, f, and d blocks of the periodic table?
Unit Essential Vocabulary	Dalton's atomic theory, cathode ray, electron, nucleus, proton, neutron, atomic number, plum pudding model, gold foil experiment, oil drop experiment, magnet, positive, negative, alpha particle, nuclear atom, Atomic number, isotope, mass number, atomic mass unit (amu), atomic mass, proton, neutron, electron, average atomic mass, isotope notation, Atom, nucleus, isotope, proton, electron, mass, nuclear reaction, radioactivity, radiation, radioactive decay, radioisotope, alpha radiation, beta radiation, alpha particle, beta particle, nuclear equation, gamma ray, positive plate, negative plate, half-life, x-ray, electromagnetic radiation, wavelength, frequency, amplitude, electromagnetic spectrum, quantum, Plank's constant, photoelectric effect, photon, atomic emission spectrum, Ground state, Heisenberg uncertainty principle, quantum mechanical model of the atom, atomic orbital, principal quantum number, principal energy level, energy sub-level, s, p. d, and f orbital and shapes, Aufbau principle, Pauli exclusion principle, valence electron, Lewis dot diagram, Hund's rule, Periodic law, group, period, representative element, transition element, metal, alkali metal, alkaline earth metal, transition metal, inner transition metal, nonmetal, halogen, noble gas, metalloid, atomic #, mass #, electron configuration, valence electrons, s, p, d, f blocks, Ion, ionization energy, octet rule, electronegativity, atomic radius, ionic radius,
Resources	Chemistry Text book, chemicals, lab equipment, Alabama Science in Motion lab equipment, iPad
Assessment(s)	Chapter tests, unit test, formative assessments, lab techniques, Tyler DeWitt YouTube videos
Course Name:	**Chemistry**
Unit Name:	**Unit 3 Chemical Compounds, Bonding, and Reactions (Ch 8-10, 22)**
Time Frame:	**3 weeks**
Unit Standards	**ALCOS:** 6 -Predict ionic and covalent bond types • Assign oxidation numbers for individual atoms of monatomic and polyatomic ions • -Identify the nomenclature of ionic compounds and binary compounds, and acids

	2 –describe the structure of carbon chains, branched, chains, and rings • -classifying chemical reactions as composition (synthesis), decomposition, single replacement, or double replacement **Quality Core/ACT**: IV B 3 a: describe the characteristics of ionic and covalent bonding IV B 3 b: explain ionic stability-recognize ionic configurations, and predict ionic configurations for elements (electron configurations and Lewis dot models) IV B 3 c: describe the nature of the chemical bond with respect to valence electrons in bonding atoms IV B 3 d: explain how ionic and covalent compounds differ IV B 3 e: describe the unique features of bonding in carbon compounds IV B 4 a: use Lewis diagrams to represent bonding in ionic compounds IV B 4 b: draw Lewis structures for molecules and polyatomic ions, including those that must be represented by a set of resonance structures IV B 4 c: use VSEPR theory to explain geometries of molecules and polyatomic ions IV B 4 d: describe how orbital hybridization models relate to molecular geometry IV B 4 e: describe the molecular orbital models for double bonds, triple bonds, and delocalized pi electrons IV B 4 f: describe the relationship between molecular polarity and bond polarity III A 3 a: explain how conservation laws form the basis for balancing chemical reactions and know what quantities are conserved in physical, chemical, and nuclear changes III A 3 b: write and balance chemical equations given the reactants and products III A 3 c: describe what is represented on a molecular and molar level by chemical equations III A 3 d: use the appropriate symbols for state (solid, liquid, gaseous, aqueous) and reaction direction when writing chemical equations III A 3 e: classify chemical reactions as synthesis, decomposition, single or double replacement, or combustion reactions III A 3 f: predict the products of synthesis, combustion, and decomposition reactions and write balanced equations for these reactions III A 3 g: predict products of single replacement reactions using the activity series and write balanced equations for these reactions III A 3 h: predict the products of double replacement reactions using solubility charts to identify precipitates and write balanced equations for these reactions III A 3 m: write ionic equations, identifying spectator ions and the ned ionic equation V A a: define solution, solute, and solvent On-going: I A 1 a, b, c, d, e, f, g (scientific inquiry)
Unit Essential Questions	What is a chemical bond? How are ions formed? What are some characteristics of ionic bonds? How does one name and write formulas for ionic compounds? How are metallic bonds related to the characteristics of metals? What is the nature of a covalent bond? How are covalently bonded molecules named? What are the characteristics of covalent molecules? What is the difference between polar and nonpolar molecules? How does one write a chemical equation which describes a chemical reaction? What are the five different classifications of chemical reactions? What is the correct method to write ionic and net ionic equations?

Unit Essential Vocabulary	Chemical bond, cation, anion, Lewis dot diagram, orbital diagram, metal, nonmetal, ionic bond, electrolyte, lattice energy, crystal lattice, stable atom, octet, valence electrons, oxide, binary, exothermic reaction, salt, Formula unit, monatomic ion, oxidation number, polyatomic ion, oxyanion, valence electron, Lewis structures, metallic bond, alloy, covalent bond, ionic bond, endothermic, exothermic, hybridization, Lewis structure, molecule, oxy acid, acid, pi bond, polar covalent, resonance, sigma bond, structural formula, VSEPR theory, single bond, double bond, triple bond, alkane, alkene, alkyne, valence electron, Aqueous solution, chemical equation, chemical reaction, coefficient, combustion reaction, complete ionic equation, decomposition reaction, double-replacement reaction, net ionic equation, precipitate, product, reactant, single-replacement reaction, solute, solvent, spectator ion, synthesis reaction, acid, electrolyte, activity series, solubility chart, solid, liquid, gas, mixture, solution, metal, halogen, nonmetal, skeleton equation
Resources	Chemistry Text book, chemicals, lab equipment, Alabama Science in Motion lab equipment, iPad
Assessment(s)	Chapter tests, unit test, formative assessments, lab techniques
Course Name:	**Chemistry**
Unit Name:	**Unit 4 Moles, Stoichiometry, and Gas Laws (Ch 11-12, 14)**
Time Frame:	**3 weeks**
Unit Standards	**ALCOS:** 6- Solve stoichiometric problems involving relationships among the number of particles, moles, and masses of reactants and products in a chemical reaction • Determine the empirical or molecular formula for a compound using percent composition data 7- explain the behavior of ideal gases in terms of pressure, volume, temperature, and number of particles using Charles' law, Boyle's ;aw, Gay-Lussac's law, the combined gas law and the ideal gas law **Quality Core/ACT:** II B 2 a: define gas pressure and the various pressure units II B 2 b: describe the use and operation of mercury barometers and manometers to find atmospheric pressure II B 2 c: define the gas laws given by Boyle, Charles, Gay-Lussac, and Dalton and solve problems based on these laws II B 2 d: predict boiling point changes based on atm pressure II B 2 e: explain the basis of gaseous diffusion and effusion II B 2 f: describe Avogadro's hypothesis and use it to solve stoichiometric problems II B 3 a: explain the difference between and ideal and real gas and the assumptions made about an ideal gas and what conditions favor ideal behavior for a real gas II b 3 b: apply the mathematical relationships that exist among volume, temperature, pressure, and number of particles on an ideal gas II B 3 c: compute gas density when given molar mass, temperature, and pressure II B 3 d: apply the ideal gas law to determine the molar mass of a volatile compound II B 3 e: sole gas stoichiometry problems at standard and nonstandard conditions III A 1 b: interpret the information conveyed by chemical formulas for numbers of atoms of each element Represented III A 1 c: use the names, formulas, and charges of common polyatomic ions III A 1 d: provide the interconversion of molecular formulas, structural formulas and names including common binary and ternary acids III A 1 e: calculate the percent composition of a substance given its formula or masses of each component element in a sample III A 1 f: determine the empirical formulas and molecular formulas of compounds given percent composition data of mass composition data III A 1 g: Determine percent composition experimentally and derive empirical formulas from the data (LAB)

	III A 2 a: Explain the meaning of mole and Avogadro's number III A 2 b: Interconvert between mass, moles, and number of particles III A 2 c: Distinguish between formula mass, empirical mass, molecular mass, gram molecular mass, and gram formula mass III A 3 i: Use chemical equations to perform basic mole-mole, mass-mass, mass-mole computations for chemical reactions III A 3 l: Calculate percent error and analyze experimental errors that affect percent error IV A 2 b: Explain the basis and importance of absolute temperature and convert between Celsius and Kelvin scales On-going: I A 1 a, b, c, d, e, f, g (scientific inquiry)
Unit Essential Questions	What is a mole? How can one make conversions between moles, molecules, mass, and particles? How is percent composition calculated? How are empirical and molecular formulas calculated?
	What are hydrates and how are they named? How does one write molar ratios from balanced chemical equations? What is a limiting reagent and how can it be calculated? How is percent yield determined? How do pressure, temperature, volume, and number of moles affect gases? What are real and ideal gases? How can Avogadro's principle and the gas laws be applied to chemical equations?
Unit Essential Vocabulary	Avogadro's number, molar mass, molecular formula, empirical formula, hydrate, mole, percent composition, dimensional analysis, conversion factor, formula unit, molecules, atom, ion, compound, Stoichiometry, mole, mass, ratio, limiting reactant, excess reactant, actual yield, experimental yield, percent yield, theoretical yield, grams, reaction, reactant, product, Avogadro's principle, Boyle's law, Charles's law, combined gas law, Gay-Lussac's law, ideal gas law, ideal gas constant, molar volume
Resources	Chemistry Textbook, chemicals, lab equipment, Alabama Science in Motion lab equipment, iPad
Assessment(s)	Chapter tests, unit test, formative assessments, lab techniques
Course Name:	**Chemistry**
Unit Name:	**Unit 5 Solutions, Energy, and Reaction Rates (Ch 15-17)**
Time Frame:	**3 weeks**
Unit Standards	**ALCOS:** 4- Describe solubility in terms of energy changes associated with the solution process • Using solubility curves to interpret saturation levels • Describe factors that affect the rate of solution • Solve problems involving molarity including solution preparation and dilution 8- Calculate temperature change by using specific heat • Use Le Chatelier's principle to explain changes in physical and chemical equilibrium **Quality Core/ACT:** V A 1 c: define the terms saturated, unsaturated, supersaturated, dilute, and concentrated as they pertain to solutions V A 1 d: give examples of solid, liquid, and gas medium solutions V A 1 e: define and calculate the molarity of a solution V A 1 f: define and calculate the percent composition for a solution V A 1 g: describe the preparation and properties of solutions

	V A 1 h: solve stoichiometry calculations based on reactions involving aqueous solutions V A 1 i: describe the relationship between temperature and pressure and the solubility of gases in liquids V A 1 j: describe the relationship between solvent character and solute character and explain miscibility V A 1 k: apply the general rules of solubility to aqueous salt solutions V A 1 l: describe the factors affecting solubility of a solute on a given solvent and its rate of solution V A 2 a: describe qualitatively the effect of adding solute on freezing point, boiling point, and vapor pressure of a solvent V A 2 b: define molality and mole fraction V A 2 c: calculate changes on the boiling point and freezing point when nonvolatile, nonelectrolyte solutes are added to solvents V A 4 a: define enthalpy and explain how changes in enthalpy determine whether a reaction is endothermic or exothermic V A 4 b: compute ΔH rxn from ΔHt° values and explain why the ΔHt° values for elements are zero V A 4 c: explain and apply mathematically the relationship between ΔH rxn (forward) and (reverse) V A 4 d: define entropy and explain the role of entropy in chemical and physical changes and explain the changes that favor increase in entropy V B 1 a: explain the collision theory of reactions V B 1 b: analyze factors affecting reaction rates in relation to the kinetic theory (temp, nature of reactants) V B 1 c: relate reaction mechanisms, rate-determining step, activated complex, heat of reaction, and activation energy to reaction kinetics V B 1 d: Interpret potential energy diagrams for chemical reactions V B 2 a: relate the rate of a chemical reaction to the appearance of products and the disappearance of reactants V B 2 b: describe the meaning of reaction mechanisms and rate-determining step V B 2 c: relate collision theory to the factors that affect the rate of reaction V B 2 d: describe the meaning of activation energy and activation complex V B 2 e: interpret and label a plot of energy versus reaction coordinate V B 2 f: explain the effects of catalysts on reaction rates V B 3 a: explain the law of conservation of energy in chemical reactions V B 3 b: describe the concept of heat and explain the difference between heat energy and temperature V B 3 c: explain physical and chemical changes as endothermic or exothermic energy changes V B 3 d: solve heat capacity and heat transfer problems involving specific heat, heat of fusion, and heat of vaporization V B 3 e: calculate the heat of reaction for a given chemical reaction when given calorimetric data On-going: I A 1 a, b, c, d, e, f, g (scientific inquiry)
Unit Essential Questions	How are solutions categorized? How can the concentration of solutions be calculated? What are homogeneous mixtures as well as examples? How do the colligative properties of solutions compare? How is energy calculated? How do changes in enthalpy and entropy affect the spontaneity of chemical reactions? How do chemical reactions occur as a result of collisions? What factors affect the rate of a chemical reaction? How is the rate of a chemical reaction calculated?
Unit Essential Vocabulary	Boiling point elevation, Brownian motion, colligative property, colloid, concentration, freezing point depression, heat of solute, Henry's law, immiscible, insoluble, miscible, molality, molarity, mole fraction, osmosis, osmotic pressure, saturated solution, solubility, soluble, solvation, supersaturates solution, suspension, Tyndall effect, unsaturated solution, vapor pressure lowering Calorie, calorimeter, chemical potential energy, energy, enthalpy, enthalpy heat of reaction, enthalpy heat of combustion, entropy, free energy, heat, Hess's law, joule, law of conservation of energy, law of disorder, molar enthalpy of fusion, molar enthalpy of vaporization, specific heat, spontaneous process, standard enthalpy of formation, surroundings, system, thermochemical equation, thermochemistry, universe Activated complex, activation energy, catalyst, collision theory, complex reaction, heterogeneous catalyst, homogeneous catalyst, inhibitor, instantaneous rate, intermediate, method of initial rates, rate-determining

	step, rate law, reaction mechanisms, reaction order, reaction rate, specific rate constant, transition state
Resources	Chemistry Textbook, chemicals, lab equipment, Alabama Science in Motion lab equipment, iPad
Assessment(s)	Chapter tests, unit test, formative assessments, lab techniques
Course Name:	**Chemistry**
Unit Name:	**Unit 6 Equilibrium, Acids and Bases, and Redox Rxns (Ch 18-21)**
Time Frame:	**2 weeks**
Unit Standards	**ALCOS:** 4- Describe solubility in terms of energy changes associated with the solution process • Explain the conductivity of electrolyte solutions • Describe acids and bases in terms of strength, concentration, pH, and neutralization reactions **Quality Core/ACT:** V B 1 e: Describe the conditions that define equilibrium systems on a dynamic molecular level and on a static macroscopic scale V B 1 f: Apply Le Chatelier's principle to explain a variety of changes in physical and chemical equilibria V B 1 g: define Ksp and manipulate Ksp to predict solubility V B 1 h: explain the law of concentration action and write equilibrium law expressions for chemical equilibria V B 1 i: determine solubility product constants from solubilities (and vise-versa) for a given solubility equilibrium system V C 1 a: describe the nature and interactions of acids and bases V C 1 b: describe the hydronium ion and the concept of amphoterism V C 1 c: describe Arrhenius and Bronsted-Lowry acids and bases; identify conjugate acids and bases in reactions V C 1 d: relate solvent interaction to the formation of acidic and basic solutions V C 1 e: define the water constant Kw and the pH scale V C 1 f: describe characteristics of strong and weak acids and bases and identify common examples of Both V C 2 a: write and balance a simple equation for a neutralization reaction V C 2 b: calculate hydrogen ion concentration, hydroxide concentration, pH, and pOH for acidic of basic solutions V C 2 c: explain how the acid-base indicators work V C 2 d: define percent ionization Ka and Kb and explain how they relate to acid/base strength V C 2 e: conduct a titration experiment in order to determine the concentration of an acid or base solution V C 2 f: qualitatively understand the behavior of a buffer and explain why buffer solutions maintain pH upon dilution V D a: define REDOX reaction, oxidation, reduction, oxidizing agent, and reducing agent V D b: assign oxidation numbers to reaction species; identify the species oxidized and reduced and the oxidizing agent and reducing agent in a REDOX reaction V D c: balance REDOX equations by the ion-electron and half-reaction methods V D d: diagram and explain the operation of a voltaic cell (ch 21) V D e: determine the net voltage obtained when standards half-cells are paired to form a voltaic cell and use this voltage to predict reaction spontaneity (ch 21) On-going: I A 1 a, b, c, d, e, f, g (scientific inquiry)

Unit Essential Questions	What is LeChatlier's principle? What is meant by chemical equilibrium? What are the main differences between acids and bases? What is pH and pOH and how are they calculated? How do buffers resist changes in pH? What is a redox reaction? How are oxidation numbers of elements in compounds determined? How can redox reactions be balanced? How do redox reactions produce electric currents? What is a voltaic cell?
Unit Essential Vocabulary	Equilibrium, reversible reaction, equilibrium constant, LeChatlier's principle, soluble, insoluble, acid, base, indicator, buffer, neutralization reaction, pH, pOH, Arrhenius model, Bronsted-Lowry model, weak acid, weak base, strong acid, strong base, titration, oxidation-reduction reaction, oxidizing agent, redox reaction, anode, cathode, battery, corrosion, dry cell, electrolysis, voltaic cell
Resources	Chemistry Textbook, chemicals, lab equipment, Alabama Science in Motion lab equipment, iPad
Assessment(s)	Chapter tests, unit test, formative assessments, lab techniques