

Chemistry

Scope and sequence

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Chemistry: Scope and sequence of content

Course	pp. 9–11	pp.12–13	pp.14–17	pp.18–20	pp.21–23	pp.24–26
Content organiser	1A	1B	2A	2B	3A	3B
Macroscopic properties of matter	<p>explain the differences between elements, compounds and mixtures use examples to describe homogeneous and heterogeneous mixtures explain the difference between a physical and a chemical property explain and describe the differences between physical and chemical changes describe the following methods for separating mixtures:</p> <ul style="list-style-type: none"> ▪ decantation ▪ filtration ▪ crystallisation ▪ evaporation ▪ distillation ▪ chromatography. <p>States of matter and Kinetic Theory</p> <ul style="list-style-type: none"> • use the Kinetic Theory of matter to explain: <ul style="list-style-type: none"> ▪ properties of gases, liquids and solids ▪ phase changes ▪ heating and cooling curves ▪ temperature and kinetic energy. <p>Gas laws use qualitative data to explain the behaviour of gases in response to changes in temperature, pressure and volume.</p> <p>Solutions and solubility describe the different solute/solvent combinations that form different types of solutions explain and apply the concept of solubility to describe: unsaturated and saturated</p>		<ul style="list-style-type: none"> • describe the characteristics of homogeneous and heterogeneous mixtures • distinguish between pure substances, homogeneous mixtures and heterogeneous mixtures. <p>Kinetic Theory</p> <ul style="list-style-type: none"> • use the Kinetic Theory of Matter to explain <ul style="list-style-type: none"> ▪ relationship between heat and temperature ▪ change of phase ▪ vapour pressure and factors that affect vapour pressure ▪ effect on gases of changes in pressure, temperature and volume ▪ the characteristics of gases • predict the effect on gases of changes in pressure, temperature and volume (qualitative only) • explain the boiling point of a liquid. <p>Solutions identify, explain and give examples of saturated, unsaturated and supersaturated solutions apply solubility rules to predict if a precipitate will form when two dilute ionic solutions are mixed (see data sheet) use the colour of ions (see data sheet) to identify reactants and the products in chemical processes explain the effect of concentration on vapour pressure, melting point and boiling point of a solution describe the characteristics and give examples of strong, weak and non-electrolytes</p>		<ul style="list-style-type: none"> • interpret observations, such as the colour changes, of physical and chemical systems at equilibrium • use observable properties, such as the colour of ions, to help predict and explain the formation of products in chemical processes (see data sheet) • use the Kinetic Theory to explain the concept of absolute zero. <p>Solutions</p> <ul style="list-style-type: none"> • apply the solubility rules to predict if a precipitate will form when two dilute ionic solutions are mixed (see data sheet) • perform concentration calculations (mol L^{-1}, g L^{-1}, ppm, percentage composition) • calculate the concentration of ions in solution for strong electrolytes • perform the calculation of concentration and volume involved in the dilution of solutions and the addition of solutions 	

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Content organiser	1A	1B	2A	2B	3A	3B
	solutions concentration scales (g L^{-1}) explain factors that affect solubility and crystallisation.		explain the differences between concentrated and dilute solutions of strong and weak electrolytes.			
Atomic structure and bonding	Atomic structure and Periodic Table <ul style="list-style-type: none"> describe the structure of matter in terms of particles called atoms composed of protons, neutrons and electrons describe and explain the differences between atoms, molecules and ions use an element's position on the Periodic Table to help with the identification of metals and non-metals relate the physical properties of metals and non-metals to their uses. 		Atomic structure and Periodic Table <p>compare the relative charge and relative masses of protons, neutrons and electrons identify elements using their atomic number (Z) explain isotopes using their atomic number (Z) and mass number (A) use the energy level or shell model of electron structure to write the electron configurations for the first twenty elements (Na 2, 8, 1) explain the relationship between position on the Periodic Table and number of valence electrons of elements in groups 1, 2 and 13–18 explain the relationship between the number of valence electrons and chemical properties of elements in groups 1, 2 and 13–18 explain the formation of positive and negative ions for elements in groups 1, 2 and 13–18.</p> Bonding <ul style="list-style-type: none"> describe and explain the formation and characteristics of: <ul style="list-style-type: none"> ionic bonds and ionic substances metallic bonds and metallic substances covalent bonds covalent network and molecular substances describe and explain the relationships between properties and structures of ionic, metallic, covalent network and covalent 		Atomic structure and Periodic Table <ul style="list-style-type: none"> explain the structure of the atom in terms of protons, neutrons and electrons write the electron configuration using the shell model for the first twenty elements e.g. Na. 2, 8, 1 explain trends in ionisation energy, atomic radius and electronegativity across periods and down groups (for main group elements) in the Periodic Table describe and explain the relationship between the number of valence electrons and an element's; <ul style="list-style-type: none"> bonding capacity position on Periodic Table physical and chemical properties. Bonding <ul style="list-style-type: none"> describe and apply the relationships between the physical properties and the structure of ionic, metallic, covalent network and covalent molecular substances use the Valence Shell Electron Pair Repulsion (VSEPR) theory and Lewis structure diagrams to explain and predict and draw the shape of molecules and polyatomic ions (octet only) explain polar and non-polar covalent bonds in terms of the electronegativity of the atoms involved in the bond formation use the relationship 	

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Content organiser	1A	1B	2A	2B	3A	3B
			molecular substances <ul style="list-style-type: none"> draw representations of molecular and ionic substances using electron dot (octet only) or Lewis structure diagrams. 		between molecule shape and bond polarity to predict and explain the polarity of a molecule <ul style="list-style-type: none"> explain the differences between intermolecular and intramolecular forces describe and explain the origin and relative strength of the following intermolecular interactions for molecules of a similar size: <ul style="list-style-type: none"> dispersion forces dipole-dipole attractions hydrogen bonds ion-dipole interactions such as solvation of ions in aqueous solution explain the relationships between physical properties such as melting and boiling point, and the types of intermolecular forces present in substances of similar size apply an understanding of intermolecular interactions to explain the trends in melting and boiling points of hydrides of groups 15, 16 and 17 accounting for the anomalous behaviour of NH_3, H_2O and HF explain and describe the interaction between solute and solvent particles in a solution <ul style="list-style-type: none"> use the nature of the interactions, including the formation of ion-dipole and hydrogen bonds to explain water's ability to dissolve ionic, polar and non-polar solutes. 	

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Content organiser	1A	1B	2A	2B	3A	3B
Chemical reactions	<ul style="list-style-type: none"> write the symbols and names of common elements and compounds that are appropriate to the chosen context describe the difference between elements and compounds in terms of the types of particles interpret chemical formula by identifying the number of atoms in a chemical formula write the formulae of simple familiar compounds state that mass and atoms are conserved during a chemical reaction write word equations to describe chemical reactions identify and name the reactant/s or product/s given an incomplete word equation. <p>Energy changes in chemical reactions</p> <ul style="list-style-type: none"> use observation to identify heat producing and heat absorbing reactions. <p>Reaction rates</p> <ul style="list-style-type: none"> use qualitative data to describe reaction rates (time to complete) e.g. rusting is a slow reaction and precipitation is a fast reaction investigate factors that effect chemical changes involved in processes such as spoiling of food, corrosion control. 	<ul style="list-style-type: none"> describe the observations and write word equations for the following chemical reaction types: <ul style="list-style-type: none"> acid-base acid-metal acid-carbonate simple ion/element displacement 	<ul style="list-style-type: none"> write and interpret formulae of elements and compounds write equations for simple chemical reactions (molecular or ionic from the list below) using state symbols where appropriate. explain conservation of mass, atoms and charge during a chemical reaction use molar volume of gases at STP in calculations involving the evolution of gases perform simple calculations: <ul style="list-style-type: none"> molar mass mole to mole mass to mole mass to mass mass to volume (gases at STP) volume to volume concentration calculations (mol L⁻¹, g L⁻¹) percentage composition perform stoichiometric problems that interrelate mass, molar mass, number of moles of solute, and concentration and volume of solution. <p>Energy effects</p> <ul style="list-style-type: none"> use the Law of Conservation of Energy to explain endothermic and exothermic reactions apply the concepts of system and surroundings to energy transfer explain enthalpy (H) in terms of stored chemical energy explain endothermic and exothermic reactions in terms of bond breaking 	<ul style="list-style-type: none"> describe, write equations and predict observations for the following reaction types: <ul style="list-style-type: none"> acid-base acid-carbonate acid-metal displacement write equations that show only the species involved in the reaction perform calculations <ul style="list-style-type: none"> mass to volume (STP) volume (STP) to moles molecular formulae from empirical formula and molar mass empirical formula calculations using percentage composition, mass composition and combustion data limiting reagent. 	<ul style="list-style-type: none"> describe, write equations for and interpret observations for the following reaction types: <ul style="list-style-type: none"> precipitation solvation of ions in aqueous solution physical and chemical equilibrium write ionic equations appropriate to the chosen context using ions in the list in the Course document. perform calculations involving <ul style="list-style-type: none"> conversion between Celsius and Kelvin temperature scales mass, molar mass, number of moles of solute, concentration and volume of solution and gas volume using PV=nRT percentage purity of reactants or percentage yield in industrial processes a limiting reagent, including <ul style="list-style-type: none"> identification of limiting reagents calculation of excess reagents. <p>Chemical equilibrium</p> <ul style="list-style-type: none"> explain by applying the collision theory how changes in rates of reactions can be accomplished by: <ul style="list-style-type: none"> the presence of catalysts; changes in temperature; pressure of whole system concentration; state of sub-division describe and explain the characteristics of a system in dynamic chemical equilibrium write equilibrium law 	<ul style="list-style-type: none"> describe, write equations for and interpret observations for the following reaction types: <ul style="list-style-type: none"> neutralisation hydrolysis of salts of weak acids and weak bases oxidation and reduction equations in an acidic environment perform volumetric analysis using either acid-base or redox context, and: <ul style="list-style-type: none"> give a description of procedures used and methods for minimising experimental error describe and explain the characteristics of primary standards and standard solutions apply an understanding of end point and equivalence point to the selection of an appropriate indicator in an acid-base titration explain the choice of indicators (in acid-base only) or use of self-indicators (redox) perform calculations based on acid-base and redox titrations determine by calculation the empirical and molecular formulae and the structure of a compound from the analysis of combustion or other data.

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Content organiser	1A	1B	2A	2B	3A	3B
			and bond making <ul style="list-style-type: none"> interpret and explain enthalpy diagrams and equations that include the heat lost or gained (ΔH). Reaction rates <ul style="list-style-type: none"> describe the rate of a reaction in terms of rate of change of a measurable quantity with time identify and apply the factors affecting rates of reaction: <ul style="list-style-type: none"> concentration catalysts temperature state of sub-division apply the collision theory to explain the factors affecting rates of reaction draw and interpret energy profile diagrams to show the transition state, activation energy, uncatalysed and catalysed pathways and the heat of reaction explain the relationship between collision theory, kinetic energy distribution graphs and the rate of a reaction.		expressions for homogeneous and heterogeneous systems <ul style="list-style-type: none"> use K and equilibrium law expression to explain the relative proportions of products and reactants in a system in dynamic chemical equilibrium apply and explain how Le Châtelier's principle can be used to predict the impact of the following changes to a system initially at chemical equilibrium: <ul style="list-style-type: none"> changes in temperature changes in solution concentration changes in partial pressure of a gas addition of a catalyst. 	
Acids and bases in aqueous solutions		<ul style="list-style-type: none"> describe how indicators are used to identify acids and bases explain the relationship between the pH scale and the colour of universal indicator identification of acids by: <ul style="list-style-type: none"> colour on a universal indicator colour chart pH scale value identification of bases by: <ul style="list-style-type: none"> colour on a universal indicator colour chart pH scale value compare the acid and base properties of common 		<ul style="list-style-type: none"> describe, explain and apply an understanding of the Arrhenius and Brønsted-Lowry models of acids and bases describe and explain the difference between strong acids including HCl, H_2SO_4, HNO_3 and weak acids including CH_3COOH and H_3PO_4 identify acids by: <ul style="list-style-type: none"> indicator colour pH scale value reaction with: <ul style="list-style-type: none"> metal carbonates and hydrogen carbonates 		<ul style="list-style-type: none"> apply an understanding of the concept of an electrolyte to explain the self-ionisation of water explain and apply the Arrhenius and Brønsted-Lowry models to describe acids and bases apply the relationship between K_w and temperature to explain the pH value of a neutral solution at different temperatures apply the relationship $\text{pH} = -\log[\text{H}^+]$ to calculate the pH of: <ul style="list-style-type: none"> strong acid solutions

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Content organiser	1A	1B	2A	2B	3A	3B
		substances.		<ul style="list-style-type: none"> ○ metals such as magnesium and iron ○ metal oxides ○ metal hydroxides • describe and explain the difference between strong bases including group 1 and group 2 hydroxides and weak bases including NH_3 and Na_2CO_3 • identify bases by <ul style="list-style-type: none"> ▪ indicator colour ▪ pH scale value ▪ reaction with: <ul style="list-style-type: none"> ○ acids ○ ammonium salts • write equations for the successive ionisation of polyprotic acids • qualitatively apply the pH scale describe properties and reactions of non-metal and metal oxides e.g. reaction of SO_2 with water. 		<ul style="list-style-type: none"> ▪ strong base solutions ▪ the resulting solution when strong acid-base solutions are mixed • apply the Brønsted-Lowry model to the hydrolysis of salts to predict and explain the acidic, basic or neutral nature of salts derived from monoprotic and polyprotic acids, and bases • describe and explain the conjugate nature of buffer solutions <ul style="list-style-type: none"> ▪ explain using Le Châtelier's Principle how buffers respond to the addition of H^+ and OH^- • explain qualitatively the concept of buffering capacity.
Oxidation and reduction				<ul style="list-style-type: none"> • explain oxidation and reduction as an electron transfer process • calculate oxidation numbers • identify and name oxidants and reductants in equations • identify oxidation-reduction reactions using oxidation numbers • describe, write equations for and interpret observations for: <ul style="list-style-type: none"> ▪ metal displacement reactions ▪ halogen displacement reactions • write balanced simple redox equations (metal/metal ion, metal/hydrogen ion and halogen/halide ion) • describe and explain how an electric current is conducted in an electrolytic cell • describe and explain the 		<ul style="list-style-type: none"> • apply the table of Standard Reductions Potentials to determine the relative strength of oxidising and reducing agents • apply oxidation numbers to identify redox equations and/or oxidants and reductants <ul style="list-style-type: none"> ▪ identify by name and/or formula common oxidising and reducing agents including O_2, Cl_2, MnO_4^-, $\text{Cr}_2\text{O}_7^{2-}$, ClO^-, H^+, concentrated sulfuric acid, concentrated nitric acid and common reducing agents (reductants) including Zn, C, H_2, Fe^{2+}, $\text{C}_2\text{O}_4^{2-}$ • describe and explain the role of the following in the operation of an electrochemical (galvanic) cell: <ul style="list-style-type: none"> ▪ anode processes

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Content organiser	1A	1B	2A	2B	3A	3B
				<p>following during the operation of an electrolytic cell:</p> <ul style="list-style-type: none"> ▪ anode processes ▪ cathode processes ▪ role of the electrolyte ▪ direction of ion migration ▪ direction of electron flow in external circuit <ul style="list-style-type: none"> • predict and name the electrode products for the electrolysis of molten metal halides only. 		<ul style="list-style-type: none"> ▪ cathode processes ▪ electrolyte ▪ salt bridge and ion migration ▪ electron flow in external circuit • describe the electrical potential of a galvanic cell as the ability of a cell to produce an electric current • describe and explain how an electrochemical cell can be considered as two half-cells • explain the role of the hydrogen half-cell in the table of Standard Reduction Potentials • explain the limitations of Standard Reduction Potentials table
Organic chemistry		<p>identify organic materials as those that contain carbon and hydrogen and produce carbon dioxide and water when burnt</p> <p>explain the origins of hydrocarbons</p> <p>describe simple polymers (natural and/or synthetic).</p>		<ul style="list-style-type: none"> • describe the bonding capacity of carbon • explain the diversity of carbon based compounds • Alkanes: <ul style="list-style-type: none"> ▪ name and draw straight and simple branched to C₈ ▪ observations and equations for <ul style="list-style-type: none"> ○ substitution reactions ○ combustion reactions ▪ draw and name structural isomers • Alkenes: <ul style="list-style-type: none"> ▪ name and draw straight and simple branched to C₈ (only one double bond per structure) ▪ write observations and equations for: <ul style="list-style-type: none"> ○ addition reactions with halogens and hydrogen ○ combustion reactions ▪ draw and name structural and geometric isomers • Cycloalkanes and 		<ul style="list-style-type: none"> • write balanced equations for the following reactions of hydrocarbons: <ul style="list-style-type: none"> ▪ substitution reactions of alkanes ▪ addition reactions of alkenes ▪ combustion • draw and name structural isomers of alkanes and structural and geometric isomers of alkenes • recognise the functional groups—alcohols, aldehydes, ketones, carboxylic acids and esters and name simple straight chain examples to C₈ • explain the relationship between the presence of a functional group and chemical behaviour • alcohols: <ul style="list-style-type: none"> ▪ name simple straight chain examples to C₈ ▪ draw simple structural formula for primary, secondary and tertiary alcohols ▪ explain physical properties of alcohols such as melting and

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Content organiser	1A	1B	2A	2B	3A	3B
				Cycloalkenes: <ul style="list-style-type: none"> ▪ draw and name simple structures to C₈ ▪ write observations and equations for: <ul style="list-style-type: none"> ○ substitution and combustion reactions for cycloalkanes ○ addition and combustion reactions for cycloalkenes • Benzene: <ul style="list-style-type: none"> ▪ explain the unique structure and reactivity of benzene ▪ write equations for: <ul style="list-style-type: none"> ○ catalysed substitution reactions with halogens ○ combustion reactions. 		boiling points and solubility in polar and non-polar solvents in terms of the intermolecular interactions <ul style="list-style-type: none"> ▪ describe, write equations for and predict and interpret observations for the following reactions of alcohols: <ul style="list-style-type: none"> ○ with carboxylic acids ○ with acidified Cr₂O₇²⁻ and MnO₄⁻ to produce: <ul style="list-style-type: none"> - aldehydes - ketones - carboxylic acids • amines: <ul style="list-style-type: none"> ▪ recognise primary amines ▪ name and draw simple structural formulae for primary amines only • α amino acids: <ul style="list-style-type: none"> ▪ recognise general structural formula for α amino acids.
Applied chemistry	<ul style="list-style-type: none"> • explain everyday chemical changes such as rusting, burning, respiration, composting and cooking in terms of: <ul style="list-style-type: none"> ▪ rate of reaction ▪ energy changes • analyse food labelling to determine <ul style="list-style-type: none"> ▪ concentration scale used to describe the nutrition information provided ▪ shelf life (length of use by dates) • describe and explain situations where the rates of chemical reactions are altered e.g. food preservation • investigate real world problems in a laboratory setting with appropriate 	<ul style="list-style-type: none"> • explain where and why acids and bases are used in everyday life • prepare simple polymers and describe their properties (PVA/borax or casein glue) • interpret information contained on chemical labels such as constituent chemicals, dilutions and disposal • perform simple chemical reactions involving everyday chemicals (acid/base, acid/carbonate etc.) and describe their observations • explain the need for safety information and waste disposal procedures given on the packaging of commonly used chemicals • investigate real world 	<ul style="list-style-type: none"> • describe and give examples of solutions and their uses in and around the home • explain concentration units used in household mixtures (g 100g⁻¹, mL L⁻¹, mg mL⁻¹, percentage composition) • describe the relationships between properties and uses of ionic, metallic, covalent network and covalent molecular substances found in and around the home • describe and explain common examples of endothermic and exothermic reactions or processes in and around the home e.g. combustion, hot packs, change of phase 	<ul style="list-style-type: none"> • describe and explain the formation and impact of acids in the environment e.g. rain, acid rain, soil acidification in agriculture or acidification of ground water by mineral sulfides • describe electro-winning and electro-refining • describe and explain the sources and uses of hydrocarbons e.g. fuels • investigate real world problems in a laboratory setting with appropriate teacher direction, considering: <ul style="list-style-type: none"> ▪ sources of uncertainty in experimental measurements ▪ selection of the appropriate units of measurement of quantities such as 	<ul style="list-style-type: none"> • apply the concept of equilibrium in biological, environmental or laboratory situations where a system is in dynamic chemical equilibrium • explain the reasons for compromises between the ideal and actual conditions used in industrial processes that involve reversible reactions • write the chemical formulae for molecular compounds based on the number of atoms of each element present as inferred from the systematic names • write the molecular formulae of commonly encountered molecules that have non-systematic names 	<ul style="list-style-type: none"> • describe the chemistry of common organic substances such as soaps, detergents, amino acids and trans-fatty acids • apply and explain the concept of polymerisation such as polypeptides, silicones or plastics • investigate real world problems in a laboratory setting, considering: <ul style="list-style-type: none"> ▪ sources of uncertainty in experimental measurements ▪ selection of the appropriate units of measurement of quantities such as volume and time • investigate a biological, environmental or industrial redox process applicable to context/s chosen e.g.

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	<p>teacher direction, considering:</p> <ul style="list-style-type: none"> ▪ sources of uncertainty in experimental measurements ▪ selection of the appropriate units of measurement of quantities such as volume and time <ul style="list-style-type: none"> • investigate a separation technique applicable to the context/s chosen and <ul style="list-style-type: none"> ▪ describe the process ▪ explain relationships between the chosen technique and the chemical or physical property, or properties, the process is based on ▪ describe the safe handling and disposal of chemicals and materials involved • use labels and other manufacturer's information to explain the appropriate method for use and disposal of household chemicals e.g. pool chemicals, bleach, caustic soda, car oil • describe and explain reasons behind the recycling of inorganic household materials e.g. glass and aluminium • read, write and interpret symbols and formulae of some common elements and compounds found on labels of common household substances (fertilisers, pool chemicals etc.) • perform simple calculations in context such as solubility and concentration (g L^{-1} and g cm^{-3}), dilutions. 	<p>problems in a laboratory setting with appropriate teacher direction, considering:</p> <ul style="list-style-type: none"> ▪ sources of uncertainty in experimental measurements ▪ selection of the appropriate units of measurement of quantities such as volume and time <ul style="list-style-type: none"> • investigate, by field work or case study, a biological, environmental or industrial process in the local community e.g. pH of soils in a local ecosystem, comparison of the types of crude oil, comparison the strength of casein and PVA glues. Include: <ul style="list-style-type: none"> ▪ a description of the chosen process ▪ an explanation of relationships between properties and uses ▪ where appropriate: <ul style="list-style-type: none"> ○ safe handling and disposal of any materials or specific chemicals involved in the process. 	<ul style="list-style-type: none"> • describe and explain examples where rates of reaction have been altered in and around the home • write the chemical formulae for molecular compounds based on the number of atoms of each element present as inferred from the systematic names • write the molecular formulae of commonly encountered molecules that have non-systematic names • investigate real world problems in a laboratory setting with appropriate teacher direction, considering: <ul style="list-style-type: none"> ▪ sources of uncertainty in experimental measurements ▪ selection of the appropriate units of measurement of quantities such as volume and time • investigate a biological, environmental or industrial process applicable to a chosen context e.g. chemicals in the garden, kitchen chemistry or chemistry of cleaning. Include: <ul style="list-style-type: none"> ▪ a description of the chosen process ▪ an explanation of relationships between the chosen process and chemical models and theories ▪ where appropriate: <ul style="list-style-type: none"> ○ safe handling and disposal of any materials or specific chemicals involved in the process ○ discussion of sustainability of the process 	<p>volume and time</p> <ul style="list-style-type: none"> • investigate a biological, environmental or industrial process applicable to the context/s chosen e.g. catalytic cracking of hydrocarbons, electroplating, electrowinning or chemistry in agriculture. Include: <ul style="list-style-type: none"> ▪ a description of the chosen process ▪ an explanation of the relationships between the chosen process and chemical models and theories ▪ where appropriate: <ul style="list-style-type: none"> ○ safe handling and disposal of any materials or specific chemicals involved in the process ○ discussion of sustainability of the process ○ discussion of the environmental impact of the process. 	<ul style="list-style-type: none"> • investigate real world problems in a laboratory setting, considering: <ul style="list-style-type: none"> ▪ sources of uncertainty in experimental measurements ▪ selection of the appropriate units of measurement of quantities such as volume and time • investigate a biological, environmental or industrial process applicable to context/s chosen. Include: <ul style="list-style-type: none"> ▪ a description of the chosen process and the chemical reactions occurring ▪ an explanation of the relationships between the chosen process and chemical models and theories ▪ where appropriate <ul style="list-style-type: none"> ○ safe handling and disposal of any materials or specific chemicals involved in the process ○ discussion of the sustainability of the process ○ discussion of the environmental impact of the process 	<p>metal extraction, commercial electrochemical cells, corrosion, etc. Include:</p> <ul style="list-style-type: none"> ▪ a description of the chosen process and the chemical reactions occurring ▪ an explanation of the relationships between the chosen process and chemical models and theories ▪ where appropriate <ul style="list-style-type: none"> ○ safe handling and disposal of any materials or specific chemicals involved in the process ○ discussion of the sustainability of the process ○ discussion of the environmental impact of the process.