Curriculum Plans: Year __11__ (Combined Science - Chemistry)

	Topic	Knowledge: By the end of the unit students will know:	Skills: What skills will students have developed by the end of this unit?	Key terms: What new key terms and vocabulary will be learnt in this unit?	Summative Assessment: How will pupils be assessed in this unit?
Michaelmas 1	4.3 Quantitative Chemistry	**- the law of conservation of mass and how to balance chemical symbol equations** **- how to calculate the relative formula mass from relative atomic mass and using both to calculate the moles of a substance** **- Using moles to calculate reacting masses and understanding the meaning of limiting and excess reagents** **- calculating concentration of solutions**	- Balancing chemical equations with respect to the conservation of mass. - Calculating formula masses, moles, and concentrations. - Applying quantitative analysis in practical and theoretical contexts to predict outcomes	**Avogadro constant:** *the number of atoms, molecules, or ions in a mole of any substance (i.e., 6.02 × 10^{-23} per mol)* **Mole:** *the amount of substance in the relative atomic or formula mass of a substance in gram The symbol for the unit mole is mol* **Concentration:** *the amount of a substance dissolved in a given volume of liquid* **Limiting reactant :** *the reactant in a chemical reaction that when used up causes the reaction to stop* **Relative formula mass RFM :** *the total of the relative atomic masses, added up in the ratio shown in the chemical formula, of a substance* **Relative atomic mass A_r:** *the average mass of the atoms of an element compared with carbon-12 (which is given a mass of exactly 12). (Found on the periodic table)* **Thermal decomposition:** *Reaction where high temperature causes a substance to break down into simpler substances.* **Excess:** *When the amount of a reactant is greater than the mount that can react.* **Limiting reactant:** *The reactant in a reaction that determines the amount of products formed. Any other reagents are all in excess and will not react.*	End of Unit Test
Michaelmas 2	4.6 Rates of reaction 4.7 Organic Chemistry 4.8 Chemical Analysis	**- how to measure and then use experimental data to calculate rate of reaction** **- Know the four factors that affect rates of reaction and be able to explain each using collision theory** **- Understand what crude oil is and how hydrocarbons**	- Balancing chemical equations related to cracking and combustion reactions. - Interpreting structural formulas for different organic molecules (alkanes, alkenes).	**Rate of reaction:** *The speed at which a reaction takes place. This can be worked out in two ways:* *Mean rate of reaction = quantity of reactant used ÷ time* *Mean rate of reaction = quantity of product formed ÷ time* **Activation energy:** *The minimum energy particles must have to react* **Catalyst:** *A substance that speeds up a chemical reaction by lowering the activation energy*	
Lent 1					End of Unit Test

		can be extracted from it using fractional distillation **- know that alkanes are a type of hydrocarbon** **- know the products of combustion of alkanes and be able to balance the chemical equations** **- know what alkenes are and how they can be produced by cracking of alkanes** **- recognise pure substances, mixtures and formulations** **- know how to correctly use chromatography to separate coloured mixtures** **- know the tests for 4 gases**	- Predicting and explaining the outcomes of chemical reactions involving hydrocarbons. - Interpreting data from charts, graphs, and tables related to environmental chemistry. - Evaluating the environmental impact of products through life cycle assessments. - Comparing methods of metal extraction based on sustainability.	**Enzymes:** *Molecules that act as catalysts in biological systems* **Closed system:** *A system where no substances can get in or out* **Dynamic equilibrium:** *System where both the forward and reverse reactions are taking place simultaneously and at the same rate* **Hydrocarbon:** *A molecule made of hydrogen and carbon atoms only* **Crude oil:** *A mixture of a very large number of compounds.* **Mixture:** *Two or more elements or compounds that are not chemically joined together.* **Alkanes:** *A group of saturated hydrocarbons with the general formula* C_nH_{2n+2} **General formula:** *This shows the number of atoms of each element in a substance which has 'n' carbon atoms.* **Saturated:** *Molecule containing no double bonds.* **Unsaturated:** *Molecule containing double bond(s).* **Fractional distillation:** *A method of separating the different hydrocarbons in crude oil by using the fact that they have different boiling points.* **Boiling point:** *The temperature at which the liquid boils and evaporates or the gas condenses.* **Volatility:** *The tendency of a liquid to turn into a gas.* **Viscosity:** *How easily a liquid flows.* **Flammability:** *How easily a fuel burns.* **Complete Combustion:** *When a hydrocarbon fuel is oxidised and energy is released. The carbon and hydrogen are oxidised, producing carbon dioxide and water.* **Cracking:** *The process of using heat to turn large hydrocarbons into smaller, more useful molecules.* **Alkenes:** *A group of unsaturated hydrocarbons, with the general formula* C_nH_{2n}	

				Unsaturated: *When hydrocarbons like alkenes have a double bond and so have the potential to bond with extra hydrogen atoms.* **Bromine water:** *Used to test for alkenes – turns from orange to colourless.* **Polymers:** *A long molecule made of lots of monomers joined together.* **Pure substance:** *A single element or compound not mixed with any other substance.* **Formulation:** *A mixture that has been designed as a useful product. Many formulations are complex mixtures in which each chemical has a particular purpose.* **Chromatography:** *A technique used to separate mixtures.* **Stationary phase:** *The material the sample travels on but which doesn't move itself e.g. paper* **Mobile phase:** *The solvent which moves the sample. The more soluble the sample is in the solvent, the further it moves.* **Solvent front:** *The maximum point on the chromatography paper that the mobile phase reaches – usually marked on afterwards using a pencil.* **Retention Factor:** *The ratio of how far a substance moves compared to the distance to the solvent front. For the same substance this number will always be the same.*	
Lent 2	4.6 Equilibria 4.10 Using Resources	**- Identify Reversible reactions** **- know the conditions needed for an equilibrium to occur** **- explain how changing factors affects the position of a chemical Equilibrium**		**equilibrium:** *In chemical reactions, a situation where the forward and backward reactions happen at the same rate, and the concentrations of the substances stay the same.* **equilibrium position:** *A measure of the relative concentrations of substances in an equilibrium, showing if there are more reactants or products at equilibrium.* **reversible reaction:** *A chemical reaction which can go both ways.*	

		- understand why alternative methods of metal extraction are necessary and know examples of alternative methods **- be able to construct and evaluate life cycle assessments** **- know the reasons for reducing the use of the Earths resources**		**Le Chatelier's Principle:** *"if a system is at equilibrium and a change is made to any of the conditions, then the system responds to counteract that change."* **Exothermic:** *Reaction in which energy is given out to the surroundings. The surroundings then have more energy than they started with so the temperature increases* **Endothermic:** *Reaction in which energy is taken in. The surroundings then have less energy so the temperature decreases* ***Sustainable development**: Using resources to meet the needs of people today without preventing people in the future from meeting theirs.* ***Life cycle assessment**: An examination of the impact of a product on the environment throughout its life.* ***Value judgement**: An assessment of a situation that may be subjective, based on a persons opinion and / or values.* ***Ore**: A rock from which a metal can be extracted for profit.* ***Phytomining**: The use of plants to absorb metal compounds from soil as part of metal extraction.* ***Bioleaching**: The use of dilute acid to produce soluble metal compounds from insoluble metal compounds.* ***Leachate**: A solution produced by leaching or bioleaching.*	
Trinity 1					
Trinity 2					