

(Triple Science) Chemistry Paper 2	Confidence Level		
	Red	Amber	Green
Topic 6 – Groups in the periodic table			
Explain why some elements can be classified as alkali metals, halogens or noble gases, based on their position in the periodic table			
Recall the physical properties of alkali metals			
Describe the reactions of lithium, sodium and potassium with water			
Describe the pattern in reactivity of the alkali metals, lithium, sodium and potassium, with water; and use this pattern to predict the reactivity of other alkali metals			
Explain this pattern in reactivity in terms of electronic configurations			
Recall the colours and physical states of chlorine, bromine and iodine at room temperature			
Describe the pattern in the physical properties of the halogens, chlorine, bromine and iodine, and use this pattern to predict the physical properties of other halogens			
Describe the chemical test for chlorine			
Describe the reactions of the halogens, chlorine, bromine and iodine, with metals to form metal halides, and use this pattern to predict the reactions of other halogens			
Recall that the halogens, chlorine, bromine and iodine, form hydrogen halides which dissolve in water to form acidic solutions, and use this pattern to predict the reactions of other halogens			
Describe the relative reactivity of the halogens chlorine, bromine and iodine, as shown by their displacement reactions with halide ions and use this to predict the reactions of astatine			
Explain the relative reactivity of the halogens in terms of electronic configurations			
Explain why the noble gases are chemically inert, compared with the other elements, in terms of their electronic configurations			
Explain how the uses of noble gases depend on their inertness, low density and/or non-flammability			
Describe the pattern in the physical properties of some noble gases and use this pattern to predict the physical properties of other noble gases			
Higher Tier Only			
Explain why these displacement reactions are redox reactions in terms of gain and loss of electrons, identifying which of these are oxidised and which are reduced			
Topic 7 – Rates of reaction and energy changes			
Suggest practical methods for determining the rate of a given reaction			
Explain how reactions occur by discussing the collision theory			
Explain the effects on rates of reaction of changes in temperature, concentration, surface area to volume ratio and pressure in terms of frequency and energy of collisions			
Interpret graphs of mass, volume or concentration of reactant or product against time			
Describe what a catalyst is			
Explain how the addition of a catalyst increases the rate of a reaction in terms of activation energy			
Recall that enzymes are biological catalysts and that enzymes are used in the production of alcoholic drinks			
Recall when chemical changes occur that they cause changes in heat energy			
Describe the differences between endothermic and exothermic in terms of energy taken in or given out			

Recall if bonds are broken or made for each of the following reactions: endothermic and exothermic			
Describe why the overall heat energy change for a reaction is exothermic or endothermic in terms of bonds being made or broken			
Explain the term activation energy			
Draw and label reaction profiles for endothermic and exothermic reactions, identifying activation energy			
<i>Core Practical: Investigate the effects of changing the conditions of a reaction on the rates of chemical reactions by: measuring the production of a gas/observing a colour change</i>			
Higher Tier Only			
Calculate the energy change in a reaction given the energies of bonds (in kJ mol^{-1})			
Topic 8 – Fuels and Earth science			
Recall what a hydrocarbon is			
Describe and explain what crude oil is and why it is important			
Describe and explain the separation of crude oil into simpler, more useful mixtures by the process of fractional distillation			
Recall the names and uses of the following fractions: gases, petrol, kerosene, diesel oil, fuel oil and bitumen			
Explain how hydrocarbons in different fractions differ from each other in terms of boiling point, number of C & H's, flammability and viscosity			
Explain what a homologous series of hydrocarbon compounds is			
Describe the complete combustion of hydrocarbon fuels including energy changes and products			
Explain why the incomplete combustion of hydrocarbons can produce carbon and carbon monoxide			
Explain how carbon monoxide behaves as a toxic gas			
Describe the problems caused by incomplete combustion in appliances that use carbon compounds as fuels			
Explain how impurities in some hydrocarbon fuels result in the production of sulphur dioxide			
Explain some problems associated with acid rain			
Explain why, when fuels are burned in engines, oxides of nitrogen are formed and that they are pollutants			
Evaluate the advantages and disadvantages of using hydrogen, rather than petrol, as a fuel in cars			
Recall the names and sources of some renewable fossil fuels			
Explain what cracking is and why it is necessary			
Recall that the gases produced by volcanic activity formed the Earth's early atmosphere			
Describe what the Earth's early atmosphere was thought to contain			
Explain what the oceans were formed from			
Explain why the amount of carbon dioxide in the atmosphere decreases when the oceans were formed			
Explain how the growth of primitive plants changes the composition of gases in the atmosphere			
Describe the chemical test for oxygen			
Describe and explain the greenhouse effect and name the gases that contribute to it			
Evaluate the evidence for human activity causing climate change			
Describe the potential effects on the climate of increased levels of carbon dioxide and methane generated by human activity			
Describe how effects on the climate may be mitigated: consider scale, risk and environmental implications			

Topic 9a – Separate chemistry 2 part a			
Chem ONLY: Explain why the test for any ion must be unique			
Chem ONLY: Describe flame tests to identify the following ions in solids: Li ⁺ , Na ⁺ , K ⁺ , Ca ²⁺ , Cu ²⁺ including the colours of the flames			
Chem ONLY: Describe tests to identify the following ions: Al ³⁺ , Ca ²⁺ , Cu ²⁺ , Fe ²⁺ , Fe ³⁺ , NH ₄ using NaOH solution			
Chem ONLY: Describe the chemical test for ammonia			
Chem ONLY: Describe tests to identify the following ions: CO ₃ ²⁻ , SO ₄ ²⁻ , Cl ⁻ , Br ⁻ , I ⁻			
<i>Chem ONLY: Core Practical: Identify the ions in unknown salts, using the tests for the specified cations and anions in the specification</i>			
Chem ONLY: Identify the ions in unknown salts, using results of the tests stated			
Chem ONLY: Describe that instrumental methods of analysis are available and that these may improve sensitivity, accuracy and speed of tests			
Chem ONLY: Evaluate data from a flame photometer to determine the concentration of ions in dilute solution using a calibration curve			
Chem ONLY: Evaluate data from a flame photometer to identify metal ions by comparing the data with reference data			
Chem ONLY: To identify metal ions by comparing the data with reference data			
Chem ONLY: Recall the formulae of molecules of the alkanes, methane, ethane, propane and butane, and draw the structure of these			
Chem ONLY: Explain why the alkanes are saturated hydrocarbons			
Chem ONLY: Recall the formulae of molecules of the alkenes, ethene, propene, butene, and draw the structures (but-1-ene and but-2-ene only)			
Chem ONLY: Explain why the alkenes are unsaturated hydrocarbons			
Chem ONLY: Recall the addition reaction of ethene with bromine, showing the structures of reactants and products, and extend this to other alkenes			
Chem ONLY: Explain how bromine water is used to distinguish between alkanes and alkenes			
Chem ONLY: Describe how the complete combustion of alkanes and alkenes involves the oxidation of the hydrocarbons, name the products			
Topic 9b – Separate chemistry 2 part b			
Chem ONLY: Recall that a polymer is a substance of high average relative molecular mass made up of small repeating units			
Chem ONLY: Describe how ethene molecules can combine together in a polymerisation reaction			
Chem ONLY: Describe that the addition polymer formed is called polyethene			
Chem ONLY: Describe how other addition polymers can be made by combining together other monomer molecules containing C=C			
Chem ONLY: Describe how to deduce the structure of a monomer from the structure of an addition polymer and vice versa			
Chem ONLY: Explain how the uses of polymers are related to their properties and vice versa			
Chem ONLY: Describe some problems associated with polymers including the availability of starting materials			
Chem ONLY: Describe the advantages and disadvantages of recycling polymers, including economic implications, availability of starting materials and environmental impact			
Chem ONLY: Recall that DNA is a polymer made from four different monomers called nucleotides			
Chem ONLY: Recall that starch is a polymer based on sugars			
Chem ONLY: Recall that proteins are polymers based on amino acids			
Chem ONLY: Recall the formulae of molecules of the alcohols, methanol, ethanol, propanol and butanol, and draw the structures of these molecules, showing all covalent bonds			

Chem ONLY: Recall that the functional group in alcohols is –OH			
<i>Chem ONLY: Core Practical: Investigate the temperature rise produced in a known mass of water by the combustion of the alcohols ethanol, propanol, butanol and pentanol</i>			
Chem ONLY: Recall the formulae of molecules of the carboxylic acids, methanoic, ethanoic, propanoic and butanoic acids, and draw the structures of these molecules, showing all covalent bonds			
Chem ONLY: Recall that the functional group in carboxylic acids is –COOH			
Chem ONLY: Recall that ethanol can be oxidised to produce ethanoic acid and extend this to other alcohols			
Chem ONLY: Recall members of a given homologous series have similar reactions because their molecules contain the same functional group and use this to predict the products of other in series			
Chem ONLY: Describe the production of ethanol by fermentation of carbohydrates in aqueous solution, using yeast to provide enzymes			
Chem ONLY: Explain how to obtain a concentrated solution of ethanol by fractional distillation of the fermentation mixture			
Chem ONLY: Compare the size of nanoparticles with the sizes of atoms and molecules			
Chem ONLY: Describe how the properties of nanoparticulate materials are related to their uses including surface area to volume ratio of the particles they contain, including sunscreens			
Chem ONLY: Explain the possible risks associated with some nanoparticulate materials			
Chem ONLY: Compare, using data, the physical properties of glass and clay ceramics, polymers, composites and metals			
Chem ONLY: Describe how the properties of nanoparticulate materials are related to their uses including surface area to volume ratio of the particles they contain, including sunscreens			
Chem ONLY: Explain the possible risks associated with some nanoparticulate materials			
Chem ONLY: Compare, using data, the physical properties of glass and clay ceramics, polymers, composites and metals			
Chem ONLY: Explain why the properties of a material make it suitable for a given use and use data to select materials appropriate for specific uses			
Higher Tier Only			
Explain why polyesters are condensation polymers			
Explain how a polyester is formed when a monomer molecule containing two carboxylic acid groups is reacted with a monomer molecule containing two alcohol groups			
Explain how a molecule of water is formed each time an ester link is formed			