Key Stage 4 Curriculum Map - Chemistry

	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Year 10	Key Learning Objectives: 1. Use the names and symbols of the first 20 elements in the periodic table, the elements in Groups 1 and 7, and other elements in this specification 2. To calculate the numbers of protons, neutrons and electrons in an atom or ion, given its atomic number and mass number. 3. Suggest suitable separation and purification techniques for mixtures when given appropriate information. 4. To explain why the new evidence from the scattering experiment led to a change in the atomic model 5. To describe these steps in the development of the periodic table. 6. Explain how the position of an element in the periodic table is related to the arrangement of electrons in its atoms and hence to its atomic number 7. explain how properties of the elements in Group 1,2,7 and 0 depend on the outer shell of electrons of the atoms 8. predict properties from given trends down the group	Key Learning Objectives: 1. Students should be able to explain chemical bonding in terms of electrostatic forces and the transfer or sharing of electrons. 2. Work out the empirical formula of an ionic compound from a given model or diagram that shows the ions in the structure. 3. Recognise substances as small molecules, polymers or giant structures from diagrams showing their bonding. 4. Recognise substances as metallic giant structures from diagrams showing their bonding. 5. To identify and Properties of ionic,covalent and metallic compounds 6. Explain why alloys are harder than pure metals in terms of distortion of the layers of atoms in the structure of a pure metal. 7. Explain the properties of diamond in terms of its structure and bonding 8. Recognise graphene and fullerenes from diagrams and descriptions of their bonding and structure	Key Learning Objectives: 1. Explain any observed changes in mass in non-enclosed systems during a chemical reaction given the balanced symbol equation for the reaction and explain these changes in terms of the particle model. 2. Represent the distribution of results and make estimations of uncertainty 3. Use the range of a set of measurements about the mean as a measure of uncertainty(HT) 4. Understand that the measurement of amounts in moles can apply to atoms, molecules, ions, electrons, formulae and equations (HT). 5. use the relative formula mass of a substance to calculate the number of moles in a given mass of that substance and vice versa. 6. Use the relative formula mass of a substance to calculate the number of moles in a given mass of that substance and vice versa. 7. Calculate the mass of solute in a given volume of solution of known concentration in terms of mass per given volume of solution.	Key Learning Objectives: 1. Explain reduction and oxidation in terms of loss or gain of oxygen. 2. Explain how the reactivity of metals with water or dilute acids is related to the tendency of the metal to form its positive ion 3. Deduce an order of reactivity of metals based on experimental results. 4. Interpret or evaluate specific metal extraction processes when given appropriate information 5. Write ionic equations for displacement reactions 6. Identify in a given reaction, symbol equation or half equation which species are oxidised and which are reduced. 7. Predict products from given reactants 8. Use the formulae of common ions to deduce the formulae of salts. 9. Write half equations for the reactions occurring at the electrodes during electrolysis (HT)	Key Learning Objectives: 1. Distinguish between exothermic and endothermic reactions on the basis of the temperature change of the surroundings 2. Evaluate uses and applications of exothermic and endothermic reactions given appropriate information 3. Draw simple reaction profiles (energy level diagrams) for exothermic and endothermic reactions showing the relative energies of reactants and products, the activation energy and the overall energy change, with a curved line to show the energy as the reaction proceeds 4. Use reaction profiles to identify reactions as exothermic or endothermic 5. Explain that the activation energy is the energy needed for a reaction to occur 6. Students should be able to calculate the energy transferred in chemical reactions using bond energies supplied. (HT)	Key Learning Objectives: 1. Calculate the mean rate of a reaction from given information about the quantity of a reactant used or the quantity of a product formed and the time taken 2. Draw, and interpret, graphs showing the quantity of product formed or quantity of reactant used up against time 3. Draw tangents to the curves on these graphs and use the slope of the tangent as a measure of the rate of reaction 4. Calculate the gradient of a tangent to the curve on these graphs as a measure of rate of reaction at a specific time(HT) 5. Predict and explain using collision theory the effects of changing conditions of concentration, pressure and temperature on the rate of a reaction 6. Identify catalysts in reactions from their effect on the rate of reaction 7. Students should be able to make qualitative predictions about the effect of changes on systems at equilibrium when given appropriate information.
	Key Assessment: Practical: demo group 1 elements reaction with water Written: TBC	Key Assessment: Practical: N/A Written: TBC	Key Assessment: Practical: change in mass in a chemical reaction Written:TBC	Key Assessment: Practical: reactivity of metals with water and reactivity of metals with dilute acids Written:TBC	Key Assessment: Practical: investigate the variables that affect temperature changes in reacting solutions Written:TBC	Key Assessment: Practical:investigate how changes in concentration affect the rates of reactions by a method involving measuring the volume of a gas produced and a method involving a change in colour or turbidity. Written:TBC

Year 11	Key Learning Objectives: 1. Recognise substances as alkanes given their formulae in these forms. 2. Explain how fractional distillation works in terms of evaporation and condensation. 3. Write balanced equations for the complete combustion of hydrocarbons with a given formula. 4. Recall how boiling point, viscosity and flammability change with increasing molecular size. 5. Balance chemical equations as examples of cracking given the formulae of the reactants and products. 6. Give examples to illustrate the usefulness of cracking. 7. Explain how modern life depends on the uses of hydrocarbons.	Key Learning Objectives: 1. State that Instrumental methods provide fast, sensitive and accurate means of analysing chemicals, and are particularly useful when the amount of chemical being analysed is small. 2. Use melting point and boiling point data to distinguish pure from impure substances. 3. Identify formulations given appropriate information. 4. Explain how paper chromatography separates mixtures 5. Suggest how chromatographic methods can be used for distinguishing pure substances from impure substances 6. Interpret chromatograms and determine Rf values from chromatograms 7. Use of different tests to identify hydrogen,carbon dioxide,oxygen and Chlorine	Key Learning Objectives: 1. Interpret evidence and evaluate different theories about the Earth's early atmosphere. 2. Explain how oxygen increased 3. Explain how Carbon dioxide decreased 4. Describe the greenhouse effect in terms of the interaction of short and long wavelength radiation with matter. 5. Recall two human activities that increase the amounts of each of the greenhouse gases carbon dioxide and methane 6. Evaluate the quality of evidence in a report about global climate change given appropriate information 7. Describe uncertainties in the evidence base 8. Recognise the importance of peer review of results and of communicating results to a wide range of audiences. 9. Describe actions to reduce emissions of carbon dioxide and methane	Key Learning Objectives: 1. Describe how carbon monoxide, soot (carbon particles), sulfur dioxide and oxides of nitrogen are produced by burning fuels 2. Predict the products of combustion of a fuel given appropriate information about the composition of the fuel and the conditions in which it is used. 3. Describe and explain the problems caused by increased amounts of these pollutants in the air. 4. State examples of natural products that are supplemented or replaced by agricultural and synthetic products 5. Distinguish between finite and renewable resources given appropriate information. 6. distinguish between potable water and pure water 7. Describe the differences in treatment of groundwater and salty water	Key Learning Objectives: Revising using exam techniques	Key Learning Objectives: Revising using exam techniques
	Key Assessment: Practical: Demo on combustion Written:TBC	Key Assessment: Practical: Tests to identify hydrogen,carbon dioxide,oxygen and Chlorine Written:TBC	Key Assessment: Practical:N/A Written:TBC	Key Assessment: Practical:Analysis and purification of water samples from different sources, including pH, dissolved solids and distillation. Written:TBC	Key Assessment: Past paper questions	Key Assessment: Past paper questions