(Science/Chemistry) Long-Term Plan

Ousedale School
Be Kind | Work Hard | Succeed Together

Long-term planning (LTPs) - Planning how the key concepts, knowledge, skills identified in the Progression map will be delivered termly per year group
Ensuring that end points & NC/spec are covered
Identifying what assessments are planned and when
Ensuring whole school intent priorities to be planned for

(Year 12 Chemistry)						
	Autumn 1	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
Unit title:	Teacher 1 (3 hrs) 1 Atomic Structure 2 Amount of Substance Teacher 2 (2 hrs) 3 Bonding	Teacher 1 (3 hrs) 2 Amount of Substance 11 Introduction to Organic Chemistry Teacher 2 (2 hrs) 3 Bonding 8 Redox	Teacher 1 (3 hrs) 11 Introduction to Organic Chemistry 12 Alkanes 14 Alkenes 13 Haloalkanes Teacher 2 (2 hrs) 8 Redox 9 Periodicity and Group 2 10 Halogens	Teacher 1 (3 hrs) 13 Haloalkanes 15 Alcohols 16 Organic Analysis Teacher 2 (2 hrs) 10 Halogens 5 Kinetics	Teacher 1 (3 hrs) 4 Energetics A2 4 Equilibrium - Kp A2 1 Thermodynamics Born Haber Teacher 2 (2 hrs) 5 Kinetics 6 Chemical Equilibria and Le Chatelier's Principle 7 Equilibrium Constant 6 Acids and Bases	Teacher 1 (3 hrs) A2 1 Thermodynamics Born Haber A2 2 Thermodynamics - Gibbs and Entropy 4 Equilibrium - Kp Teacher 2 (2 hrs) 6 Acids and Bases
Unit length:	Teacher 1 (3 hrs) 1 Atomic Structure (11 hrs) 2 Amount of Substance (9 hrs) Teacher 2 (2 hrs) 3 Bonding (7 hrs)	Teacher 1 (3 hrs) 2 Amount of Substance (14 hrs) 11 Introduction to Organic Chemistry (2 hrs) Teacher 2 (2 hrs) 3 Bonding (6 hrs) 8 Redox (2 hrs)	Teacher 1 (3 hrs) 11 Introduction to Organic Chemistry (2 hrs) 12 Alkanes (4 hrs) 14 Alkenes (5 hrs) 13 Haloalkanes (4 hrs) Teacher 2 (2 hrs) 8 Redox (2 hrs) 9 Periodicity and Group 2 (3 hrs) 10 Halogens (7 hrs)	Teacher 1 (3 hrs) 13 Haloalkanes (5 hrs) 15 Alcohols (8 hrs) 16 Organic Analysis (4 hrs) Teacher 2 (2 hrs) 10 Halogens (2 hrs) 5 Kinetics (8 hrs)	Teacher 1 (3 hrs) 4 Energetics (13 hrs) A2 4 Equilibrium – Kp (4 hrs) A2 1 Thermodynamics Born Haber (1 hr) Teacher 2 (2 hrs) 5 Kinetics (2 hrs) 6 Chemical Equilibria and Le Chatelier's Principle (4 hrs) 7 Equilibrium Constant (3 hrs)	Teacher 1 (3 hrs) A2 1 Thermodynamics Born Haber (6 hrs) A2 2 Thermodynamics - Gibbs and Entropy (9 hrs) Teacher 2 (2 hrs) 6 Acids and Bases (10 hrs)

					6 Acids and Bases (1 hr)	
Key concepts:	T1.1 Atomic Structure T1.2 Mass Spectrometry T1.2 Mass Spec Calculations T1.3 Electron Configuration T1.4 Orbitals T1.6 Trends in Ionisation Energy T1.7 Successive Ionisation Energy T2.1 Empirical Formulae T2.2 Balanced and Ionic Equations T2.3 Moles T2.4 Reacting Amounts and Calculating from solutions T2.5 Yields & Density T2.6 Titrations Method T2.7 Titrations Calculations T3.2 Ionic Bonding & Bond Strength T3.4 Metallic Bonding T3.5 Covalent Bonding T3.6 Dative Covalent Bond	T2.8 Water of Crystallisation T2.9 Gas Volumes T2.10 Ideal Gas Law T3.7 Bond Angles and Shapes Impact of intermolecular forces on boiling point T3.11 Solubility T8.1 Redox T11.1 Organic Introduction T11.2 Naming	T8.2 Redox Equations T9.1 Periodicity T9.2 Group 2 Reactions T10.1 Group 7 - Physical Properties T10.2 Group 7 – Reactivity T10.3 Group 7 - Halide Tests T10.4 Group 7 - Halide + Sulfuric Acid T11.3 Organic Isomers T12.1 Obtaining Alkanes T12.2 Combustion of Alkanes T12.3 Free Radical Substitution T14.2 Alkenes - Electrophilic Addition T14.3 Addition Polymerisation T13.1 Haloalkanes Introduction and Nucleophilic Substitution T13.2 Haloalkanes Reactions - Elimination	T10.5 Group 7 - Inorganic Analysis T5.1 Kinetics - Introduction T5.2 Measuring Rates T5.3 Maxwell Boltzmann T5.4 Catalysts T13.2 Haloalkanes Reactions – Elimination T15.1 Alcohols Introduction T15.2 Alcohols - Distillation and Reflux T15.3 Alcohols - Other Reactions T16.1 Mass Spectrometry T16.2 IR T16.3 Test Tube Reactions	T4.1 Enthalpy Changes T4.2 Measuring Enthalpy Change (Combustion) T4.2b Measuring Enthalpy Change (Neutralisation) T4.3 Bond Enthalpy T4.5- 6 Hess' Law A2 T4.1 Calculating Kp A2 T4.2 Factors affecting Kp A2 T1.1 Lattice Energy T6.1 Equilibria Introduction T6.2 Le Chatelier's Principle T7.1 Equilibrium Constant T7.2 Calculating Kc and ICE Tables	T6.1 Acids, Bases and strength T6.2 pH Calculations - Strong Acids T6.3 pH Calculations - Strong Bases (Kw) T6.4 pH Calculations - Weak Acids (Ka) T6.5 pH Calculations – Mixtures T6.6 pH curves A2 T1.2 Born-Haber Cycles A2 T1.3 Theorectical VS Experimental Data A2 T1.4 Solubility of Ionic Substances A2 T2.1 Entropy Introduction A2 T2.2 - Calculating Entropy and Gibbs A2 T2.3 Predicting Feasibility A2 T2.4 Free Energy & Equilibrium

Knowledge/ Skills:	Calculations: • Time of Flight calculations (mass spec) • Moles (mass = mr x mole) • Concentration (n = cV) • Empirical and molecular formula • Balancing equations Skill: • Ionic equations • Compound errors	Required Practical: • T2 - Required Practical 1a • T2 - Required Practical 1b Calculations: • Yields • Density • Water of crystallisation • Titrimetric Analysis • Gas volumes • Ideal gas laws % error Skill: • Half equations (redox) • Calculating bond enthalpy Skills: • Naming organic compounds • Impact of intermolecular forces on boiling point • Calculating oxidation states	Mechanisms: • Free Radical Substitution • Electrophilic Addition • Nucleophilic Substitution • Elimination of haloalkanes Skills: • Structural Isomerism • Geometric Isomerism • Intermolecular forces in organic compounds and its impact on boiling point • Periodicity of period 2 and period 3 elements • Solubility of group 2 hydroxides • Solubility of group 2 sulphates • Reactivity of halogens • Reactivity of halides • Inorganic Analysis – test tube reactions	Required Practical: • T13 - Required Practical 6 • T15 - Required Practical 5 • T10 - Required Practical 4 Mechanisms: • Nucleophilic Substitution (hydrolysis) • Elimination of alcohols Skills: • Mass Spec analysis of organic compounds • Infrared Spectroscopy • Test tube reactions • Collision Theory • Maxwell-Boltzmann graphs • Intermolecular forces in organic compounds and its impact on boiling point	Required Practical: • T5 - Required Practical 3 • T4 - Required Practical 2 Skills: • Constructing Hess Cycles • Errors in calorimetry • Le Chatelier's Principle and Equilibrium Calculations: • Calculating Kc • Calculating Kp	Skills: • Drawing Born-Haber Cycles • Calculations: • Calculating ΔH lattice formation from a BH cycle • Entropy ΔS • pH calculation of strong acids (pH = -log $[H^+]$ • Kw Calculations • Calculating Ka • pH calculations of mixtures • Analysis of pH curves

End points covered: From Progression Map **From vision**	Progression Map 1, 2, 3, 4, 5, 6, 9, 10, 11 Vision 3	Progression Map 3, 5, 9, 16 Vision 3	Progression Map 5, 11, 13, 16 Vision 3	Progression Map 7, 9, 10, 11, 15, 16 Vision 3	Progression Map 7, 8, 10, 14 Vision 3	Progression Map 6, 14 Vision 3
NC/Spec coverage:	Physical Chemistry 3.1.1 Atomic structure 3.1.2 Amount of substance 3.1.3 Bonding	Physical Chemistry 3.1.2 Amount of substance 3.1.3 Bonding 3.1.7 Oxidation, reduction and redox equations Organic Chemistry 3.3.1 Introduction to organic chemistry	Physical Chemistry 3.1.7 Oxidation, reduction and redox equations Inorganic Chemistry 3.2.1 Periodicity 3.2.2 Group 2, the alkaline earth metals 3.2.3 Group 7(17), the halogens Organic Chemistry 3.3.1 Introduction to organic chemistry write 3.3.2 Alkanes 3.3.3 Halogenoalkanes 3.3.4 Alkenes	Physical Chemistry 3.2.3 Group 7(17), the halogens 3.1.5 Kinetics Inorganic Chemistry 3.2.3 Group 7(17), the halogens Organic Chemistry 3.3.3 Halogenoalkanes 3.3.5 Alcohols 3.3.6 Organic analysis	Physical Chemistry 3.1.4 Energetics 3.1.5 Kinetics 3.1.6 Chemical equilibria, Le Chatelier's principle and Kc 3.1.10 Equilibrium constant Kp for homogeneous systems (A-level only) 3.1.8 Thermodynamics (A-level only)	Physical Chemistry 3.1.8 Thermodynamics (A-level only) 3.1.12 Acids and bases (A-level only)
Cross-curricular links:	Maths skills	Maths skills	Maths skills	Maths skills	Maths skills	Maths skills
Assessments:	AP Assessments	AP Assessments	AP Assessments	AP Assessments	AP Assessments	AP Assessments
Other school intent priorities						
New experiences – broadening horizons			Chemistry Olympiad			

Developing character – *Kind, Hard Working, Successful*	*Hard Working*	*Hard Working*	*Hard Working*	*Hard Working*	*Hard Working*	*Hard Working*
Context specific need – diversity, inclusion; reading, literacy; mental health						
Curriculum Careers - Gatsby 4			Careers in Medicine			

(Year 13 & Chemistry)						
	Autumn 1	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
Unit title:	Teacher 1 (3 hrs) 6 Acids and Bases 3 Rate Equations Teacher 2 (2 hrs) A2 4 Equilibrium - Kp A2 2 Thermodynamics - Gibbs and Entropy 5 Electrode Potentials	Teacher 1 (3 hrs) 3 Rate Equations 10 Optical Isomerism 11 Carbonyl Teacher 2 (2 hrs) 5 Electrode Potentials 9 Transition Metals - Variable Oxidation States (9.4-9.6)	Teacher 1 (3 hrs) 11 Carbonyl 12 Aromatic Chemistry Teacher 2 (2 hrs) 8 Transition Metals 9 Transition Metals - Variable Oxidation States (9.1-9.3)	Teacher 1 (3 hrs) 13 Amines 14 Polymers, Amino Acids and DNA 15 Organic Synthesis, NMR and Chromatography Teacher 2 (2 hrs) 9 Transition Metals - Variable Oxidation States (9.1-9.3)	Teacher 1 (3 hrs) 15 Organic Synthesis, NMR and Chromatography (3 hrs) 7 Period 3 elements (4 hrs) Teacher 2 (2 hrs) Variable Oxidation States (9.1-9.3)	Study leave
Unit length:	Teacher 1 (3 hrs) 6 Acids and Bases (16 hrs) 3 Rate Equations (5) Teacher 2 (2 hrs) A2 4 Equilibrium – Kp (4 hrs) A2 2 Thermodynamics - Gibbs and Entropy (8 hrs) 5 Electrode Potentials (2 hrs)	Teacher 1 (3 hrs) 3 Rate Equations (9 hrs) 10 Optical Isomerism (4 hrs) 11 Carbonyl (7 hrs) Teacher 2 (2 hrs) 5 Electrode Potentials (12 hrs) 9 Transition Metals - Variable Oxidation States (9.4-9.6) (1 hr)	Teacher 1 (3 hrs) 11 Carbonyl (8 hrs) 12 Aromatic Chemistry (4 hrs) Teacher 2 (2 hrs) 8 Transition Metals (4 hrs) 9 Transition Metals - Variable Oxidation States (9.1-9.3) (4 hrs)	Teacher 1 (3 hrs) 13 Amines (4 hrs) 14 Polymers, Amino Acids and DNA (6 hrs) 15 Organic Synthesis, NMR and Chromatography (8 hrs) Teacher 2 (2 hrs) 8 Transition Metals (8 hrs) 9 Transition Metals - Variable Oxidation States (9.1-9.3) (4 hrs)	Teacher 1 (3 hrs) 15 Organic Synthesis, NMR and Chromatography (3 hrs) 7 Period 3 elements (4 hrs) Teacher 2 (2 hrs) Variable Oxidation States (9.1-9.3) (2 hrs)	
Key concepts:	T6.1 Recap T6.5 pH Calculations - Mixtures	T3.3 Determining Orders	T11.6 Carboxyl Derivatives – AQA	T13.1 Organic Nitrogen Compounds – Introduction	T15.4 Organic Techniques	

	T6.6 pH curves T6.7 Indicators T6.8 Buffers (Acid, Alkaline and Capacity) T6.9 Buffers Calculations T6.10 Enthalpy of Neutralisation T3.1 Measuring rates of reaction T3.2 Order of Reaction T3.3 Determining Orders T4.1 Calculating Kp T4.2 Factors affecting Kp T2.1 Entropy Introduction T2.2 Calculating Entropy and Gibbs T2.3 Predicting Feasibility T2.4 Free Energy & Equilibrium T2.5 Free Energy & Equilibrium T5.1 Half Cells	T3.4 Rates & Mechanisms T3.5 Rates & Activation Energy T10.1 Stereoisomers T10.2 Optical Activity T11.1 Carbonyl Introduction T11.2 Carbonyl Reactions T11.3 Nucleophillic Addition T11.4 Carboxyl Chemistry - AQA T11.5 Carboxyl Reactions T5.2 Cells and Cell Potentials T5.3 Predicting Cell Feasibility T5.4 Storage T5.5 Fuel Cell (Hydrogen and ethanol) and Alkaline half equations T9.4 Redox	T12.1 Benzene T12.2 Benzene Reactions T18A.4 Arene Reactions Synthesis Pathway (Summary) T9.5 Redox Titrations T9.6 Redox Titrations Calculations T8.1 Principles of Transition Metals T8.2 Transition Metal Complexes	T13.2 Organic Nitrogen Compounds Reactions T14.1 Carboxyl Polymerisation T18.2 Amino Acids T14.3 DNA 15.1 Chromatography 15.2 CNMR 15.3 HNMR T8.3 Complex Colours T8.4 Transition Metal Reactions T9.1 Variable Oxidiation Numbers T9.2 Vanadium and Tollen's T9.3 Transition Metal Catalysts	T15.5 Organic Synthesis (Pathways) T7.1 Period 3 T7.2 Properties of Period 3 Oxides T7.3 Acidic Basic Properties of Period 3 Oxides	
Knowledge/ Skills:	Calculations: • Moles (mass = mr x mole) • Concentration (n = cV)	Calculations: • Determining orders of reaction • Moles (mass = mr x mole)	Calculations: • Moles (mass = mr x mole) • Concentration (n = cV)	Calculations: • Moles (mass = mr x mole) • Concentration (n = cV)	Calculations: • Balancing equations Skill: • Ionic equations	

	• Empirical and molecular formula • Balancing equations • Entropy ΔS • pH calculation of strong acids (pH = -log [H+] • Kw Calculations • Calculating Ka • pH calculations of mixtures • Analysis of pH curves • Calculating Kp • Calculating orders of reaction (rate = $k[A]^m[B]^n$) Skill: • Ionic equations • Determine the slowest step in a reaction	• Concentration (n = cV) • E cell = reduction – oxidiation • Calculating activation energy Skill: • Ionic equations • Compound errors • Drawing full cells and half cells • Drawing optical isomers • Calculating oxidation states Mechanisms: • Nucleophilic Addition • Nucleophilic Addition elimination	Skill: • Ionic equations • Compound errors • Drawing transition metal complex and its isomers • Determining oxidation states Mechanisms: • Electrophilic Substitution • Nucleophilic Substitution	• Empirical and molecular formula • Balancing equations • Calculating oxidation states Skill: • Ionic equations • Compound errors • Analysing chromatograms • Analysing CNMR spectra • Analysing HNMR Spectra	• Organic Synthesis of all organic compounds	
NC/Spec coverage:	<u>Physical Chemistry</u> 3.1.8 Thermodynamics 3.1.9 Rate equations 3.1.10 Equilibrium constant Kp for homogeneous systems 3.1.12 Acids and bases 3.1.11 Electrode potentials and electrochemical cells	<u>Physical Chemistry</u> 3.1.9 Rate equations 3.1.11 Electrode potentials and electrochemical cells <u>Inorganic Chemistry</u> 3.2.6 Reactions of ions in aqueous solution <u>Organic Chemistry</u> 3.3.7 Optical isomerism	<u>Inorganic Chemistry</u> 3.2.5 Transition metals 3.2.6 Reactions of ions in aqueous solution <u>Organic Chemistry</u> 3.3.8 Aldehydes and ketones 3.3.9 Carboxylic acids and derivatives 3.3.10 Aromatic chemistry	<u>Inorganic Chemistry</u> 3.2.5 Transition metals 3.2.6 Reactions of ions in aqueous solution <u>Organic Chemistry</u> 3.3.11 Amines 3.3.12 Polymers 3.3.13 Amino acids, proteins and DNA (A-level only)	<u>Inorganic Chemistry</u> 3.2.4 Properties of Period 3 elements and their oxides <u>Organic Chemistry</u> 3.1.1 Atomic structure 3.3.14 Organic synthesis (A-level only) 3.3.15 Nuclear magnetic resonance	

		3.3.8 Aldehydes and ketones		3.3.14 Organic synthesis (A-level only) 3.3.15 Nuclear magnetic resonance spectroscopy (A-level only) 3.3.16 Chromatography (A-level only)	spectroscopy (A-level only) 3.3.16 Chromatography (A-level only)	
End points covered:	<u>Progression Map</u> 6, 7, 8, 10, 14 <u>Vision</u> 3	<u>Progression Map</u> 10, 16 <u>Vision</u> 3	<u>Progression Map</u> 3, 4, 5, 6, 9, 11, 16 <u>Vision</u> 3	<u>Progression Map</u> 3, 4, 5, 6, 11, 12, 15, 16 <u>Vision</u> 3	<u>Progression Map</u> 5, 11, 15, 16 <u>Vision</u> 3	
Cross-curricular links:	Maths skills	Maths skills	Maths skills	Maths skills	Maths skills	Maths skills
Assessments:	AP Assessments	AP Assessments	AP Assessments	AP Assessments	AP Assessments	AP Assessments
Other school intent priorities						
New experiences – broadening horizons						
Developing character – *Kind, Hard Working, Successful*	*Hard Working*	*Hard Working*	*Hard Working*	*Hard Working*	*Hard Working*	*Hard Working*
Context specific need – diversity, inclusion; reading,						

literacy; mental health						
Curriculum Careers - Gatsby 4						