Year Group: 13	Subject: Chemistry	Term: Autumn 2021
Topic	**Key Learning points**	**Assessment**
Acid-base equilibria	*End Point: To understand why we cannot simply identify acids and bases simply for what they do/don't contain and be able to carry out structured calculations for pH for acids and bases, acknowledging the assumption necessary.* • Be able to define acids and bases using Bronsted-Lowry theory • Be able to describe acid-base reactions • Be able to identify acid-base pairs • Be able to describe weak acids and strong acids in terms of dissociation • Be able to define the term pH • Deduce the expression for the dissociation of a weak acid, K_a • Be able to define the ionic product of water, K_w • Be able to define the terms pK_a and pK_w • Understand the pH values based on components for acids, bases and salt solutions and for dilutions of these solutions • Be able to interpret pH curves and use them to select suitable indicators for a titration • Understand what a buffer solution is and how it works to stabilise pH • Be able to calculate the pH of a strong acid, weak acid, strong base and buffer, stating any appropriate assumptions • Be able to calculate the concentrations of solutions needed to make a buffer of a certain pH • Understand how the pH of blood is maintained • Understand why there is a difference in the standard enthalpy of neutralisation for strong and weak acids	Students will be formatively assessed during each topic by past paper questions completed in lesson time. • Students will complete homework assignments as ongoing assessment of understanding. • Teachers will provide students with targeted feedback, based on their test performance.
Further energetics	*End Point: To understand how the feasibility of reactions can be predicted and what factors affect the magnitude of some of the values involved for calculations of enthalpy, entropy and therefore Gibbs energy.* • Be able to define the terms; lattice energy, enthalpy of atomisation, electron affinity, enthalpy of solution, enthalpy of hydration • Understand what lattice energy provides a measure of • Be able to construct Born-Haber cycles and use them to solve enthalpy calculations • Understand what factors effect lattice energy • Understand that comparing experimental and theoretical lattice energy indicates the degree of covalent character • Understand the meaning of polarisation when applied to ions • Understand the factors that affect the polarising power of a cation and polarisability of an anion • Understand the factors that affect the degree of hydration of an ion • Understand that enthalpy changes alone do not control whether a reaction occurs • Be able to define entropy and describe the factors that affect it • Be able to calculate the entropy of a system, the entropy of the surroundings and the total entropy • Understand what determines the feasibility of a reaction • Be able to calculate Gibbs energy and use it to predict whether a reaction is feasible at a given temperature, explain why some salts are soluble, explain why HF is a weak acid and the trend in strength of chloroethanoic acids • Understand why some thermodynamically feasible reactions are inhibited by kinetic factors	

Further organic chemistry (carbonyl compounds, carboxylic acids, amines, amides, amino acids and proteins)	*End Point: To understand how to identify organic molecules from their functional groups and describe some physical properties and reactions of these compounds.* • Be able to identify functional groups for aldehydes and ketones • Understand the how the intermolecular forces formed with aldehydes and ketones affects their physical properties and solubility • Understand the reactions of carbonyl compounds; with Fehling's solution, Benedict's solution, Tollens' reagent, acidified dichromate ions, lithium tetrahydridoaluminate in dry ether and iodine in the presence of alkali • Be able to draw the mechanisms for the reactions of carbonyl compounds with; hydrogen cyanide in the presence of potassium cyanide and 2,4-dinitrophenylhydrazine • Identify functional groups for; carboxylic acids, acyl chlorides, esters, amines and amides • Understand how hydrogen bonds affect the boiling point and solubility of carboxylic acids • Understand how carboxylic acids are prepared • Understand the reactions of carboxylic acids with; lithium tetrahydridoaluminate in dry ether, bases, phosphorus (V) chloride and alcohols in the presence of an acid catalyst • Understand the reactions of acyl chlorides with; water, alcohols, concentrated ammonia and amines • Understand the hydrolysis of esters in both acidic and alkaline solution • Understand how polyesters are formed by condensation reactions • Understand how to prepare an amine from a halogenoalkane and by the reduction of nitriles • Understand how aromatic nitro-compounds can be reduced • Understand the reactions of amines with water and acids • Understand reasons for the difference in basicity of ammonia and amines • Understand the reactions of amines with; ethanoyl chloride, halogenoalkanes and copper (II) ions • Understand how amides are prepared from acyl chlorides • Know that the formation of a polyamide is a condensation reaction • Be able to draw repeating units for polyamides • Be able to identify amino acids • Be able to draw the repeating units of the polymers formed by reactions between amino acids • Understand the acidity/basicity of 2-amino acids • Understand the effect of 2-amino acids on plane-polarised monochromatic light • Understand how peptide bonds form in proteins and how it can be hydrolysed	