

## Content Mastery Outline – Road to IB Exams

1	<b>Mole Concept</b> -Limiting Reagents - Excess calculations	<b>Ideal Gas</b> -Graphs -Formula	<b>Percentage Formulas</b> (Yield, Mass & Purity)	<b>Back Titrations</b> Redox Acid & Base	<b>Empirical Formula</b> -Percentage -Combustion	<b>Uncertainties</b> Absolute, Relative & Percentage uncertainties		
2/12	<b>Emission Energy Level</b> <b>Emission Spectrum</b>	<b>% Abundance</b>	<b>Orbitals &amp; Electronic Config</b>	<b>Convergence Limit</b>	<b>Energy Calculations</b> - $E = h \lambda$ $c = v \lambda$	<b>Successive Ionisation Energies</b> Large & Small increases in IE		
3/13	<b>Trends</b> Atomic & Ionic Radius M.Point, I.E, E.A	<b>Period 3 Oxides</b> -Equations	<b>Displacement Reactions</b> <b>Grp 1 Metal Combustion</b> <b>Grp 1 Metal Oxide</b>	<b>Transition Metals</b> Definitions Properties	<b>Ligands &amp; Colours</b>	<b>Cis/Trans Complexes</b>	<b>High Spin Low Spin</b> <b>Paramagnetic / Diamagnetic</b>	
4/14	<b>Structure &amp; Bonding</b> Ionic/Covalent/ Metallic	<b>IMFs</b> LDF, Dipole-Dipole H-bonds	<b>ED &amp; Angles (VSEPR)</b> -2ED,3ED,4ED -5ED, 6ED	<b>Resonance</b> -list of compounds -Bond Order, Length	<b>Ozone Depletion</b> Bond Order of O <sub>3</sub> Radical Reaction	<b>Formal Charge</b> Central Atom FC differences & Electro(-ve)	<b>Hybridisation</b> - sigma / pi bonds - sp, sp <sup>2</sup> & sp <sup>3</sup>	
5/15	<b>Exothermic/Endothermic</b> Stability Bond Breaking V.S Formation	<b>Calorimetric Experiment</b> - $Q = mc\Delta T$ - $\Delta H = Q/n$	<b>Extrapolation</b> -Temp Vs time -Thermo-titration	<b>Bond Enthalpy</b> <b>Hess's Law</b> (Formation/Combustion)	<b>Definitions</b> -Atomisation -I.E, E.A	<b>Lattice Enthalpy, Hydration Solution</b> -SOLEH	<b>Entropy Change in Entropy</b>	<b>Gibbs Energy</b> Equations with $\Delta G$ Signs of $\Delta S + \Delta H$
6/16	<b>Definitions &amp; Factors</b> Energy Profile Diagram	<b>Graphs for Initial Rate</b>	<b>Maxwell Boltzmann</b> -Catalyst -Temperature	<b>Graphical changes &amp; Experimental Methods</b>	<b>Rate Equations</b> <b>Rate Constant &amp; Units</b>	<b>Order of reaction</b> <b>Graphs</b>	<b>Activation Energy &amp; Arrhenius</b>	
7/17	<b>Definitions &amp; Properties of equilibrium</b>	<b>Graphs</b>	<b>Kc expression</b> <b>Qc expression</b> <b>Qc vs Kc</b>	<b>LCP Principles</b> And all factors	<b>LCP Graphs</b>	<b>ICE table calculate Kc</b> <b>ICE table to calculate [A] at eqm</b>	<b><math>\Delta G</math> &amp; ln Kc</b> - Equation	
8/18	<b>Definitions of BL</b> <b>Amphiprotic</b> <b>Strong Vs Weak Acid</b>	<b>Acid + Base</b> <b>Reactions &amp; Equations</b>	<b>pH Scale &amp; Formula</b> <b>Dissociation of water</b>	<b>Acid Deposition</b> <b>Equations</b>	<b>Lewis Theory</b> Cation Hydrolysis	<b>K<sub>a</sub>, K<sub>b</sub> &amp; K<sub>w</sub> Weak acid &amp; base formula</b>	<b>pH graphs</b> - 8 forms - 4 points on graph	<b>Buffers</b> - Acidic & Basic - Indicators
9/19	<b>Definitions of redox</b> <b>Common oxidation numbers</b>	<b>Redox Half Eqns &amp; Balancing</b>	<b>Winkler's Method</b> Biochemical Oxygen Demand	<b>Voltaic Cells</b> Cell Notation, Cell Potential & Set-up $\Delta G = -nF E_{cell}$		<b>Electrolytic Cell</b> Calculations: $Q = It$ , $Q = nF$ <b>Predicting the products of electrolysis</b> Molten, concentrated & aqueous		
10/21	<b>Homologous Series</b> Functional Group Names Pri, Sec, Tertiary – Alcohols & Amines	<b>Structural Isomers</b> -Chain, Positional, Functional Grp	<b>Free Radical Sub</b> <b>Esterification</b> <b>Alcohol Oxidation</b> (Primary & Secondary)	<b>Stereoisomers</b> Configurational Conformational	<b>Arrowing Pushing (Curly Arrow) - Mechanism</b> Electrophilic Addition & Substitution Nucleophilic Sub (S <sub>N</sub> 1, S <sub>N</sub> 2) Energy Profile Diagrams & Links to Order of reaction			<b>Reduction</b> Aldehyde, Ketone & Acids Nitrobenzene
11/22	<b>Index of Hydrogen Deficiency (IHD)</b> - Formula & Structure	<b>IR Spectroscopy</b> -strong broad -wavenumbers	<b>Mass Spectroscopy</b> - positive ions only -molecular ion	<b>NMR Spectroscopy</b> Hydrogen environments & Integration Trace Splitting Pattern			<b>X-ray Crystallography</b> Bond length Bond Angle	