



Year 10: Chemistry

Curriculum Intent: Year 10 Chemistry tackles more complex ideas and concepts in the subject. It builds on the key knowledge from years 7,8 and 9 to link together all the areas of the subject. The key areas of particles, reactions, monitoring reactions and earth and environmental science are developed through more challenging topics such as structure and bonding, advanced chromatographic methods, mole calculations, electrolysis and trends in the periodic table. Knowledge of key industrial chemical processes is also developed. Procedural knowledge and practical skills are developed further, building on experience with making salts, neutralisation, redox and displacement reaction. The curriculum in year 10 aims to bring everything together so that students have a complete understanding of the Chemistry aspect of the Combined Science course.

	Topic 1 Particles and PT	Topic 2 Chem reactions	Topic 3 Monitoring reactions	Topic 4 Earth and environmental
Key ideas	<ul style="list-style-type: none"> • revision/retrieval • Explain properties of metals, ionics, simple covalents, giant covalents • Select appropriate separation method • TLC and GC • Atomic structure and the periodic table link • Rutherford's experiment • Limitations of the particle model 	<ul style="list-style-type: none"> • revision/retrieval • Mole calculations • Reacting masses • Conc calculations • Balancing equations • Formulae of ionic compounds- 3.1.1 and 3.1.2 • Electrolysis of solutions • Half equations • Bond energy calculations • Redox reactions (electrons) • Neutralisation • H⁺ and pH • Dilute vs concentrated acids • Strong vs weak acids 	<ul style="list-style-type: none"> • revision/retrieval • Explain trends in group 1 • Explain trends in group 7 • Displacement reactions • Equilibrium • Changing the equilibrium position • Calculating the rate of reactions from graphs and data • Calculating average rate • Calculating instantaneous rate 	<ul style="list-style-type: none"> • Extracting metals • Extracting iron • Extracting aluminium • Phytoextraction • Bioleaching
Sequence of Learning - Key Questions	<ol style="list-style-type: none"> 1. Everything from topic 1 in year 9 including references to years 7+8 2. What is a metallic bond? 3. Why do metals conduct electricity? 	<ol style="list-style-type: none"> 1. Everything from topic 2 in year 9 including references to years 7+8 2. How do you write the formulae of ionics given its ions? 	<ol style="list-style-type: none"> 1. Everything from topic 3 in year 9 including references to years 7+8 2. Why does group 1 get more reactive going down the group? 	<ol style="list-style-type: none"> 1. Everything from topic 4 in year 9 including references to years 7+8 2. How are metals found? 3. What are the advantages and disadvantages of extracting metals?

	<ol style="list-style-type: none"> 4. Why do metals have a high melting point? 5. Why are metals malleable? 6. Why do simple covalents have low melting points? 7. Why don't simple covalents conduct electricity? 8. Why do ionics have a high melting point? 9. Why do ionics conduct electricity when liquid but not when solid? 10. Can you explain the difference in the properties of diamond and graphite? 11. Can you select the appropriate separation technique based on different scenarios? 12. What are the advantages of using TLC and GC? 13. How does the periodic table relate to atomic structure and electronic structure? 14. How does Rutherford's experiment prove a nucleus is small and positive? 	<ol style="list-style-type: none"> 3. How do you balance a chemical equation? 4. What are the 4 state symbols? 5. What is a mole? 6. How do you calculate moles? 7. How do you use mole ratios to find reacting masses? 8. Why does hydrogen and oxygen occasionally form during electrolysis? 9. Can you write half equations to describe electrolysis? 10. Can you define reduction and oxidation in terms of electrons? 11. Can you write ionic and half equations to describe redox reactions? 12. Can you use bond energies to calculate if a reaction is endothermic or exothermic? 13. What is a neutralisation reaction? 14. What is the difference between dilute and concentrated acids? 	<ol style="list-style-type: none"> 3. Why does group 7 get less reactive going down the group? 4. Can you define a displacement reaction? 5. Can you write and balance displacement reactions? 6. Can you write and balance reactions with group 1? 7. Can you calculate the average rate of reaction from data or a graph? 8. Can you calculate the instantaneous rate of reaction from a graph? 9. What is equilibrium? 10. How does temperature affect equilibrium position? 11. How does pressure affect equilibrium position? 	<ol style="list-style-type: none"> 4. How do you tell which process to use to extract a metal? 5. How does a blast furnace extract iron? 6. What are the advantages and disadvantages of using a blast furnace? 7. How does electrolysis extract aluminium? 8. What are the advantages and disadvantages of using electrolysis? 9. What is phytoextraction? 10. What are the advantages and disadvantages of extracting metals with phytoextraction? 11. What is bioleaching? 12. What are the advantages and disadvantages of extracting metals using bioleaching?
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	15. What are the limitations of the particle model?	15. What is the difference between strong and weak acids? 16. How does the pH relate to the H ⁺ concentration?		
Vocabulary	<ul style="list-style-type: none"> • Sea of electrons • Metallic bond • Cations • Ionic bond • Covalent bond • Intermolecular force • Distillation • Fractional distillation • Chromatography • Crystallisation • Filtration • Solvent • Solute • Solution • Soluble • Insoluble • TLC • Gas chromatography • Mobile phase • Stationary phase • Alpha particle • Nucleus • Repel • Limitations 	<ul style="list-style-type: none"> • Balancing • Formula • Cation • Anion • Anode • Cathode • Electrolysis • Reduction • Oxidation • OILRIG • PANIC • Half equation • Ionic equation • Neutralisation • Dilute • Concentrated • Strong acid • Weak acid • Dissociation • Hydrogen ion • pH 	<ul style="list-style-type: none"> • trends • outer electron • electrostatic attraction • displacement reaction • equilibrium • forward reaction • reverse reaction • average rate • instantaneous rate • tangent • gradient • reactant • product • endothermic • exothermic 	<ul style="list-style-type: none"> • extraction • blast furnace • electrolysis • ore • cryolite • bauxite • phytoextraction • bioleaching • low grade ore
Practical Skills	1. Properties of metals, ionic, compounds and giant covalent, e.g. graphite – test electrical conductivity, solubility etc	1. Electrolysis of copper chloride and sodium chloride 2. Titration style neutralisation reaction	1. Displacement reactions with metals 2. Investigating rates of reaction following by graph drawing and calculating	1. Obtaining copper from copper carbonate 2. Making iron from iron oxide (reduction) using non-safety matches

	<p>2. Separation techniques – separating mixture of soluble and insoluble solid. Fractional distillation to separate two liquids</p>		<p>instantaneous rate of reaction 3. Equilibrium – cobalt complex practical to monitor position of equilibrium</p>	
<p>Assessment (Related to mastery grids)</p>	<p>Separation practical assessment – students given a mixture to separate. 6 marker question.</p>	<p>Exam-style questions assessment</p>	<p>Badger task – 9F-4 Patterns of reactivity</p>	<p>Badger task – 6-B Chemistry</p>