

Chemistry Curriculum Overview – Year 10

Sequencing of topics	What knowledge will students develop? (Including key terminology)	What skills will students develop? (Including literacy & numeracy)	Assessment opportunities	Homework opportunities	Personal development (Ursuline Values, Catholic Social Teaching, Cultural Capital, Cross-curricular, Careers)	Curriculum links
Autumn Term 1						
Quantitative Chemistry	<ul style="list-style-type: none"> ○ Conservation of mass and balanced chemical equations ○ Relative formula mass ○ Mass changes when a reactant or product is a gas ○ Chemical measurements ○ Moles ○ Amounts of substances in equations (HT only) ○ Using moles to balance equations (HT only) ○ Limiting reactants (HT only) 	<ul style="list-style-type: none"> ○ Explain the meaning of the law of conservation. ○ Calculate the relative formula mass (M_r) of a compound from its formula, given the relative atomic masses. ○ Write simple word equations. ○ Write simple symbol equations. ○ Balance symbol equations. ○ Be able to use the relative formula mass of a substance to calculate the number of moles in a given mass of that substance and vice versa. ○ Be able to explain the effect of a limiting quantity of a reactant on the amount of products 	<ul style="list-style-type: none"> ○ AFL in lessons and homework ○ Mid Topic assessment QWC ○ End of topic test-summative assessment 	<ul style="list-style-type: none"> ○ Differentiated worksheets ○ Flipped Learning ○ Exam style questions ○ Neeto/satchel quizzes ○ Research Task ○ YouTube videos with questions ○ SAM learning ○ Practical write up 	<ul style="list-style-type: none"> ○ United in harmony when we consider the wider uses of materials and medicine ○ Grateful for the beauty of the different types of atoms ○ Faith-filled and hopeful when seeing beyond the naked eye ○ Discerning and joyful ○ Leading others in pursuit of justice when planning and carrying out a practical ○ Service and sacrifice when we recognise the scientific work that has been done before us 	<p>KS3 Balancing equations</p> <p>KS4 Yr 9 Atomic structure Chemical changes</p> <p>KS5 Yr 8/9 Balancing equations Yr 12 Amount of substance</p>

○ Concentration of solutions

- Link the limiting reactant to the masses in grams.
- Calculate the mass of solute in a given volume of solution of known concentration in terms of mass per given volume of solution. (HT only)
- Explain how the mass of a solute and the volume of a solution is related to the concentration of the solution
- Explain the meaning of concentration and the unit grams per dm^3
- Be able to convert cm^3 into dm^3 .
- Use the equation:
 - $C = m / v$
 - to calculate the concentration of a solution.
- Rearrange the equation:
 - $C = m / v$
- Calculate the masses of reactants and products from the balanced symbol equation and the mass of a given reactant or product

- Care for creation
- Community and participation
- Dignity of God's people
- Solidarity
- Personal
- Social
- Physical
- Moral
- Cultural
- Art
- Design & Technology
- Geography
- PE
- Food Tech
- Maths
- Analytical Chemist
- Environmental scientist
- Chemist
- Research

	<ul style="list-style-type: none"> ○ Percentage yield ○ Atom economy ○ Titration & calculations (HT only) ○ Volumes of gases (Triple HT only) 	<ul style="list-style-type: none"> ○ Change the subject of a mathematical equation. ○ Use a variety of models such as descriptive, representational, spatial, computational and mathematical to solve problems, ○ Make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts ○ Calculate the percentage yield of a product from the actual yield of a reaction.(HT only) ○ Calculate the theoretical amount of a product from a given amount of reactant and the balanced equation for the reaction. ○ Use balanced equations and known volume of reactant/product to calculate the volumes of gaseous reactants/ products ○ AT 1: Use of appropriate apparatus 				
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to make and record a range of measurements accurately, including mass, time, temperature, and volume of liquids and gases

- AT 2: Safe use of appropriate heating devices and techniques including use of a Bunsen burner and a water bath or electric heater

- AT 6 Safe use and careful handling of gases, liquids and solids, including careful mixing of reagents under controlled conditions, using appropriate apparatus to explore chemical changes and/or products

- Recognise and use expressions in decimal form.
- Use ratios, fractions and percentages.
- Change the subject of an equation.

- Substitute numerical values

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| | | <ul style="list-style-type: none">○ into algebraic equations○ using appropriate units for physical quantities.○ Use an appropriate number of significant figures. | | | | |
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Autumn Term 2

<p>Chemical Changes I</p>	<p>Reactions of Metals with oxygen</p> <p>Extraction of metals and reduction</p> <p>Extraction of metals and reduction</p>	<ul style="list-style-type: none"> ○ Explain reduction and oxidation in terms of loss or gain of oxygen. ○ Mixing of reagents to explore chemical changes and/or products. ○ Recall and describe the reactions, if any, of potassium, sodium, lithium, calcium, magnesium, zinc, iron and copper with water or dilute acids, where appropriate, to place these metals in order of reactivity. ○ Explain how the reactivity of metals with water or dilute acids is related to the tendency of the metal to form its positive ion. ○ Deduce an order of reactivity of metals based on experimental results ○ Interpret or evaluate specific metal extraction processes when given appropriate information. ○ Identify the substances which are oxidised or 	<ul style="list-style-type: none"> ○ AFL in lessons and homework ○ Mid Topic assessment QWC ○ End of topic test-summative assessment 	<ul style="list-style-type: none"> ○ Differentiated worksheets ○ Flipped Learning ○ Exam style questions ○ Neeto/satchel quizzes ○ Research Task ○ YouTube videos with questions ○ SAM learning ○ Practical write up 	<ul style="list-style-type: none"> ○ United in harmony when we consider the wider uses of materials and medicine ○ Grateful for the beauty of the different types of atoms ○ Faith-filled and hopeful when seeing beyond the naked eye ○ Discerning and joyful ○ Leading others in pursuit of justice when planning and carrying out a practical ○ Service and sacrifice when we recognise the scientific work that has been done before us ○ Care for creation ○ Community and participation ○ Dignity of God's people ○ Solidarity ○ Personal ○ Social ○ Physical ○ Moral 	<p>KS3 Yr 7 Reactions</p> <p>KS4/KS5 Titration</p> <p>KS5 Extraction of metal - Ti</p> <p>Redox reactions</p>
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	<ul style="list-style-type: none"> ○ Reactions of acids with metals ○ Ionic equations ○ Neutralisation of acids and salt production ○ Soluble salts 	<p>reduced in terms of gain or loss of oxygen</p> <ul style="list-style-type: none"> ○ Write ionic equations for displacement reactions. ○ Identify in a given reaction, symbol equation or half equation which species are oxidised and which are reduced ○ Explain in terms of gain or loss of electrons, that these are redox reactions ○ HT only) Identify which species are oxidised and which are reduced in given chemical equations ○ Describe how to make pure, dry samples of named soluble salts from information provided ○ Predict products from given reactants. ○ Use the formulae of common ions to deduce the formulae of salts. <p>Describe how to make pure, dry samples of named soluble salts from information provided</p>			<ul style="list-style-type: none"> ○ Cultural ○ Art ○ Design & Technology ○ Geography ○ Food Tech ○ Maths ○ Analytical Chemist ○ Environmental scientist ○ Chemist Research 	
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	<ul style="list-style-type: none"> ○ The pH scale and neutralisation ○ Strong and weak acids (HT only) ○ Titrations (chemistry only) 	<ul style="list-style-type: none"> ○ Describe the use of universal indicator or a wide range indicator to measure the approximate pH of a solution. ○ Use the pH scale to identify acidic or alkaline solution ○ An opportunity to measure the pH of different acids at different concentrations ○ Explain the meaning of the following terms: <ul style="list-style-type: none"> ○ dilute ○ concentrated ○ weak ○ strong. ○ Explain why strong acids are completely ionised in aqueous solutions but a weak acid is only partially ionised. ○ Describe neutrality in terms on hydrogen ion concentration. ○ Describe relative acidity in terms of hydrogen ion concentration. ○ Describe how to carry out titrations using strong acids and strong 				
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		<p>alkalis only (sulfuric, hydrochloric and nitric acids only) to find the reacting volumes accurately.</p> <ul style="list-style-type: none"> (HT Only) Calculate the chemical quantities in titrations involving concentrations in mol/dm³ and in g/dm³ 				
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Spring Term 1

<p>Chemical changes II (Electrolysis)</p>	<ul style="list-style-type: none"> The process of electrolysis Electrolysis of molten ionic compounds Using electrolysis to extract metals Electrolysis of aqueous solutions 	<ul style="list-style-type: none"> Explain why solid ionic compounds cannot conduct electricity but ionic compounds can conduct electricity when melted or dissolved in water. Define the term electrolyte. Describe how an electric current can pass through an ionic compound. Explain what happens to positive and negative ions during electrolysis and how elements form from their ions. students should be able to write half equations for the reactions occurring at the 	<ul style="list-style-type: none"> AFL in lessons and homework Mid Topic assessment QWC End of topic test-summative assessment 	<ul style="list-style-type: none"> Differentiated worksheets Flipped Learning Exam style questions Neeto/satchel quizzes Research Task YouTube videos with questions SAM learning Practical write up 	<ul style="list-style-type: none"> United in harmony when we consider the wider uses of materials and medicine Grateful for the beauty of the different types of atoms Faith-filled and hopeful when seeing beyond the naked eye Discerning and joyful Leading others in pursuit of justice when planning and carrying out a practical Service and sacrifice when we 	
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	<p>Electrolysis of Aluminium oxide</p>	<p>electrodes during electrolysis, and may be required to complete and balance supplied half equations</p> <ul style="list-style-type: none"> ○ To predict the products of the electrolysis of binary ionic compounds in the molten state. ○ Give reasons why some metals have to be extracted by electrolysis. ○ Extended writing: describe how aluminium is extracted from its ore. ○ Write balanced half equations for the reactions that occur at both electrodes. ○ Extended writing: describe how reactive metal elements were discovered by electrolysis. ○ Be able to predict the products of the electrolysis of aqueous solutions containing a single ionic compound. ○ Describe how an aqueous solution is electrolysed. ○ Explain why the following atoms could be produced: hydrogen oxygen. 			<p>recognise the scientific work that has been done before us</p> <ul style="list-style-type: none"> ○ Care for creation ○ Community and participation ○ Dignity of God's people ○ Solidarity ○ Personal ○ Social ○ Physical ○ Moral ○ Cultural ○ Art ○ Design & Technology ○ Geography ○ PE ○ Food Tech ○ Maths ○ Analytical Chemist ○ Environmental scientist ○ Chemist Research 	
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Spring Term 2

<p>Energy Changes</p>	<ul style="list-style-type: none"> ○ Energy transfer during exothermic and endothermic reactions ○ Reaction profiles ○ The energy change of reactions (HT only) --Bond energies ○ Cells and batteries ○ Fuel cells (Triple) 	<p>Safe use of appropriate heating devices and techniques including use of a Bunsen burner and a water bath or electric heater</p>	<ul style="list-style-type: none"> ○ AFL in lessons and homework ○ Mid Topic assessment QWC ○ End of topic test-summative assessment 	<ul style="list-style-type: none"> ○ Differentiated worksheets ○ Flipped Learning ○ Exam style questions ○ Neeto/satchel quizzes ○ Research Task ○ YouTube videos with questions ○ SAM learning ○ Practical write up 	<ul style="list-style-type: none"> ○ United in harmony when we consider the wider uses of materials and medicine ○ Grateful for the beauty of the different types of atoms ○ Faith-filled and hopeful when seeing beyond the naked eye ○ Discerning and joyful ○ Leading others in pursuit of justice when planning and carrying out a practical ○ Service and sacrifice when we recognise the scientific work that has been done before us ○ Care for creation ○ Community and participation ○ Dignity of God's people 	
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Summer Term 1

Rate and extent of chemical reactions	<ul style="list-style-type: none"> ○ Calculating rates of reactions ○ Collision theory and activation energy ○ Investigating factors which affect the rates of chemical reactions 	<ul style="list-style-type: none"> ○ 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. ○ Predict and explain using collision theory the effects of changing conditions of concentration, pressure and temperature on the rate of a reaction. ○ Predict and explain the effects of changes in the size of pieces of a reacting solid in terms of surface area to volume ratio. 	<ul style="list-style-type: none"> ○ AFL in lessons and homework ○ Mid Topic assessment QWC ○ End of topic test-summative assessment 	<ul style="list-style-type: none"> ○ Differentiated worksheets ○ Flipped Learning ○ Exam style questions ○ Neeto/satchel quizzes ○ Research Task ○ YouTube videos with questions ○ SAM learning ○ Practical write up 	<ul style="list-style-type: none"> ○ United in harmony when we consider the wider uses of materials and medicine ○ Grateful for the beauty of the different types of atoms ○ Faith-filled and hopeful when seeing beyond the naked eye ○ Discerning and joyful ○ Leading others in pursuit of justice when planning and 	
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	<ul style="list-style-type: none"> ○ Catalysts 	<ul style="list-style-type: none"> ○ Define the term activation energy. ○ Identify advantages of using catalysts in industrial reactions eg reducing costs. ○ Explain the effect of using a catalyst on the activation ○ Draw and interpret graphs showing the quantity of product formed or quantity of reactant used up against time. ○ Draw tangents to the curves on these graphs and use the slope of the tangent as a measure of the rate of reaction. ○ Making and recording of appropriate observations during chemical reactions including changes in temperature and the measurement of rates of reaction by a variety of ○ Methods such as production of gas and colour change 			<ul style="list-style-type: none"> ○ carrying out a practical ○ Service and sacrifice when we recognise the scientific work that has been done before us ○ Care for creation ○ Community and participation ○ Dignity of God's people ○ Solidarity ○ Personal ○ Social ○ Physical ○ Moral ○ Cultural ○ Art ○ Design & Technology ○ Geography ○ PE ○ Food Tech ○ Maths ○ Analytical Chemist ○ Environmental scientist ○ Chemist Research 	
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		<ul style="list-style-type: none"> ○ Interpret appropriate given data to make predictions on changing conditions <p>Explain what is meant by a reversible reaction.</p> <p>Explain the difference between:</p> <p>\rightleftharpoons reactions</p> <p>and</p> <p>\rightarrow reactions</p>				
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Summer Term 2

	<ul style="list-style-type: none"> ○ Equilibrium ○ Reversible reactions ○ Energy changes and reversible reactions ○ The effect of changing conditions on equilibrium (HT only) ○ The effect of changing concentration (HT only) ○ The effect of temperature changes on equilibrium (HT only) ○ The effect of pressure changes on equilibrium 	<ul style="list-style-type: none"> ○ Explain the term equilibrium and given suitable examples of when it can occur. ○ Research examples of equilibrium reactions in industry ○ Be able to interpret appropriate given data to predict the effect of a change in concentration of a reactant or product on given reactions at equilibrium ○ Use data to predict the effect of concentration on equilibrium. Justify answers 	<ul style="list-style-type: none"> ○ AFL in lessons and homework ○ Mid Topic assessment QWC ○ End of topic test-summative assessment 	<ul style="list-style-type: none"> ○ Differentiated worksheets ○ Flipped Learning ○ Exam style questions ○ Neeto/satchel quizzes ○ Research Task ○ YouTube videos with questions ○ SAM learning ○ Practical write up 	<ul style="list-style-type: none"> ○ United in harmony when we consider the wider uses of materials and medicine ○ Grateful for the beauty of the different types of atoms ○ Faith-filled and hopeful when seeing beyond the naked eye ○ Discerning and joyful 	
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○ Use data to predict the effect of pressure on equilibrium. Justify answers

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- **Service and sacrifice** when we recognise the scientific work that has been done before us
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