



Learning Aims and Curriculum Intent:

In Year 10 Chemistry lessons at Forest, students will acquire knowledge and understanding of chemical facts, terminology, concepts, principles and practical techniques. They will learn to apply the principles and concepts of chemistry, including those related to the applications of chemistry, to different contexts. They will appreciate the practical nature of chemistry, developing experimental and investigative skills based on correct and safe laboratory techniques and recognise the importance of accurate experimental work and reporting scientific methods in chemistry. They will begin to develop their exam technique, through developing a logical approach to problem solving in a wider context.

Term	Content, Key Questions and Knowledge	Skills	Assessment
Michaelmas	<p>Rates of Reaction</p> <p>Re-cap of work started on Rates of Reaction in Year 9. Students will carry out an independent investigation to determine how a factor such a temperature, surface area, concentration or adding a catalyst affects the rate of reaction. Why do chemical reactions happen fastest at the start?</p> <ul style="list-style-type: none"> • What does “fast” mean in terms of a chemical reaction? • How can I measure how quickly a chemical reaction happens? • How can I explain chemical reactions in terms of collision theory? • What factors affect the rate of a chemical reaction and why? • What can graphs tell us about the rate of chemical reactions? 	<p>Representing chemical and word equations</p> <p>Observing, describing and recording experimental results, both qualitative and quantitative</p> <p>Working safely and following a set of instructions carefully</p> <p>Generating a hypothesis from an observation</p> <p>Justifying a hypothesis using scientific reasoning</p> <p>Identifying hazards and associated risks in the lab</p> <p>Identifying independent, dependent and control variables in an experiment</p> <p>Drawing an appropriate results table for any given method</p>	<p>Each topic consists of a 40 minute End of Topic Written Test.</p>
	<p>Atomic Structure and Ionic Bonding</p> <p>In year 10, students revisit the structure of the atom and look at how the structure relates to its physical properties and chemical reactivity.</p> <ul style="list-style-type: none"> • Label the structure of an atom in terms of the positions, relative masses and relative charges of sub-atomic particles • Know what is meant by the terms atomic number, mass number, isotopes and relative atomic mass (A_r) • How to calculate the relative atomic mass of an element (A_r) from isotopic abundances • Explain how ions are formed by electron loss or gain, and know the charges of the ions named in the specification • Write formulae for compounds formed between ions • Draw dot-and-cross diagrams to show the formation of ionic compounds by electron transfer, limited to combinations of elements from Groups 1, 2, 3 and 5, 6, 7 only outer electrons need be shown • Understand ionic bonding in terms of electrostatic attractions • Describe and explain the properties of ionic compounds, by linking the properties to their structures 	<p>Understanding the difference between categoric, discrete and continuous data and select the most suitable graph for the data being used</p> <p>Drawing a line graph with correct scale, axes, points and smooth line/curve of best fit</p> <p>Writing a method to test a hypothesis.</p> <p>Recording the results to the correct resolution, and explaining why this resolution is correct</p> <p>Identifying anomalies in an experiment.</p>	<p>Atomic structure topic has a mid topic test as it is a longer topic.</p>
	<p>Covalent Bonding</p> <ul style="list-style-type: none"> • Draw dot and cross diagrams to represent covalent bonding in non-metallic compounds, including those which form double and triple bonds • Investigate and compare the properties of simple and giant covalent compounds • Describe and explain the properties of simple covalent compounds, including water, methane, oxygen, nitrogen, C₆₀ and alkanes and alkenes by linking the properties to their structures • Describe and explain the properties of giant covalent compounds, including diamond, graphite and silica by linking the properties to their structures. 	<p>Plotting multiple graphs on the same axes and comparing them</p> <p>Using your graphs to determine if your hypothesis was correct.</p> <p>Drawing a conclusion and justifying it.</p> <p>Modelling using particle diagrams</p> <p>Investigating the physical properties of covalent compounds.</p>	
	<p>Metallic Bonding</p> <ul style="list-style-type: none"> • Draw diagrams to represent the bonding in metals • Describe the typical properties of metals, and explain these by linking the properties to their structures. • Describe what an alloy is, and explain how alloying a metal affects its structure and properties 	<p>Using models to explain the difference between simple and giant structures in covalent bonding.</p>	

Lent	<p>Moles</p> <ul style="list-style-type: none"> • Introduction to the mole as a method of easily counting the number of atoms in a substance • Calculating the Relative Formula Mass of a compound • Using a balanced symbol equation to work out the maximum mass of product that could be made from a given mass of reactant • Using a balanced symbol equation to work out the mass of reactant needed to make a certain mass of product • What is meant by the term empirical formula, and how to calculate this using experimental data • What is meant by the term water of crystallisation, and how to calculate this using experimental data • Carry out an experiment to determine the empirical formula of a substance as accurately as possible • Carry out an experiment to determine the empirical formula of a salt as accurately as possible • Calculate the % yield of a chemical reaction 	<p>Numerical skills: including rearranging equations, ratios and determining appropriate units.</p> <p>Recording accurate data to use in reacting masses, empirical formula and water of crystallisation calculations</p> <p>Identifying causes of inaccuracy in experiments and suggesting ways of improving these.</p>	<p>Each topic consists of a 40 minute End of Topic Written Test.</p>
	<p>Crude Oil</p> <ul style="list-style-type: none"> • How fossil fuels form • What is meant by the term hydrocarbon, and that crude oil is the main source of hydrocarbon compounds • How crude oil is separated into different fractions • What alkanes are, their structures, and uses • The environmental issues which can occur when fossil fuels are burnt • The reactions of alkanes, including combustion and halogenation <p>Alkanes and Alkenes</p> <ul style="list-style-type: none"> • How cracking of long chain alkanes can be cracked to form shorter chain alkanes and alkenes • What alkenes are, their structures, and uses • How to draw isomers of alkanes and alkenes • How to test an unknown molecule for and unsaturation • How alkenes react together to make addition polymers • Uses and disposal of addition polymers 	<p>Making models of alkanes and alkanes using molymod kits.</p> <p>Testing for the products of combustion</p> <p>Using Bromine water to distinguish between saturated and unsaturated hydrocarbons.</p>	<p>Each topic consists of a 40 minute End of Topic Written Test.</p> <p>End of Year Exam</p> <p>Each topic consists of a 40 minute End of Topic Written Test.</p>
Trinity	<p>Acids, Bases and Making Salts</p> <ul style="list-style-type: none"> • Redox reactions including: combustion, displacement and ionic compound formation • Solubility of compounds in water and how solubility links to precipitation reactions • Neutralisation reactions • Making salts through reactions of acids with metals, metal oxides, metal hydroxides and metal carbonates • Titration as a method of making salts, and a method to determine the concentration of an unknown acid/alkali • Thermal decomposition of metal carbonates 	<p>Various practical experiments investigating the properties of acids, bases, combustion reactions and displacement reactions.</p> <p>Recording observations and results in a scientific manner.</p> <p>Use of burettes and pipettes to accurately calculate the concentration of a solution, by titrating it with another compound</p>	<p>Each topic consists of a 40 minute End of Topic Written Test.</p> <p>End of Year Exam</p>

Examples of Homework	Worksheets, research, power point presentations, drawing dot and cross diagrams to show chemical bonding, Century Tech, consolidation of key information, revising for end of topic tests.
Key terminology	Rates of reaction, ionic, covalent and metallic bonding. Mole calculations, empirical formula. Crude oil, fractional distillation, alkanes, alkenes, isomers, saturated and unsaturated hydrocarbons, homologous series, global warming, acid rain, greenhouse effect, complete combustion.
Super-curricular enrichment and scholarly extension	<ol style="list-style-type: none"> Super curricular Activities: <ul style="list-style-type: none"> ○ Attend chemistry workshops or summer schools: Look for local universities or organisations that offer chemistry-focused workshops or summer schools for students. Books: <ul style="list-style-type: none"> ○ "Chemistry: Principles and Practice" by Daniel L. Reger, Scott R. Goode, and David W. Ball ○ "Organic Chemistry" by Jonathan Clayden, Nick Greeves, and Stuart Warren ○ "Chemical Structure and Reactivity: An Integrated Approach" by James Keeler and Peter Wothers ○ "Crude Oil: A Beginner's Guide" by Vaclav Smil Documentaries: <ul style="list-style-type: none"> ○ "Chemistry: A Volatile History" (BBC documentary series) ○ "The Secret Life of Chaos" (BBC documentary) ○ "The Alchemists of Matter" (BBC documentary) ○ "The Plastic Problem" (BBC documentary)

	<p>4. Places to Visit in London:</p> <ul style="list-style-type: none"> ○ The Royal Institution: Attend lectures or demonstrations on chemistry-related topics. They often host events specifically aimed at students. ○ Imperial College London: Check if they have any chemistry-related public lectures, exhibitions, or open days for prospective students. ○ The Science Museum: Explore exhibits on chemistry, including interactive displays on chemical reactions and the history of chemistry. ○ The Wellcome Collection: Visit their exhibitions on topics related to health, medicine, and scientific discoveries, which may touch upon aspects of chemistry. ○ The Royal Society: Attend their public lectures, discussions, or events related to chemistry and scientific advancements. 	
Useful websites	<p>Here are some useful websites that can complement the topics covered in year 10 chemistry:</p> <ol style="list-style-type: none"> 1. Royal Society of Chemistry (RSC) Education: The RSC Education website provides a wide range of resources, experiments, and interactive activities for chemistry students. It covers topics such as rates of reaction, bonding, calculations, and organic chemistry. Visit: https://edu.rsc.org/ 2. Khan Academy: Khan Academy offers free video lessons, practice exercises, and quizzes on chemistry topics. Their chemistry section covers various concepts, including bonding, reactions, and calculations. Visit: https://www.khanacademy.org/science/chemistry 3. BBC Bitesize: BBC Bitesize offers educational resources, articles, and quizzes for different subjects, including chemistry. Their chemistry section covers topics such as rates of reaction, bonding, and organic chemistry. Visit: https://www.bbc.co.uk/bitesize/subjects/zs6hvcw 4. Chemguide: Chemguide provides comprehensive explanations, tutorials, and practice questions for A-level chemistry topics. It covers areas such as rates of reaction, bonding, calculations, and organic chemistry. Visit: https://www.chemguide.co.uk/ 5. ChemSpider: ChemSpider is a free chemical database that allows you to search for chemical structures, properties, and related information. It can be helpful for exploring the properties and reactions of specific compounds. Visit: http://www.chemspider.com/ 6. Royal Society of Chemistry YouTube Channel: The Royal Society of Chemistry's YouTube channel features educational videos, demonstrations, and experiments related to chemistry. It can be a valuable visual resource to enhance your understanding of various topics. Visit: https://www.youtube.com/user/roysocchem 	
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