

CHEMISTRY CURRICULUM OVERVIEW



Chemistry is an exciting and vibrant science subject and the main aim of the curriculum is not only to develop excellent chemistry students, which is reflected in the exam results, but also to instil an enthusiasm and passion for chemistry. Investigative skills and techniques are at the heart of chemistry and we have embedded frequent opportunities for our learners to develop these at all stages of the curriculum. Our curriculum reflects the vast number of our students for whom chemistry will form part or all of their further studies and to this end, from year 7 to year 13, we deliver our lessons with the expectation that our students will take the skills and knowledge they have gained here on into their future careers.

At KS3 we start with a year of Science skills, this is different to a lot of schools but prepares our very academic students with the necessary skills to target the KS3-5 curricula that are introduced from Year 8. This first year allows students to focus on how to process information and develop key scientific skills without being involved with the theory. The year gives a brilliant basis for the rest of the time in Science at Tiffin and the students finish desperate to further their understanding of the topics they have been introduced to. .

These scientific skills are then further built upon in Year 8, a one year KS3 course, with topics covering the foundations of Chemistry including Atoms and Molecules, Acids and Metals, and Earth Science. The lessons are built around the practical nature of Chemistry, employing many of the skills learnt in Year 7, and further developing their individual and group work skills. These lessons further encourage cross-curricular links (e.g. Geography and Earth Science) to encourage lateral thinking from our pupils. The year promotes engagement and enthusiasm in Chemistry further.

Chemistry is a compulsory subject at KS4, however we aim to teach in such a way that stimulates interest and maintains enthusiasm through a three year GCSE. We choose to follow AQA GCSE Chemistry as it shows a good sequence of topics through the course. This is delivered by subject-specialists at GCSE, including our combined science groups, all teachers with exceptional knowledge of Chemistry.

Our extraordinarily high uptake and retention of students into A-Level Chemistry reflects our success with engaging pupils in KS3-KS4. The AQA course is followed to continue the progression through the topics, and encompasses as much practical work as possible.

Students leave Chemistry at Tiffin with a rigorous education but also hopefully with a great passion for good science.

KS3 CHEMISTRY CURRICULUM



	Year 7	Year 8	Year 9 (GCSE)
Autumn Term 1	Developing scientific skills	Introduction to chemistry Chemicals and the safe study of them The Particle Model of Matter Using particle theory to explain states of matter. Changes of state Physical and chemical changes Properties of matter	Atomic Structure What is an atom made of? Elements on the Periodic table Word and symbol equations Separation techniques History of atomic structure Electronic structure
Autumn Term 2	Focusing on researching and referencing	The Particle Model of Matter (See above) Elements, Mixtures and Compounds What are elements, mixtures and compounds? Understanding Chemical Formulae Separating Mixtures Making Solutions and using Solubility curves	The periodic table The structure of the periodic table History of the development of the periodic table Group 1 chemistry Group 7 chemistry Transition metals
Spring Term 1	Writing up practical work	Elements, Mixtures and Compounds (See above)	Bonding Ionic bonding Covalent bonding Metallic bonding
Spring Term 2	Maths in science	Acids Defining acids and alkalis in terms of the pH scale Writing word equations for the reactions of acids The reactivity series and its links with reactions of acids	Structure Properties of ionic compounds Properties of simple molecular compounds Properties of giant covalent compounds Properties of metals Nanoparticles
Summer Term 1	Combining all skills	Metals The reactivity series Corrosion and rusting	Chemical changes - Metals Reaction with oxygen and water Word and symbol equations to represent these reactions Oxidation and Reduction
Summer Term 2	Combining all skills	Earth and rocks The structure of the Earth Types of Rocks and the Rock Cycle Composition of Air Combustion and Fossil fuels Chemicals from oils History of the Atmosphere and Earth	Chemical change - Acids Reactions with metals, bases, carbonates Word and symbol equations to represent these reactions Making salts required practical Strong/weak acids Concentrated/Dilute acids pH

KS4 CHEMISTRY CURRICULUM



	Year 10	Year 11
Autumn Term 1	Quantitative chemistry Conservation of mass Relative formula mass from atomic mass Moles Avogadro's constant Reacting masses Solution calculations and titrations Percentage Yield and Atom economy Gases	Earth's resources Potable water Phytomining Bioleaching Life cycle assessments Metal extraction
Autumn Term 2	Electrolysis Electrolysis of molten ionic compounds Electrolysis of ionic solutions Half equations Aluminium extraction	Using materials Corrosion and alloys Glass, ceramics and polymers Haber process NPK fertilisers
Spring Term 1	Rate of Reaction Definition of rate Calculating rate using graphs Factors affecting rate of reaction Collision theory Catalysts	Organic Chemistry Crude oil and fractional distillation Alkanes Alkenes Alcohols Polymers
Spring Term 2	Extent of Reaction Reversible reactions Le Chatelier's principle Effect of changing conditions	Revision
Summer Term 1	Energy changes Energy conservation Exothermic and Endothermic reactions Reaction profile diagrams Bond breaking and bond making Chemical cells Fuel cells	Revision
Summer Term 2	Analysis Definitions of pure and formulations Chromatography Identification of gases Identification of positive ions Identification of negative ions Spectroscopy	

KS5 CHEMISTRY CURRICULUM



	Year 12		Year 13	
Autumn Term 1	Atomic Structure (& Periodicity) Atomic structure Arrangement of electrons Ionisation energies Time of flight mass spectrometry	Intro to Organic Chemistry Empirical, molecular, general, structural, displayed and skeletal structures Isomerism Naming organic molecules Alkanes Fractional distillation Cracking Pollution Free radical substitution	Thermodynamics Entropy Gibbs free energy Rate equation Rate equations Order of reaction Arrhenius equation	Carbonyl chemistry and stereochemistry Oxidation of alcohols Reduction of aldehydes and mechanism Reaction with KCN Carboxylic acids Naming carboxylic acids Esterification Vegetable oils and animal fats Acylation
Autumn Term 2	Bonding Ionic, covalent and metallic bonding Link to properties Shapes of covalent molecule Polarity Intermolecular forces	Qualitative Chemistry Relative mass of atoms and compounds Moles Reacting masses Solution calculations and titrations Percentage Yield and Atom economy Ideal gas equation	Acids and Bases Proton donors and acceptors pH of a strong acid pH of a weak acid Using Kw pH curves and indicators Buffers	NMR H1 and C13 NMR to find structures
Spring Term 1	Kinetics Collision theory Maxwell Boltzmann distributions Effect of changing the conditions Catalysts Energetics (& Born Haber cycles) Standard enthalpy changes and Calorimetry Hess's Law Bond enthalpies Born Haber and solutions	Haloalkanes Nucleophilic substitution Elimination Ozone depletion	Electrode Potentials Cells Standard Hydrogen Electrode Calculate EMF Measuring EMF Electrochemical Cells	Amines Formation Basic properties Nucleophilic addition with halogenoalkanes, acyl chlorides and acid anhydrides, including mechanisms. Polymers Addition Polymers Condensation Polymers
Spring Term 2	Chemical Equilibria (including Kp) Dynamic equilibria Le Chateliers principe Equilibrium constants Kc and Kp Redox Oxidation and reduction Oxidation states Writing redox half equations and full equations.	Alkenes Electrophilic addition reactions of alkenes with HBr, H ₂ SO ₄ and Br ₂ Addition polymers	Transition Metals Electronic structure Substitution reactions Shapes of complex ions Colours of complex ions Variable oxidation state Catalysts Reactions of Inorganic compounds Reactions with NH ₃ , OH ⁻ , CO ₃ ²⁻	Amino Acids, Proteins and DNA Amino Acids structures and zwitterions Enzymes DNA Anti-cancer drugs
Summer Term 1	Group 2 Trends Reaction with water Solubilities Group 7 Trends Oxidising power and Reducing power	Alcohols, Organic analysis Making alcohols Oxidation Aldehydes and ketones Organic analysis Chemical tests for functional groups IR and Mass spectrometry	Period 3 compounds Reactions of Na and Mg with water. Reactions of Na, Mg, Al, Si, P and S with oxygen. Melting points of period 3 oxides. Reactions of period 3 oxides with water.	Organic synthesis Devise synthetic routes Chromatography How chromatography works TLC, gas and column chromatography
Summer Term 2	Consolidating knowledge, enrichment and progression activities	Consolidating knowledge, enrichment and progression activities		

