

## Chemistry at King's Academy Ringmer

| End point  | Knowledge acquired  | Skills acquired  |
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| <b>YEAR 7</b>  |   |  |
| <b>5 Matter</b><br>5.1 Particles<br>5.2 Mixtures                         | <ul style="list-style-type: none"> <li>- The particle model</li> <li>- States of matter</li> <li>- Melting, freezing and boiling</li> <li>- Evaporation, condensation and sublimation</li> <li>- Diffusion</li> <li>- Gas pressure</li> <li>- Pure substances and mixtures</li> <li>- Solutes, solvents and solutions</li> <li>- Solubility</li> <li>- Filtration</li> <li>- Evaporation and distillation</li> <li>- Chromatography</li> </ul> <p style="text-align: center;"><b>Top 5 Keywords</b><br/>states of matter; property; density; solubility; filtration</p> | <ul style="list-style-type: none"> <li>- Measuring temperature</li> <li>- Planning investigations</li> <li>- Particle diagrams</li> <li>- Plotting temperature-time</li> <li>- Choosing scales</li> <li>- Carrying out experiments and recording observations results</li> <li>- Using models to explain properties</li> <li>- Separating mixtures</li> <li>- Scientific apparatus</li> </ul>  |
| <b>6 Reactions</b><br>6.1 Acids and alkalis<br>6.2 Metals and non-metals | <ul style="list-style-type: none"> <li>- Chemical reactions</li> <li>- Acids and alkalis</li> <li>- Indicators and pH</li> <li>- Acid strength</li> <li>- Neutralisation</li> <li>- Making salts</li> <li>- Elements</li> <li>- Chemical reactions of metals and non-metals</li> <li>- Metals and acids</li> <li>- Metals and oxygen</li> <li>- Metals and water</li> <li>- Metal displacement reactions</li> </ul> <p style="text-align: center;"><b>Top 5 Keywords</b><br/>Acid and alkali; Chemical property; Reactivity; Element; Concentration</p>                 | <ul style="list-style-type: none"> <li>- Carrying out experiments and recording observations results</li> <li>- Using universal indicator</li> <li>- Use the pH scale to measure acidity and alkalinity.</li> <li>- Use models</li> <li>- Deduce the hazards of different acids</li> <li>- Design an investigation</li> <li>- Interpret a graph of pH changes during a neutralisation reaction.</li> <li>- Describe what a salt is and choose the correct name</li> <li>- Calculating percentages</li> <li>- Comparing the reactivity of metals</li> </ul> |

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| <p><b>7 Earth</b><br/>7.1 Earth Structure<br/>7.2 Universe</p>              | <ul style="list-style-type: none"> <li>- Sedimentary rocks</li> <li>- Igneous and metamorphic rocks</li> <li>- The rock cycle</li> <li>- Ceramics</li> <li>- The night sky</li> <li>- The Solar System</li> <li>- The structure of the Universe</li> <li>- The Earth</li> <li>- The Seasons</li> <li>- The Moon and changing ideas</li> </ul> <p style="text-align: center;"><b>Top 5 Keywords</b><br/>Weathering; Erosion; Igneous; Sedimentary; Metamorphic</p> | <ul style="list-style-type: none"> <li>- Modelling Earth's structure</li> <li>- Describe advantages and disadvantages of a given model</li> <li>- Modelling sedimentary rock formation</li> <li>- What determines crystal size in igneous rock?</li> <li>- Predict observations</li> <li>- Carrying out experiments and recording observations results</li> <li>- Give a detailed descriptions and explanations (Rock cycle)</li> <li>- Make a conclusion and explain it.</li> <li>- Write a fair test enquiry question.</li> <li>- Identify control variables.</li> <li>- Identify risks and hazards and Identify control measures.</li> <li>- Justify decisions made from property data</li> </ul> |
| <b>YEAR 8</b>   |   |  |
| <p><b>5 Matter -</b><br/>5.3 Elements<br/>5.4 Periodic Table</p>            | <ul style="list-style-type: none"> <li>- Elements</li> <li>- Atoms</li> <li>- Compounds</li> <li>- Chemical formulae</li> <li>- Polymers</li> <li>- The Periodic Table</li> <li>- The elements of Group 1;</li> <li>- The elements of Group 7</li> <li>- The elements of Group 0</li> </ul> <p style="text-align: center;"><b>Top 5 Keywords</b><br/>Atom; Molecule; Compound; Chemical formula; Trend</p>  | <ul style="list-style-type: none"> <li>- Use scientific vocabulary accurately</li> <li>- Use appropriate units</li> <li>- Use correct chemical nomenclature</li> <li>- Represent atoms, molecules, elements, mixtures, and compounds using particle diagrams.</li> <li>- Use observations of a pattern in chemical reactions to predict the behaviour</li> <li>- Use data to describe a trend in physical properties.</li> <li>- Carrying out experiments and recording observations results</li> <li>- Name compounds using their chemical formulae.</li> <li>- Explain how properties make substances suitable for their uses.</li> <li>- Identify hazards</li> </ul>                              |
| <p><b>6 Reactions</b><br/>6.3 Types of reaction<br/>6.4 Chemical energy</p> | <ul style="list-style-type: none"> <li>- That in a chemical reaction particles are rearranged</li> <li>- Combustion</li> <li>- Thermal decomposition</li> <li>- Conservation of mass</li> <li>- Exothermic and endothermic</li> <li>- Energy level diagrams</li> <li>- Bond energies</li> </ul> <p style="text-align: center;"><b>Top 5 Keywords</b><br/>Reactant; Product; Fuel; Combustion; Exothermic and Endothermic</p>                                      | <ul style="list-style-type: none"> <li>- Modelling reactions</li> <li>- Writing word equations from information about chemical reactions.</li> <li>- Identify possible hazards in a demonstration</li> <li>- Interpret particle diagrams and models to explain what happens in a chemical reaction.</li> <li>- Compare the pros and cons of fuels</li> <li>- Predict the products of thermal decomposition</li> <li>- Carrying out experiments and recording observations results</li> <li>- Use known masses to calculate unknown masses</li> <li>- Use experimental observations to distinguish exothermic and endothermic reactions.</li> <li>- Use a relative energy level diagrams</li> </ul>   |

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| <p><b>7 Earth</b><br/>7.3 Climate<br/>7.4 Earth resources</p> | <ul style="list-style-type: none"> <li>- Greenhouse effect</li> <li>- Greenhouse gases</li> <li>- Global warming</li> <li>- The carbon cycle</li> <li>- Climate change</li> <li>- Extracting metals</li> <li>- Recycling</li> </ul> <p style="text-align: center;"><b>Top 5 Keywords</b></p> <p style="text-align: center;">Global Warming; Climate change; Extraction; Electrolysis; Recycling</p>   | <ul style="list-style-type: none"> <li>- Design a model to explain the greenhouse effect</li> <li>- Evaluate claims that human activity is causing global warming or climate change.</li> <li>- Identify patterns in data.</li> <li>- Use an annotated diagram to describe the model in detail</li> <li>- Compare the relative effects of human-produced and natural global warming.</li> <li>- Interpret graphs that show trends over time, and explain their limitations.</li> <li>- Use equations to explain processes that exchange carbon dioxide into and out of the atmosphere.</li> <li>- Describe how global warming can impact on climate and local weather patterns.</li> </ul> |
| <p><b>YEAR 9</b></p>  |   |  |
| <p><b>Particle model and state change</b></p>                 | <ul style="list-style-type: none"> <li>● Explain why Brownian motion and dilution are evidence for the particle model.</li> <li>● Explain why something is, or is not, a substance.</li> <li>● Describe the movement, arrangement, and separation of the particles in foals and aerosols.</li> <li>● Use the particle model to explain applications of sublimation.</li> <li>● Use the particle model to explain energy changes in changes of state.</li> <li>● Evaluate the strengths and weaknesses of the particle model.</li> </ul> <p style="text-align: center;"><b>Top Keywords</b></p> <p style="text-align: center;">Brownian Motion, substance,aerosol, sublimation, deposition,endothemic, exothermic,</p> | <ul style="list-style-type: none"> <li>● Explain how a scientific theory changed over time.</li> <li>● Present data in a bar chart and use it to draw conclusions</li> <li>● Interpret data in a bar chart.</li> <li>● Interpret data in a line graph and use it to draw conclusions.</li> <li>● Interpret and present data in a table.</li> </ul>   |
| <p><b>Atoms and the periodic table</b></p>                    | <ul style="list-style-type: none"> <li>● Describe the contributions of different scientists to the development of the periodic table.</li> <li>● Describe the structure of the atom.</li> <li>● Classify an element as a metal of a non-metal, given its properties.</li> <li>● Describe some contributions of Mendeleev to the discovery of the Periodic Table.</li> <li>● Describe the pattern and properties of group 2 elements</li> <li>● Explain how the uses of elements, compounds</li> </ul>   | <ul style="list-style-type: none"> <li>● Define the use of models and analogies in science.</li> <li>● Present and interpret data in bar charts.</li> <li>● Make predictions using scientific knowledge.</li> </ul>  |

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|                              | <ul style="list-style-type: none"> <li>and mixtures depend on their properties.</li> <li>• Use ratios to determine chemical formula.</li> <li>• Draw the electronic structure of the atoms of the first 18 elements of the Periodic Table.</li> <li>• Define covalent and ionic bonding.</li> </ul> <p style="text-align: center;"><b>Top Keywords</b></p> <p style="text-align: center;">Periodic table, analogy, particle, formulation, electronic structure, covalent, ionic</p>  |  |
| <b>Chemical changes</b>      | <ul style="list-style-type: none"> <li>• Compare physical and chemical changes.</li> <li>• Predict the product of combustion reactions.</li> <li>• Interpret and write word equations.</li> <li>• Apply the idea of the conservation of mass.</li> <li>• Apply ratios to calculate reacting masses.</li> <li>• Compare energy changes in combustion reactions.</li> <li>• Interpret observations and data to decide if a change is exothermic or endothermic.</li> </ul> <p style="text-align: center;"><b>To Keywords</b></p> <p style="text-align: center;">Chemical, reaction, hydrocarbon, combustion, reactant, balanced, equation, conservation</p>  | <ul style="list-style-type: none"> <li>• Plan and carry out investigations</li> <li>• Interpret observations to make conclusions.</li> <li>• Analyse results and make conclusion</li> <li>• Interpret observations.</li> </ul>   |
| <b>YEAR 10 (GCSE course)</b> |  |  |
| <b>C1 Atomic structure</b>   | <ul style="list-style-type: none"> <li>- The law of the conservation of mass</li> <li>- Balance chemical equations and formulae of substances</li> <li>- Differences between compounds and mixtures</li> <li>- How mixtures can be separated using techniques such as filtration, crystallisation, distillation, and chromatography.</li> <li>- The development of the atomic model</li> <li>- The mass, charge and location of the subatomic particles and what ions and isotopes are</li> <li>- To write and draw electronic structures up to element 20.</li> </ul> <p style="text-align: center;"><b>Top 5 Keywords</b></p> <p style="text-align: center;">Formulae, ions, isotope, distillation, chromatography</p> | <ul style="list-style-type: none"> <li>- Draw the basic structure of an atom.</li> <li>- Diagrams of the difference between a pure element, a mixture, and a compound.</li> <li>- Balance given symbol equations.</li> <li>- Plan and carry out experiments and separation techniques and recording observations and results</li> <li>- Evaluate the models</li> <li>- Using atomic number and mass numbers of familiar atoms to determine the number of each sub-atomic particle.</li> <li>- Using SI units and prefixes to describe the size of an atom and its nucleus in standard form.</li> <li>- Writing the standard electronic configuration notation from a diagram for the first 20 elements.</li> </ul> |
| <b>C2 The periodic table</b> | <ul style="list-style-type: none"> <li>- The development of the periodic table</li> <li>- The work of Dalton, Newlands, and Mendeleev</li> <li>- The chemical properties of Group 0, Group 1, and Group 7 elements</li> </ul>  | <ul style="list-style-type: none"> <li>- Listing significant models for ordering the elements.</li> <li>- Explaining how and why the ordering of the elements has changed over time.</li> <li>- Using electronic structure to show how metals and</li> </ul>   |

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|                                 | <ul style="list-style-type: none"> <li>- Identify trends in properties and reactivity</li> <li>- Explain these in terms of the electronic structure of the elements. (HT only)</li> <li>- The properties and reactions of the transition elements. (TS only)</li> </ul> <p style="text-align: center;"><b>Top 5 Keywords</b></p> <p>Group, period, periodicity, atomic radius, displacement,</p>  | <p>non-metals are different.</p> <ul style="list-style-type: none"> <li>- Linking electronic structure to how the elements are arranged in the periodic table.</li> <li>- Recognise trends in supplied data.</li> <li>- Recognising a halogen displacement reaction and explaining what happens in the reaction.</li> <li>- Explaining how the outer electrons experience different levels of attraction to the nucleus.</li> </ul>  |
| <b>C3 Structure and bonding</b> | <ul style="list-style-type: none"> <li>- The states of matter and the particle model</li> <li>- Limitations of the particle model (HT only)</li> <li>- The energy transfers when substances change state.</li> <li>- That covalent bonding is the sharing of one or more pairs of electrons between non-metal atoms</li> <li>- Ionic bonding involves a metal and nonmetal atom transferring electrons</li> <li>- Metallic bonding and the delocalised sea of electrons</li> <li>- The difference in bonding of giant ionic structures, simple covalent molecules, and giant covalent structures</li> <li>- Nanoparticles and their applications (TS only)</li> </ul> <p style="text-align: center;"><b>Top 5 Keywords</b></p> <p>Ionic, covalent , metallic, simple molecular, delocalised</p> | <ul style="list-style-type: none"> <li>- Linking how energy, movement, and attraction between particles change as a substance is heated or cooled.</li> <li>- Cooling curves</li> <li>- Dot and cross diagrams</li> <li>- Interpreting the formulae of familiar ionic compounds</li> <li>- Modelling ionic compounds</li> <li>- Testing conductivity</li> <li>- Molecular modelling</li> <li>- Ball and stick diagrams</li> <li>- Using intermolecular forces to explain properties</li> <li>- Comparing structures to explain properties</li> <li>- Researching news articles re fullerenes and graphene</li> </ul> |
| <b>C4 Chemical calculations</b> | <ul style="list-style-type: none"> <li>- Understand relative atomic mass and relative formula mass</li> <li>- The mole and Avogadro's constant (HT only)</li> <li>- To use the equation number of moles = mass (g) / Ar (HT only)</li> <li>- Use moles to balance symbol equations and calculate reacting masses (HT only)</li> <li>- Relative atomic mass, relative formula mass, and moles to concentrations (HT only)</li> <li>- Carry out calculations with concentrations in g/dm<sup>3</sup>.</li> <li>- Calculations for yield, atom economy and titrations (TS only)</li> </ul> <p style="text-align: center;"><b>Top 5 Keywords</b></p> <p>relative atomic mass, relative formula mass, constant, moles, concentration</p>   | <ul style="list-style-type: none"> <li>- Calculate relative atomic mass</li> <li>- Calculate relative formula mass</li> <li>- Calculate reacting masses (HT only)</li> <li>- Calculate moles to concentrations (HT only)</li> <li>- Calculate yield (TS only)</li> <li>- Calculate atom economy (TS only)</li> <li>- Calculate titrations (TS only)</li> <li>- Carry out titrations (TS only)</li> <li>- Calculate volumes of gases (TS only)</li> </ul>   |
| <b>C5 Chemical changes</b>      | <ul style="list-style-type: none"> <li>- The reactivity series</li> <li>- The reactions of the metals with water and acids</li> <li>- Displacement reactions</li> <li>- The extraction of metals</li> </ul>   | <ul style="list-style-type: none"> <li>- Plan and carry out experiments and recording observations and results</li> <li>- Use general equations to write specific word equations</li> <li>- Using oxidation and reduction in descriptions</li> </ul>   |

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|                                 | <ul style="list-style-type: none"> <li>- The concepts of oxidation and reduction</li> <li>- Salts and how they are prepared</li> <li>- The pH scale</li> <li>- How pH relates to <math>H^+(aq)</math> ion concentration and the difference between strong and weak acids. (HT only)</li> <li>- How alkalis are a subgroup of bases.</li> <li>- Ionic and half equations (HT only)</li> </ul> <p style="text-align: center;"><b>Top 5 Keywords</b><br/>pH, salt, displacement, oxidation, reduction</p>   | <ul style="list-style-type: none"> <li>- Justify uses of metals based on their chemical reactivity.</li> <li>- Write balanced symbol equations, with state symbols</li> <li>- Evaluate in detail investigations</li> <li>- Use the reactivity series to determine if reactions occur.</li> <li>- Explaining how carbon or hydrogen can be used to reduce an ore.</li> <li>- Identify the chemical formula of the salt</li> <li>- Write ionic and half equations, including state symbols</li> <li>- Preparing a pure, dry sample of a soluble salt from an insoluble substance and a dilute acid.</li> </ul> |
| <b>C6 Electrolysis</b>          | <ul style="list-style-type: none"> <li>- Ionic compounds can undergo electrolysis when molten or in solution</li> <li>- Explain the movement of particles during electrolysis</li> <li>- The reactions that occur at the electrodes</li> <li>- The extraction of aluminium</li> <li>- How to investigate the electrolysis of a solution</li> <li>- Predict the products of electrolysis</li> <li>- Write balanced half equations. (HT only)</li> </ul> <p style="text-align: center;"><b>Top 5 Keywords</b><br/>Electrolysis, aqueous, molten, cryolite, brine</p> | <ul style="list-style-type: none"> <li>- Plan and carry out electrolysis and recording observations and results</li> <li>- Writing half equations</li> <li>- Understanding the effect of water on electrolysis</li> <li>- Using OIL RIG</li> <li>- Explaining the use of cryolite and graphite anodes</li> <li>- Linking to industrial uses</li> </ul>   |
| <b>C7 Energy changes</b>        | <ul style="list-style-type: none"> <li>- Energy transfers that occur during chemical reactions</li> <li>- Exothermic reactions</li> <li>- Endothermic reactions</li> <li>- Describe uses of exothermic and endothermic reactions</li> <li>- The quantitative energy transfers in a reaction</li> <li>- Bond energies (HT only)</li> <li>- Chemical cells (TS only)</li> <li>- Fuel cells (TS only)</li> </ul> <p style="text-align: center;"><b>Top 5 Keywords</b><br/>exothermic, endothermic, activation energy, reaction profile, bonds</p>                     | <ul style="list-style-type: none"> <li>- Interpret experimental data</li> <li>- Identifying if a reaction is exothermic or endothermic</li> <li>- Sketching and interpreting reaction profile diagrams</li> <li>- Calculating bond energies (HT only)</li> <li>- Bond diagrams (HT only)</li> <li>- Applying understanding of the reactivity series and electrolysis to chemical cells and fuel cells (TS only)</li> <li>- Investigating chemical cell</li> </ul>  |
| <b>YEAR 11 (GCSE course)</b>    |  |  |
| <b>C8 Rates and equilibrium</b> | <ul style="list-style-type: none"> <li>- The factors that affect the rate of a reaction, including temperature, surface area, concentration, and pressure</li> <li>- Explain the effect of each factor on the rate of reaction using collision theory</li> <li>- That each factor increases the frequency of effective</li> </ul>  | <ul style="list-style-type: none"> <li>- Calculating the mean rate of reaction.</li> <li>- Calculating the rate of reaction at a specific time.</li> <li>- Plot and use a graph to calculate the gradient to measure the initial rate of reaction.</li> <li>- Use tangents to calculate rate (HT only)</li> </ul>  |

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|  | <p>collisions, not just the number of collisions</p> <ul style="list-style-type: none"> <li>- Explain the effect of catalysts on the rate of a reaction in terms of providing an alternative reaction pathway with a lower activation energy</li> <li>- Reversible reactions and dynamic equilibrium</li> <li>- Apply their knowledge on endothermic and exothermic reactions to equilibrium reactions</li> <li>- Predict the effect of temperature changes on the reversible reactions and the position of the equilibrium</li> <li>- Use Le Châtelier's principle to explain the effect of temperature and pressure on the position of equilibrium (HT only)</li> </ul> <p style="text-align: center;"><b>Top 5 Keywords</b></p> <p style="text-align: center;">Rate factor, frequency, collision theory, catalyst, equilibrium</p> | <ul style="list-style-type: none"> <li>- Justify a chosen method for a given reaction to monitor the rate of reaction.</li> <li>- Use collision theory to explain how increasing factors increase the rate of reaction.</li> <li>- Safely complete experiments on how factors affect the rate of a reaction.</li> <li>- Justify quantitative predictions</li> <li>- Evaluate in investigations</li> <li>- Use ideas about proportionality.</li> <li>- Use reaction profiles in explanations</li> </ul>                               |
| <b>C9 Crude oil and fuels</b>          | <ul style="list-style-type: none"> <li>- Hydrocarbons and the alkanes</li> <li>- The reactions of hydrocarbons, including combustion (both complete and incomplete) and cracking</li> <li>- Write balanced symbol equations for the complete combustion of hydrocarbons</li> <li>- Describe the conditions of cracking</li> <li>- Describe the test for alkenes (a product of cracking)</li> <li>- Crude oil as a source of hydrocarbons and the fractional distillation of crude oil</li> <li>- How the size of the hydrocarbon molecule affects its properties, including viscosity, boiling point, and flammability</li> </ul> <p style="text-align: center;"><b>Top 5 Keywords</b></p> <p style="text-align: center;">Fraction, hydrocarbon, viscosity, saturated, cracking</p>   | <ul style="list-style-type: none"> <li>- Name and draw the displayed formula of the first four alkanes</li> <li>- Interpreting tables of boiling point</li> <li>- Displayed formulae</li> <li>- Classify alkanes</li> <li>- Apply general formulae</li> <li>- Bar charts</li> <li>- Compare properties of fractions</li> <li>- Summarise trends</li> <li>- Use standard lab tests for gases</li> <li>- Calculate amounts of reactants</li> <li>- Evaluate dangers of incomplete combustion</li> <li>- Balancing equations</li> </ul> |
| <b>C10 Organic reactions (TS only)</b> | <ul style="list-style-type: none"> <li>- More organic functional groups – alkenes, alcohols, carboxylic acids, and esters. .</li> <li>- The reactions and conditions of alkenes (with halogens, water, and hydrogen),</li> <li>- Alcohols (combustion, oxidation, and reaction with sodium), and carboxylic acids (to make esters).</li> <li>- Why carboxylic acids are called weak acids</li> </ul> <p style="text-align: center;"><b>Top 5 Keywords</b></p> <p style="text-align: center;">Alkene, alcohols, carboxylic acids, ester, homologous series</p>   | <ul style="list-style-type: none"> <li>- Identify, name, and draw the structural formula of the first four alkenes, alcohols, and carboxylic acids</li> <li>- Identify, name, and draw the ester ethyl ethanoate</li> <li>- Predict the word and balanced symbol equations</li> <li>- Compare and contrast the reactivity of alkanes and alkenes.</li> <li>- Use general formulae</li> <li>- Classify an organic compounds</li> <li>- Comparing the reactions of alcohols</li> <li>- Link volatility to molecular forces.</li> </ul> |

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| <b>C11 Polymers (TS only)</b>     | <ul style="list-style-type: none"> <li>- Different types of manufactured polymers, including addition polymers and condensation polymers</li> <li>- Poly(ethene)</li> <li>- Basic principles of condensation polymerisation (HT only)</li> <li>- Natural polymers, including polysaccharides, proteins, and DNA.</li> <li>- The basic structure of DNA.</li> <li>- How amino acids react together to form proteins (HT only)</li> <li>- The difference between the monomer and the repeating unit of the polymer.</li> </ul> <p style="text-align: center;"><b>Top 5 Keywords</b></p> <p style="text-align: center;">Monomer, polymer, addition, condensation, amino acid</p>                                  | <ul style="list-style-type: none"> <li>- Identify an addition polymer from polymer and monomer diagrams</li> <li>- Drawing the monomer from the polymer and the polymer from the monomer</li> <li>- Draw other addition polymers and associated monomers</li> <li>- Identify the types of monomers that form natural polymers</li> <li>- Interpreting formulae</li> <li>- Labelled diagrams</li> <li>- Extracting DNA from kiwifruit</li> </ul>   |
| <b>C12 Chemical analysis</b>      | <ul style="list-style-type: none"> <li>- The difference between a pure substance, a mixture, and a formulation</li> <li>- What is meant by purity</li> <li>- Chromatography experiments</li> <li>- Analyse a chromatogram, both qualitatively and quantitatively using R<sub>f</sub> values</li> <li>- The different experimental tests for gases, including both the procedure and positive result.</li> <li>- Experimental tests for positive and negative ions (TS only)</li> <li>- Flame emission spectroscopy (TS only)</li> </ul> <p style="text-align: center;"><b>Top 5 Keywords</b></p> <p style="text-align: center;">Pure, formulation, R<sub>f</sub> value, precipitate, emission spectroscopy</p> | <ul style="list-style-type: none"> <li>- Use melting point and boiling point data can be used to determine the purity of a substance</li> <li>- Calculate percentage composition of components in a range of formulations.</li> <li>- Describe and safely carry out a method to make a paper chromatogram.</li> <li>- Calculate R<sub>f</sub> values from given data.</li> <li>- Calculate R<sub>f</sub> values from a chromatogram, using an appropriate number of significant figures.</li> <li>- Interpret a chromatogram to identify unknown substances.</li> <li>- Interpret results to identify a gas that is present.</li> <li>- Identify a metal ion from the colour of a flame or the colour of the hydroxide precipitate.</li> <li>- Ionic equations</li> <li>- Safely carry out testing for carbonates, halides, and sulfate ions.</li> <li>- Interpret instrumental results of flame emission spectroscopy</li> </ul> |
| <b>C13 The Earth's atmosphere</b> | <ul style="list-style-type: none"> <li>- The volcanic activity theory of the origin of the atmosphere</li> <li>- Describe the history of the atmosphere and timescales involved.</li> <li>- How it has evolved over time</li> <li>- General composition of the atmosphere how it has changed and how the atmosphere is currently being affected by human activity</li> <li>- Greenhouse gases and effect</li> <li>- Human activities that are thought to cause global</li> </ul>   | <ul style="list-style-type: none"> <li>- Interpret evidence concerning other theories, and be able to evaluate them.</li> <li>- Develop their working scientifically skills</li> <li>- Evaluating models</li> <li>- Interpreting and evaluating evidence for scientific theories</li> <li>- Calculate carbon footprint</li> <li>- Use balanced symbol equations to explain how gases were formed</li> <li>- Interpret pie charts</li> <li>- Make flow charts</li> </ul>   |

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|  | <p>warming, and some of the effects this has on the climate of the Earth</p> <ul style="list-style-type: none"> <li>- Carbon footprint</li> <li>- The effect of other pollutants on the Earth, including carbon monoxide, sulfur dioxide, nitrogen oxides, and particulates</li> </ul> <p style="text-align: center;"><b>Top 5 Keywords</b></p> <p>Atmosphere, greenhouse effect, carbon footprint, pollutant, particulates</p>   | <ul style="list-style-type: none"> <li>- Evaluate the scale, risk, and environmental impact of global climate change.</li> <li>- Justify why reducing greenhouse gas emissions can be difficult to achieve.</li> <li>- Evaluate the use of products, services, or events in terms of their carbon footprint</li> </ul>   |
| <b>C14 The Earth's resources</b>         | <ul style="list-style-type: none"> <li>- The difference between finite and renewable resources</li> <li>- Understanding of finite and renewable resources should be applied to the need to reuse and recycle</li> <li>- Ways of reducing the use of finite resources</li> <li>- Specific resources that we use, including water and metals (in particular copper)</li> <li>- Different ways that water is treated, both to create potable water and to remove waste products</li> <li>- Metal-ore extraction and electrolysis (HT only)</li> <li>- Alternative biological extraction of copper (HT only)</li> </ul> <p style="text-align: center;"><b>Top 5 Keywords</b></p> <p>Finite, renewable, potable, phytomining, bioleaching</p>  | <ul style="list-style-type: none"> <li>- Carry out life cycle assessments on products.</li> <li>- Describe and classify a resource as finite or renewable when information is given.</li> <li>- Explain the use of natural, sustainable, and finite resources.</li> <li>- Interpret information from different formats including graphs, charts, tables, and prose.</li> <li>- Draw conclusions consistent with information provided from graphs, charts, tables, and prose and evaluate the validity of the data.</li> <li>- Write balanced symbol equations to explain metal extraction techniques.</li> <li>- Write ionic equations to explain metal extraction techniques and identify the species being oxidised or reduced</li> </ul>  |
| <b>C15 Using our resources (TS only)</b> | <ul style="list-style-type: none"> <li>- Rusting - how both water and air are required for iron to corrode</li> <li>- Methods for preventing rusting – barrier methods and sacrificial methods</li> <li>- Alloys, polymers, ceramics, glass, and composites</li> <li>- The Haber process and how it is carried out economically on an industrial scale</li> <li>- Why the industrial conditions for the Haber process are described as a compromise</li> <li>- Importance of the Haber process in the production of ammonia, an important feedstock in the production of fertilisers, both in the laboratory and industrially alongside potassium and phosphorus fertilisers.</li> </ul> <p style="text-align: center;"><b>Top 5 Keywords</b></p> <p>Rusting, alloy, ceramic, composite, compromise</p> | <ul style="list-style-type: none"> <li>- Identify key properties and link these to their common uses</li> <li>- List some ways to prevent rusting.</li> <li>- Write balanced equations to describe rusting and identify species that are oxidised and reduced.</li> <li>- Evaluate an alloy in terms of its properties and uses.</li> <li>- Use data about the properties to suggest a suitable plastic or alloy</li> <li>- Evaluate a plastic in terms of its properties and uses.</li> <li>- Compare quantitatively the physical properties of glass and clay ceramics, polymers, composites, and metals.</li> <li>- Write a word equation to describe the Haber process.</li> <li>- Evaluate the Haber process using atom economy and LCA to determine its environmental impact.</li> </ul> |