

# MOOR PARK HIGH SCHOOL: CURRICULUM

## Key Stage 4 Long Term Planning

### Year 10

#### Faculty Area: Chemistry Single Science

| Year 10                                     | Autumn 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Autumn 2 | Spring 1                                                                                                                                                                                                                                                                                                                                                                                 | Spring 2                                                                                                        | Summer 1                                                                                                                                                                                                                                                                                                                                                      | Summer 2                                                                                                                                                                             |
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| <b>Syllabus</b>                             | AQA Chemistry<br>Collins - Chapter 4<br>Chemical Changes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |          | AQA Chemistry<br>Collins - Chapter 3<br>Chemical Quantities and calculations                                                                                                                                                                                                                                                                                                             | AQA Chemistry<br>Collins - Chapter 5<br>Energy Changes                                                          | AQA Chemistry<br>Collins - Chapter 6<br>The rate and extent of Chemical Reactions                                                                                                                                                                                                                                                                             | AQA Chemistry<br>Collins - Chapter 7<br>Hydrocarbons                                                                                                                                 |
| <b>Connections to previous KS3 learning</b> | Chemical symbols and formulae for elements and compounds<br>The concept of a pure substance<br>Mixtures, including dissolving<br>Simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography<br>Combustion, thermal decomposition, oxidation and displacement reactions<br>Defining acids and alkalis in terms of neutralisation reactions.<br>The pH scale for measuring acidity/alkalinity; and indicators<br>Reactions of acids with metals to produce a salt plus hydrogen<br>The order of metals and carbon in the reactivity series<br>The use of carbon in obtaining metals from metal oxides |          | Chemical symbols and formulae for elements and compounds<br>Conservation of mass<br>Pure and impure substances<br>The concept of a pure substance<br>The identification of pure substances.<br>Chemical reactions as the rearrangement of atoms<br>Representing chemical reactions using formulae and using equations<br>Investigate changes in mass for chemical and physical processes | Energy changes on changes of state (qualitative)<br>Exothermic and endothermic chemical reactions (qualitative) | chemical symbols and formulae for elements and compounds<br>conservation of mass<br>changes of state and chemical reactions.<br>Chemical reactions<br>chemical reactions as the rearrangement of atoms<br>representing chemical reactions using formulae and using equations<br>what catalysts do.<br>the order of metals and carbon in the reactivity series | the order of metals and carbon in the reactivity series<br>the use of carbon in obtaining metals from metal oxides<br>properties of ceramics, polymers and composites (qualitative). |
| <b>Knowledge</b>                            | Reactivity of metals<br>Extraction of metals                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          | The law of conservation of mass<br>relative atomic mass                                                                                                                                                                                                                                                                                                                                  | Exothermic and endothermic reactions                                                                            | Rate of reaction                                                                                                                                                                                                                                                                                                                                              | Carbon compounds as fuels<br>Fractional Distillation                                                                                                                                 |

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|               | <p>Oxidation and reduction reactions</p> <p>Reactivity of acids</p> <p>Neutralization reactions</p> <p>Electrolysis</p> <p>Predicting the products, using common reactants</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <p>relative formula mass</p> <p>Change in mass</p> <p>Chemical equations can be interpreted in terms of moles</p> <p>Limiting reactants</p> <p>Atom Economy</p> <p>Volumes of Gases</p> | <p>Reaction profiles</p> <p>Fuel cells</p> <p>Cells and batteries</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <p>Factors which affect the rates of chemical reactions</p> <p>Reversible reaction systems at equilibrium</p> <p>Catalysts</p>                                                                                                                                                                                                                                                                                                                                                                                 | <p>Combustion</p> <p>Cracking and Alkenes</p> <p>Reactions of Alkenes</p> <p>Alcohols</p> <p>Polymerisation</p>                                                                                                                                     |
| <b>Skills</b> | <p>Safe use of appropriate heating devices and techniques including the use of a Bunsen burner and water bath or electric heater</p> <p>safe use of a range of equipment to purify and/or separate a chemical mixture including evaporation, filtration and crystallisation</p> <p>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</p> <p>use of appropriate apparatus and techniques for conducting and monitoring</p> <p>chemical reactions including appropriate reagents and/or techniques for the</p> <p>measurement of pH in different situations</p> | <p>Plan investigations, make observations and analyse data</p> <p>Explain what has happened to the mass during the experiment and why it has happened.</p>                              | <p>use of appropriate apparatus to make and record a range of measurements accurately, including mass, temperature and volume of liquids</p> <p>making and recording appropriate observations during chemical reactions including changes in temperature</p> <p>safe 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</p> <p>Draw simple reaction profiles (energy level diagrams) for</p> | <p>use appropriate apparatus to explore chemical changes</p> <p>Plan investigations, make observations and analyse data</p> <p>Record the results and plot a graph of results of volume of gas against time.</p> <p>Predict and explain the effects of changes in the size of pieces of a reacting solid in terms of surface area to volume ratio.</p> <p>investigate how changes in concentration affect the rates of reactions by a method involving measuring the volume of a gas produced and a method</p> | <p>Plan investigations, make observations and analyse data</p> <p>Plot boiling points of alkanes against number of carbons.</p> <p>Make predictions of the boiling points of other alkanes.</p> <p>Research uses of the fractions of crude oil.</p> |

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|                                                                                   | investigate the reactivity of some of the metals with water and acid.<br>preparation of a pure, dry sample of a soluble salt from an insoluble oxide or carbonate<br>determination of the reacting volumes of solutions of a strong acid and a strong alkali by titration. |                                                                                                                                                                                                                                                                     | exothermic and endothermic reactions                                                                                                                                          | involving a change in colour or turbidity.                                                                                                                                                                |                                                                                                                                                                                                                         |
| <b>Assessment</b>                                                                 | End of unit test for Chapter 4 - Chemical Changes                                                                                                                                                                                                                          | End of unit test for Chapter 3 - Chemical Quantities and calculations                                                                                                                                                                                               | End of unit test for Chapter 5 - Energy Changes                                                                                                                               | End of unit test for Chapter 6 - The rate and extent of Chemical Reactions                                                                                                                                | End of unit test for Chapter 7 - Hydrocarbons                                                                                                                                                                           |
| <b>Homework</b>                                                                   | GCSE past paper exam questions<br>Analysis / Evaluation of investigations<br>Extended answer questions                                                                                                                                                                     | GCSE past paper exam questions<br>Analysis / Evaluation of investigations<br>Extended answer questions                                                                                                                                                              | GCSE past paper exam questions<br>Analysis / Evaluation of investigations<br>Extended answer questions                                                                        | GCSE past paper exam questions<br>Analysis / Evaluation of investigations<br>Extended answer questions                                                                                                    | GCSE past paper exam questions<br>Analysis / Evaluation of investigations<br>Extended answer questions                                                                                                                  |
| <b>Cultural enrichment including Trips, Visits, Experiences, Extra-curricular</b> | <p style="text-align: center;"><u>School and University Network</u><br/>Summer Term-UCLAN Visit (topic to be confirmed)</p>                                                                                                                                                |                                                                                                                                                                                                                                                                     |                                                                                                                                                                               |                                                                                                                                                                                                           |                                                                                                                                                                                                                         |
| <b>Literacy</b>                                                                   | Keywords:<br>Acid, Alkali, Crystallisation, Displacement, Electrolysis, Electrolyte, Extraction, Filtration, Negative electrode (cathode), Neutralisation, Oxidation, pH scale, Positive electrode (anode), *Redox reaction, Reduction, *Titration, Universal indicator,   | Keywords:<br>*Actual yield, *Atom economy, Avogadro constant, *Avogadro's law, Concentration, Conservation of mass, Limiting reactant, *Mole, *Percentage by mass, *Percentage yield, Relative formula mass, *Theoretical yield, Thermal decomposition, Uncertainty | Keywords:<br>Activation energy, *Alkaline batteries, *Battery, *Chemical cells, Endothermic reaction, Exothermic reaction, *Fuel cells, Reaction profile, *Rechargeable cells | Keywords:<br>Activation energy, Catalyst, Collision theory, Equilibrium, Pressure, temperature, concentration, collisions, kinetic energy, activation energy, Equilibrium, Le Chatelier's Principle, Rate | Keywords:<br>*Addition polymerisation, Alcohols, Alkanes, Alkenes, unsaturated, *Amino acids, Carboxylic acids, Catalytic cracking, Combustion, Complete combustion, Crude oil, *Condensation polymerisation, Cracking, |

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| <b>Numeracy</b> | <p>Using common reactants, predict the products</p> <p>Deduce an order of reactivity of metals</p> <p>Interpret or evaluate specific metal extraction processes when given appropriate information.</p> <p>Explain reactions in terms of gain or loss of electrons</p> <p>Explain what happens at the following electrodes using suitable examples and half equations:<br/>cathode<br/>anode.</p> | <p>Balancing chemical equations</p> <p>The value of the Avogadro constant is <math>6.02 \times 10^{23}</math> per mole.</p> <p>Define one mole in terms of <math>M_r</math> and <math>A_r</math></p> <p>Calculate the number of moles in a substance using the relative formula mass.</p> <p>Be able to convert <math>\text{cm}^3</math> into <math>\text{dm}^3</math>.</p> <p>Use the equation:<br/><math>C = m / v</math> to calculate the concentration of a solution.</p> <p>Rearrange the equation:<br/><math>C = m / v</math><br/>to make mass the subject.</p> | <p>Measurements of temperature change</p> <p>Draw simple reaction profiles (energy level diagrams) for exothermic and endothermic reactions</p> <p>Be able to calculate the energy transferred in chemical reactions using bond energies supplied</p> | <p>Use the results and graph to determine the mean rate of reaction.</p> <p>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.</p> <p>Draw and interpret graphs showing the quantity of product formed or quantity of reactant used up against time.</p> <p>Draw tangents to the curves on these graphs and use the slope of the tangent as a measure of the rate of reaction.</p> <p>Use simple ideas about proportionality when using collision theory to explain the effect of a factor on the rate of a reaction.</p> | Write balanced symbol equations                                                                                                     |
| <b>CIAG</b>     | What workplace skills does chemistry develop?                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                     |

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**Collating:** Bringing together information from different sources is a useful skill in many jobs. An investigative journalist will need to find evidence from a range of sources to build a story. Software testers need to collate information about the performance of a programme to find issues and suggest appropriate improvements.

**Investigation:** There are many jobs where you have to use these investigative skills. A forensic computer analyst investigates cyber crime to find out how breaches happen. A vet must investigate the causes of illness in an animal by looking at the symptoms and then deciding on a treatment.

**Critical evaluation:** Critical evaluation is a skill that transfers to many jobs. If you work as a crown prosecutor, you'll have to evaluate criminal cases and decide whether the evidence is likely to lead to a conviction. In business, managers need to carry out regular performance evaluations with the members of their team and identify areas for improvement.

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## Key Stage 4 Long Term Planning

### Year 11

#### Curriculum Area: Chemistry Single Science

| Year 10                                     | Autumn 1                                                                                                                                                                                                          | Autumn 2                                                                                                                                                                                                                                                                              | Spring 1                                                                                                                                                                                            | Spring 2                                                                                                                                                                                                                                                                                                                                                                                 | Summer 1 | Summer 2 |
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| <b>Syllabus</b>                             | AQA Chemistry<br>Collins - Chapter 8<br>Chemical Analysis                                                                                                                                                         | AQA Chemistry<br>Collins - Chapter 9<br>The Atmosphere                                                                                                                                                                                                                                | AQA Chemistry<br>Collins - Chapter 10<br>Sustainable Development                                                                                                                                    | AQA Chemistry<br>Collins - Chapter 3<br>Chemical Quantities and calculations                                                                                                                                                                                                                                                                                                             |          |          |
| <b>Connections to previous KS3 learning</b> | the concept of a pure substance<br>mixtures, including dissolving<br>simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography<br>the identification of pure substances | The composition of the Earth<br>The structure of the Earth<br>The rock cycle and the formation of igneous, sedimentary and metamorphic rocks<br>The carbon cycle<br>The composition of the atmosphere<br>The production of carbon dioxide by human activity and the impact on climate | The composition of the Earth<br>The structure of the Earth<br>The carbon cycle<br>The composition of the atmosphere<br>The production of carbon dioxide by human activity and the impact on climate | Chemical symbols and formulae for elements and compounds<br>Conservation of mass<br>Pure and impure substances<br>The concept of a pure substance<br>The identification of pure substances.<br>Chemical reactions as the rearrangement of atoms<br>Representing chemical reactions using formulae and using equations<br>Investigate changes in mass for chemical and physical processes |          |          |
| <b>Knowledge</b>                            | Purity, formulations and chromatography<br>Identification of common gases                                                                                                                                         | The composition and evolution of the Earth's atmosphere<br>Carbon dioxide and methane as greenhouse gases                                                                                                                                                                             | Using the Earth's resources and obtaining potable water                                                                                                                                             | The law of conservation of mass<br>relative atomic mass<br>relative formula mass                                                                                                                                                                                                                                                                                                         |          |          |

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|                   | Flame emission spectroscopy                                                                                                                                                                                                                                                                                     | Common atmospheric pollutants and their sources<br>Carbon footprint and its reduction | Life cycle assessment and recycling<br>Using materials<br>Sustainable development, lifecycle assessments and recycling<br>Corrosion and its prevention<br>Alloys, ceramics, polymers and composites<br>Haber process                                                                                                                          | Change in mass<br>Chemical equations can be interpreted in terms of moles<br>Limiting reactants<br>Atom Economy<br>Volumes of Gases             |  |
| <b>Skills</b>     | Plan investigations, make observations and analyse data<br>Evaluate the reliability of data<br>investigate how paper chromatography can be used to separate and tell the difference between coloured substances. Students should calculate R <sub>f</sub> values.<br>use of chemical tests to identify the ions | observations and analysis of data                                                     | Plan investigations, make observations and analyse data<br>Analysis and purification of water samples from different sources, including pH, dissolved solids and distillation.<br>use of appropriate apparatus to make and record a range of measurements accurately including mass<br>safe use of appropriate heating devices and techniques | Plan investigations, make observations and analyse data<br>Explain what has happened to the mass during the experiment and why it has happened. |  |
| <b>Assessment</b> | End of unit test for Chapter 8 - Chemical Analysis                                                                                                                                                                                                                                                              | End of unit test for Chapter 9 The Atmosphere                                         | End of unit test for Chapter 10 Sustainable Development                                                                                                                                                                                                                                                                                       | End of unit test for Chapter 3 - Chemical Quantities and calculations                                                                           |  |

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| <b>Homework</b>                                                                   | GCSE past paper exam questions<br>Analysis / Evaluation of investigations<br>Extended answer questions                                                                                                                     | GCSE past paper exam questions<br>Analysis / Evaluation of investigations<br>Extended answer questions                                                                                                  | GCSE past paper exam questions<br>Analysis / Evaluation of investigations<br>Extended answer questions                                                                                                                                                                                                                                                                                                  | GCSE past paper exam questions<br>Analysis / Evaluation of investigations<br>Extended answer questions                                                                                                                                                              |  |
| <b>Cultural enrichment including Trips, Visits, Experiences, Extra-curricular</b> | <p align="center"><u><b>School and University Network</b></u><br/>Post Easter-Lancaster University 6 week revision course.</p>                                                                                             |                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                     |  |
| <b>Literacy</b>                                                                   | Keywords:<br>Chromatogram,<br>Chromatography, *Flame emission spectroscopy,<br>*Flame test, Impure substance, *Instrumental methods, Litmus paper, Mobile phase, Precipitation, Pure substance, Rf value, Stationary phase | Keywords:<br>Acid rain, Carbon footprint, Environmental implication, Fossil fuels, Global climate change, Global dimming, Greenhouse effect, Greenhouse gases, Particulates, Photosynthesis, Pollutants | Keywords:<br>*Alloy, Bioleaching, *Borosilicate glass, *Composite, *Corrosion, Desalination, Displacement, Electrolysis, *Electroplating, Finite resources, *Galvanise, Ground water, Life cycle assessment (LCA), *NPK fertilisers, Ore, Phytomining, Potable water, Raw materials, Renewable resources, *Sacrificial protection, *Soda-lime glass, Sterilisation, Sustainable development, *The Haber | Keywords:<br>*Actual yield, *Atom economy, Avogadro constant, *Avogadro's law, Concentration, Conservation of mass, Limiting reactant, *Mole, *Percentage by mass, *Percentage yield, Relative formula mass, *Theoretical yield, Thermal decomposition, Uncertainty |  |

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|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                               | process, Thermosetting polymers, Thermosoftening polymers |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |
| <b>Numeracy</b> | <p>Suggest the effects on Earth and atmosphere of the carbon footprint</p> <p>Draw pie charts for the composition of the atmosphere</p> <p>Use the equation for photosynthesis</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <p>Extract and interpret information about resources from charts, graphs and tables.</p> <p>Use orders of magnitude to evaluate the significance of data.</p> | Balancing chemical equations                              | <p>Balancing chemical equations</p> <p>The value of the Avogadro constant is <math>6.02 \times 10^{23}</math> per mole.</p> <p>Define one mole in terms of <math>M_r</math> and <math>A_r</math></p> <p>Calculate the number of moles in a substance using the relative formula mass.</p> <p>Be able to convert <math>\text{cm}^3</math> into <math>\text{dm}^3</math>.</p> <p>Use the equation:<br/><math>C = m / v</math> to calculate the concentration of a solution.</p> <p>Rearrange the equation:<br/><math>C = m / v</math> to make mass the subject.</p> |  |
| <b>CIAG</b>     | <p>What workplace skills does chemistry develop?</p> <p>Collating: Bringing together information from different sources is a useful skill in many jobs. An investigative journalist will need to find evidence from a range of sources to build a story. Software testers need to collate information about the performance of a programme to find issues and suggest appropriate improvements.</p> <p>Investigation: There are many jobs where you have to use these investigative skills. A forensic computer analyst investigates cyber crime to find out how breaches happen. A vet must investigate the causes of illness in an animal by looking at the symptoms and then deciding on a treatment.</p> |                                                                                                                                                               |                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |

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|  | <p>Critical evaluation: Critical evaluation is a skill that transfers to many jobs. If you work as a crown prosecutor, you'll have to evaluate criminal cases and decide whether the evidence is likely to lead to a conviction. In business, managers need to carry out regular performance evaluations with the members of their team and identify areas for improvement.</p> |
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