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| **Chemistry Separate Science** |
| **Year 10****KS3 links refer to the year 9 course the students studied previously** |
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| **Term 1 content and skills** | **Term 2 Content and skills** | **Term 3 Content and Skills** | **Extended Curriculum (trips/visits/afterschool activities)** |
| **Module 1 Foundations in Chemistry** (Links to KS3 T6, and T12) * Separation techniques
* Atomic structure; protons, neutrons, electrons, and electron shells
* Isotopes and calculating Relative Atomic Mass (Links the Physics GCSE module 4)
* The development of the model of the atom (Same content as Physics Module 4)
* Structure of the periodic table
* Group 1
* Group 7
* Group 0
* Properties of transition metals

**Module 2 Bonding** (Links to KS3 T15 and T25)* Using the particle model of matter to explain the properties of the 3 states of matter.
* Chemical bonding
* Ionic
* Covalent
* Metallic
* How bonding and structure are related to the properties of substances.
* Ionic compounds
* Small molecules
* Polymers
* Giant covalent structures
* Metals and alloys
* Structure and bonding of carbon
* Diamond
* Graphite
* Graphene and Fullerenes
* Nanoparticles and their uses
 | **Module 4 Chemical changes** (Links to KS3 T15 and T25)* Reactivity series
* Extraction of metals
* Redox reactions – Oxidation and reduction
	+ in terms of gain and loss of oxygen
	+ in terms of electrons lost and gained (H)
* Reactions of acids with metals
* Neutralisation reactions and salt production

**Required practical -**Making an insoluble salt.* Acids as sources of hydrogen ions Alkalis produce hydroxide ions in solution.
* Strong and weak acids
* Electrolysis of molten and aqueous ionic compounds

**Required Practical -**Electrolysis of copper chloride, copper sulfate, sodium sulfate and sodium chloride.**Module 5 Energy changes** (Links to KS3 T25) * Bond breaking and making relates to exo- and endothermic reactions.
* Reaction profiles
* Relative bond energies as related to exo- and endothermic reactions
* Calculation of energy changes from bond energy data
* Fuel cells

**Required practical-** Neutralisation of sodium hydroxide and hydrochloric acid using temperature change to monitor the exothermic reaction |  **Module 3 Quantitative Chemistry** (Links to KS3 T29) (Links to maths- ratios and units)* Balanced equations and conservation of mass
* Relative formula mass
* Moles and its relationship to the stoichiometry of a chemical equation
* Use of the relationship between moles and
	+ mass of a substance
	+ volumes of a gas
	+ concentration of a solution
* Determination of limiting reactant

**Required practical-** Titrating an unknown concentration of acid* Calculating % yield and atom ecconomy
 | * Medtech challenge – links to engineering, design + tech, business skills. Provide industry mentor.
* Stem Club
* Launchpad- working with Form the Futures and local industry
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| **Assessment**: Low stakes Microsoft Forms quizzes throughout all topics. End of topic or subtopic open book tests | **Assessment:** Low stakes Microsoft Forms quizzes throughout all topics. End of topic or subtopic open book tests. Jan/Feb Year 10 test 1 | **Assessment:** Low stakes Microsoft Forms quizzes throughout all topics. End of topic or subtopic open book tests. June/July Year 10 test 2 |  |

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| **Chemistry Separate Science** |
| **Year 11** |
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| **Term 1 content and skills** | **Term 2 Content and skills** | **Term 3 Content and Skills** | **Extended Curriculum (trips/visits/afterschool activities)** |
| **Module 7 Organic** (Links to KS3 T18, T6 and T7)* Carbon can form 4 covalent bonds and this property allows it to form a vast array of natural and synthetic compounds.
* The petrochemical industry; Fractional distillation and cracking
* Functional groups in organic compounds
* alkanes,
* alkenes,
* alcohols,
* carboxylic acids
* esters
* Characteristic reactions of the functional groups listed above.
* Synthetic polymers made by
* Addition polymerisation
* Condensation polymerisation
* Natural polymers
* DNA
* proteins

**Module 8 Chemical analysis** (Links to KS3 T6,T7 and T9)* Separation techniques (Link to module 1)
	+ Filtration
	+ Distillation
	+ Crystalisation
* Chromatography

**Required practical**-Chromatography of an unknown food colouring.* Flame tests and the use of instrumental methods
* Chemical tests for aqueous cations using NaOH.
* Chemical tests for aqueous anions including.
* Sulphates
* Carbonates
* Halides
* Identification of unknown ionic compound using the results of the tests above

**Required practical-** Identification of an unknown salt. | **Module 6: Rates** (Links to KS3 T5)* Calculating the rate of a chemical reaction using graphical techniques
* Factors that affect the rate of chemical reactions
* Temperature
* Pressure
* Catalyst
* Surface area
* Concentration

**Required practical-** measuring rates- looking at concentration**.*** Reversible reactions
* Chemical equilibrium
* Factors that affect equilibrium
* Concentration
* Temperature
* Pressure

**Module 10 Earths resources** (Links to KS3 T7 and T22)* Sustainable development
* Methods for obtaining potable water from fresh water and sea water.
* Waste water treatment

**Required practical-** obtaining water from salt water and determining the mass of dissolved solids rainwater, sea water and distilled water samples* recycling and life cycle assessments
* Alternate methods of extracting metals (link with module 4)
	+ Phyto mining
	+ bioleaching
* Using materials
	+ Corrosion
	+ Alloys
	+ Polymers
	+ Ceramics
	+ Composites
* The Haber process and the production of NPK fertilisers
 | *Continuing with Module 10 from last term* **Module 9 Chemistry of the atmosphere** (Links to KS3 T18 and climate change lessons and maths (Pie Charts))* Composition and evolution of the atmosphere
* Causes, effects of ways to reduce climate change.
* Carbon footprints
* Pollutants from fuels and their effect on the environment

Consolidation work and revision for exams | * Stem Club
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| **Assessment:** Low stakes Microsoft Forms quizzes throughout all topics. End of topic or subtopic open book tests. Interim exam on paper 1 content | **Assessment:** Low stakes Microsoft Forms quizzes throughout all topics. End of topic or subtopic open book tests. Mock exam on Paper 2 content | **Assessment:** Low stakes Microsoft Forms quizzes throughout all topics. End of topic or subtopic open book tests. GCSE exams |  |