

Biddulph High School Curriculum Intent

To deliver a broad and enriching curriculum through engaging and challenging lessons that provide a wide range of opportunities for all students to achieve their potential.

Students will all be prepared to take their next steps in a diverse and ever changing future ready to make a positive contribution to society.

Through a broad programme of extracurricular activities students will have the opportunities to showcase their talents and experience new challenges.

We value individuals and all that they can offer as well as supporting each other with kindness and empathy.

Curriculum Intent for Chemistry: Year 12

. Our overarching aim is to develop well rounded chemists who can not only explain complex theoretical concepts, but can investigate them practically for themselves. Investigative skills and techniques are at the heart of chemistry at BHS 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 9 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

All teachers will follow the schemes of work provided by the department. This will ensure that all students receive the same high-quality provision. All units of work will provide a clear outline of the knowledge and skills required and assessments will ensure that this knowledge has been retained and that skills can be evidenced.

Teachers will ensure that gaps are closed through regular monitoring within the classroom. DINT activities will allow for interleaving and recap of previous learning. Misconceptions will be identified through effective questioning and the regular inspection of student work.

Chemistry Long Term Overview						
Year Group	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
9	Particle theory, equations and the periodic table	Methods of separation	Maths skills and calculating relative formula mass	pH, acids and indicators	Green Chemistry	Energetics and atomic theory
10	Atoms, isotopes and periodicity	Bonding and molar calculations	Acid, base reactions and electrolysis	Energetics and electrochemical cells. Rates of reaction.	Mock examinations and intervention	Equilibrium
11	Equilibria and extracting metals	Corrosion, Alloys and Mock examinations	Organic Chemistry	Interpreting and interacting with Earth systems.	Examinations	Examinations
12	Foundations in Chemistry. Nomenclature and alkanes	Acids and base chemistry. Periodicity. Alkene reactions and mechanisms.	Energetics. Alcohols and Haloalkanes	Hess's Law and Rates. Synthetic pathways.	Equilibria and revision. Analysis – Mass spec and IR.	Examinations. Intervention. begin Module 5 – Rates and Module 6 – Benzene.
13	Equilibria – Kc and Kp. Acids and bases. Arenes and carbonyls.	Buffers. Energetics. Carboxylic acids and derivatives. Amines and amides. C-C bond formation.	Revision Mock examinations.	Redox titration. Electrochemistry. Transition metals. Synthesis. NMR and gas chromatography.	Examinations	Examinations

Chemistry: Medium Term Overview			
Year 12	Autumn Term 1	Unit Title: Foundations in Chemistry	No of Lessons: 32
Overview/Intent	<ul style="list-style-type: none"> • develop essential knowledge and understanding of different areas of the subject and how they relate to each other • develop and demonstrate a deep appreciation of the skills, knowledge and understanding of scientific methods • develop competence and confidence in a variety of practical, mathematical and problem solving skills <p>develop their interest in and enthusiasm for the subject, including developing an interest in further study and careers associated with the subject</p> <ul style="list-style-type: none"> • understand how society makes decisions about scientific issues and how the sciences contribute to the success of the economy and society (as exemplified in 'How Science Works' (HSW)) 		
Assessment			
<u>Essential Knowledge (what must students know):</u> Atomic structure and isotopes <ul style="list-style-type: none"> • isotopes as atoms of the same element with different numbers of neutrons and different masses (b) atomic structure in terms of the numbers of protons, neutrons and electrons for atoms and ions, given the atomic number, mass number and any ionic charge 	<u>Essential Skills (what must students be able to demonstrate):</u> Atomic structure and isotopes Students will be able to: <ul style="list-style-type: none"> • Use the periodic table to determine RAM, protons neutrons and electrons. Calculate RAM for a range of isotopes from abundances. 	Lessons: <ol style="list-style-type: none"> 1. Measuring and % errors 2. Atomic structure and isotopes 3. RAM 4. Formulae and equations 5. Amount of substance and the mole 6. Determination of formulae 7. Water of crystallisation 	

<p>Relative mass</p> <ul style="list-style-type: none"> • explanation of the terms relative isotopic mass (mass compared with 1/12th mass of carbon-12) and relative atomic mass (weighted mean mass compared with 1/12th mass of carbon-12), based on the mass of a ^{12}C atom, the standard for atomic masses Definitions required. • use of mass spectrometry in: (i) the determination of relative isotopic masses and relative abundances of the isotope, (ii) calculation of the relative atomic mass of an element from the relative abundances of its isotopes • Formulae and equations (a) the writing of formulae of ionic compounds from ionic charges, including: (i) prediction of ionic charge from the position of an element in the periodic table (ii) recall of the names and formulae for the following ions: NO_3^-, CO_3^{2-}, SO_4^{2-}, OH^-, NH_4^+, Zn^{2+} and Ag^+ Note that 'nitrate' and 'sulfate' should be assumed to be NO_3^- and SO_4^{2-}. Charges on ions other than in (i) and (ii) will be provided. (b) construction of balanced chemical equations (including ionic equations), including state symbols, for reactions studied and for unfamiliar reactions given appropriate information. <p>The mole</p> <ul style="list-style-type: none"> • explanation and use of the terms: (i) amount of substance (ii) mole (symbol 'mol'), as the unit for amount of substance 	<ul style="list-style-type: none"> • Use molar calculations for moles, reacting masses and molar gas calculations. • Use ideal gas equation to answer a range of questions. • Know the range of acids reactions and the salts made during reactions. • Carry out titration practicals and perform calculations. • Assign oxidation numbers for redox reactions. • Give electron arrangements for any element. • Know the properties of covalent, ionic and metallic compounds. • Predict shapes and bond angles for a range of molecules. • Use the periodic table to identify electronegativity and polarity in molecules. • Explain physical properties of molecules in terms of IMFs • Explain the anomalous properties of water from H-bonding. 	<ol style="list-style-type: none"> 8. TEST 9. Moles and volume 10. Ideal gas equation 11. Reacting Quantities 12. PAG 1.2 13. % Yield and atom economy 14. END OF TOPIC TEST 15. Intervention 16. Acids reactions 17. Acid, Bases and neutralisation 18. Titration Practical 19. Titration theory 20. PAG 2.1 21. PAG 2.1 22. Practice Questions 23. REDOX 24. Electron arrangement 25. Electron arrangement 26. Ionic bonding 27. Covalent bonding 28. Additional covalent bonding 29. Shapes of molecules 30. Electronegativity and Polarity 31. IMFs 32. Hydrogen Bonding
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<p>(iii) the Avogadro constant, N_A (the number of particles per mole, $6.02 \times 10^{23} \text{ mol}^{-1}$)</p> <p>(iv) molar mass (mass per mole, units g mol^{-1}), (v) molar gas volume (gas volume per mole, units $\text{dm}^3 \text{ mol}^{-1}$)</p> <p>Determination of formulae</p> <ul style="list-style-type: none">• use of the terms: (i) empirical formula (the simplest whole number ratio of atoms of each element present in a compound) (ii) molecular formula (the number and type of atoms of each element in a molecule) (c) calculations of empirical and molecular formulae, from composition by mass or percentage compositions by mass and relative molecular mass• the terms anhydrous, hydrated and water of crystallisation and calculation of the formula of a hydrated salt from given percentage composition, mass composition or based on experimental results <p>Calculation of reacting masses, gas volumes and mole concentrations</p> <ul style="list-style-type: none">• calculations, using amount of substance in mol, involving: (i) mass (ii) gas volume (iii) solution volume and concentration Learners will be expected to express concentration in mol dm^{-3} and g dm^{-3}. (f) the ideal gas equation: $pV = nRT$ The value for R is provided on the Data Sheet. Learners will be expected to express quantities in SI units. (g) use of stoichiometric relationships in calculations		
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Percentage yields and atom economy calculations

- to determine: (i) the percentage yield of a reaction or related quantities (ii) the atom economy of a reaction (i) the techniques and procedures required during experiments requiring the measurement of mass, volumes of solutions and gas volumes PAG1 HSW4 Many opportunities to carry out experimental and investigative work. (j) the benefits for sustainability of developing chemical processes with a high atom economy.

Acids, bases, alkalis and neutralisation

- the formulae of the common acids (HCl, H₂SO₄, HNO₃ and CH₃COOH) and the common alkalis (NaOH, KOH and NH₃) and explanation that acids release H⁺ ions in aqueous solution and alkalis release OH⁻ ions in aqueous solution
- qualitative explanation of strong and weak acids in terms of relative dissociations
- neutralisation as the reaction of: (i) H⁺ and OH⁻ to form H₂O (ii) acids with bases, including carbonates, metal oxides and alkalis (water-soluble bases), to form salts, including full equations

Acid-base titrations

- the techniques and procedures used when preparing a standard solution of required concentration and carrying out acid-base titrations PAG2 HSW4 Many opportunities to carry out experimental and investigative work. (e) structured and non-structured

titration calculations, based on experimental results of familiar and non-familiar acids and bases.

Oxidation number

- rules for assigning and calculating oxidation number for atoms in elements, compounds and ions Learners will be expected to know oxidation numbers of O in peroxides and H in metal hydrides.
- writing formulae using oxidation numbers HSW8 Appropriate use of oxidation numbers in written communication. (c) use of a Roman numeral to indicate the magnitude of the oxidation number when an element may have compounds/ions with different oxidation numbers

Energy levels, shells, sub-shells, atomic orbitals, electron configuration

- the number of electrons that can fill the first four shells (b) atomic orbitals, including: (i) as a region around the nucleus that can hold up to two electrons, with opposite spins (ii) the shapes of s- and p-orbitals (iii) the number of orbitals making up s-, p- and d-sub-shells, and the number of electrons that can fill s-, p- and d-sub-shells (c) filling of orbitals: (i) for the first three shells and the 4s and 4p orbitals in order of increasing energy (ii) for orbitals with the same energy, occupation singly before pairing

Ionic bonding

- ionic bonding as electrostatic attraction between positive and negative ions, and the

construction of 'dot-and-cross' diagrams (b) explanation of the solid structures of giant ionic lattices, resulting from oppositely charged ions strongly attracted in all directions e.g. NaCl (c) explanation of the effect of structure and bonding on the physical properties of ionic compounds, including melting and boiling points, solubility and electrical conductivity in solid, liquid and aqueous states

Covalent bonding

- covalent bond as the strong electrostatic attraction between a shared pair of electrons and the nuclei of the bonded atoms (e) construction of 'dot-and-cross' diagrams of molecules and ions to describe: (i) single covalent bonding (ii) multiple covalent bonding (iii) dative covalent (coordinate) bonding 'Dot-and-cross' diagrams of up to six electron pairs (including lone pairs) surrounding a central atom. (f) use of the term average bond enthalpy as a measurement of covalent bond strength

The shapes of simple molecules and ions

- (g) the shapes of, and bond angles in, molecules and ions with up to six electron pairs (including lone pairs) surrounding the central atom as predicted by electron pair repulsion, including the relative repulsive strengths of bonded pairs and lone pairs of electrons Learners should be able to draw 3-D diagrams to illustrate shapes of molecules

<p>and ions. HSW1,2 Using electron pair repulsion theory to predict molecular shapes. (h) electron pair repulsion to explain the following shapes of molecules and ions: linear, non-linear, trigonal planar, pyramidal, tetrahedral and octahedral</p> <p>Electronegativity and bond polarity</p> <ul style="list-style-type: none">• electronegativity as the ability of an atom to attract the bonding electrons in a covalent bond; interpretation of Pauling electronegativity values Learners should be aware that electronegativity increases towards F in the periodic table. HSW1,2 Using ideas about electronegativity to predict chemical bond type. (j) explanation of: (i) a polar bond and permanent dipole within molecules containing covalently-bonded atoms with different electronegativities (ii) a polar molecule and overall dipole in terms of permanent dipole(s) and molecular shape A polar molecule requires polar bonds with dipoles that do not cancel due to their direction. E.g. H₂O and CO₂ both have polar bonds but only H₂O has an overall dipole. Intermolecular forces (k) intermolecular forces based on permanent dipole–dipole interactions and induced dipole– dipole interactions• hydrogen bonding as intermolecular bonding between molecules containing N, O or F and the H atom of –NH, –OH or HF Including the role of lone pairs. (m)		
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explanation of anomalous properties of H₂O resulting from hydrogen bonding, e.g.: (i) the density of ice compared with water (ii) its relatively high melting and boiling points HSW1 Use of ideas about hydrogen bonding to explain macroscopic properties. (n) explanation of the solid structures of simple molecular lattices, as covalently bonded molecules attracted by intermolecular forces, e.g. I₂, ice (o) explanation of the effect of structure and bonding on the physical properties of covalent compounds with simple molecular lattice structures including melting and boiling points, solubility and electrical conductivity.

Practical Skills:

Module 1 of the specification content relates to the practical skills learners are expected to gain throughout the course, which are assessed throughout the written examinations and also through the Practical Endorsement (see Section 5). Practical activities are embedded within the learning outcomes of the course to encourage practical activities in the classroom which contribute to the achievement of the Practical Endorsement (Section 5) as well as enhancing learners' understanding of chemical theory and practical skills..

<p>Careers Links: Nuclear physics with particle models. Laboratory work. Analytical chemist. Medicinal chemist. Forensic Scientist.</p> <p>Homework SENECA learning and examination style questions to support learning and improve skill. Work booklet for homework tasks. Completion of additional reading and research.</p>	<p>Enrichment: Students will attend a trip to Ecton hill field centre to look at Chemistry in industry.</p>	<p>MY PB Social Me- active listening, speaking effectively, working with others Practical work will require aspects of the social me strand Thinking Me – evaluating & creativity Evaluation will be utilised when assessing data from investigations This is Me – Resilience, responsibility, self-motivation, integrity, self-management Students will need to demonstrate resilience and self-management when looking at the assessed points across the lessons</p>
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Chemistry Medium Term Overview			
Year 12	Spring Term 2	Unit Title: Periodic table and Energy	No of Lessons: 28
Overview	<p>Periodic trends are first studied to extend the understanding of structure and bonding. Group properties are then studied using Group 2 and the halogens as typical metal and non-metal groups respectively, allowing an understanding of redox reactions to be developed further. Finally, this section looks at how unknown ionic compounds can be analysed and identified using simple test-tube tests</p> <p>In addition, this section introduces physical chemistry within the general theme of energy. Learners first learn about the importance of enthalpy changes, their uses and determination from experimental results including enthalpy cycles. This section then investigates the ways in which a change in conditions can affect the rate of a chemical reaction, in terms of activation energy, the Boltzmann distribution and catalysis. Reversible reactions are then studied, including the dynamic nature of chemical equilibrium and the influence of conditions upon the position of equilibrium. Finally, the integrated roles of enthalpy changes, rates, catalysts</p>		

Assessment	and equilibria are considered as a way of increasing yield and reducing energy demand, improving the sustainability of industrial processes.		
<p>Essential Knowledge (what must students know):</p> <p>Periodicity</p> <ul style="list-style-type: none"> the periodic table as the arrangement of elements: (i) by increasing atomic (proton) number (ii) in periods showing repeating trends in physical and chemical properties (periodicity) (iii) in groups having similar chemical properties HSW1,7,11 The development of the Periodic Law and acceptance by the scientific community. HSW7,11 The extension of the periodic table through discovery and confirmation of new elements. Periodic trend in electron configuration and ionisation energy (b) (i) the periodic trend in electron configurations across Periods 2 and 3 (see also 2.2.1 d) (ii) classification of elements into s-, p- and d-blocks (c) first ionisation energy (removal of 1 mol of electrons from 1 mol of gaseous atoms) and successive ionisation energy, and: (i) explanation of the trend in first ionisation energies across Periods 2 and 3, and down a group, in terms of attraction, nuclear charge and atomic radius prediction from successive ionisation energies of the number of electrons in each shell of an atom and the group of an element. Explanation to include the small decreases as a result of s- and p-sub-shell 	<p>Essential Skills (what must students be able to demonstrate):</p> <p>Students will be able to:</p> <ul style="list-style-type: none"> explain the trends of ionisation energies across a period and down a group. Explain the patterns of successive ionisation energies for a given element and that this gives evidence for the existence of sub-shells within an orbital. Learn about the properties of group 2 elements and their reactions. Learn about the properties and reactions of group 7 elements. Identify disproportionation in a reaction by recalling prior knowledge of oxidation numbers taught in term 1. Identify cations and anions through qualitative analysis. Define a range of enthalpy changes from equations. Carry out a range of practical investigations to inform enthalpies of combustion, reactions and neutralisation. Complete calculations on enthalpy changes and bond enthalpies. 	<p>Lessons:</p> <ol style="list-style-type: none"> Module 2 TEST The periodic table Ionisation energies Ionisation energies Group 2 Revision for assessment ASSESSMENT 2 Intervention Halogens and disproportionation Displacement reactions QA Theory PAG 4.1 TEST Enthalpy changes PAG 3.3 Enthalpy of combustion theory PAG 3.2 Theory enthalpy of reactions PAG 3.1 Enthalpy of neutralisation Bond enthalpies Hess's Law Hess's Law Rates Theory Boltzman Distribution Le Chateliers Principle Le Chateliers Principle Kc 	

<p>energies (e.g. between Be and B) and p-orbital repulsion (e.g. between N and O). HSW1,2 Trends in ionisation energy support the Bohr model of the atom.</p> <ul style="list-style-type: none"> • Periodic trend in structure and melting point (d) explanation of: (i) metallic bonding as strong electrostatic attraction between cations (positive ions) and delocalised electrons (ii) a giant metallic lattice structure, e.g. all metals No details of cubic or hexagonal packing required. (e) explanation of the solid giant covalent lattices of carbon (diamond, graphite and graphene) and silicon as networks of atoms bonded by strong covalent bonds <p>Group 2</p> <ul style="list-style-type: none"> • the outer shell s² electron configuration and the loss of these electrons in redox reactions to form 2+ ions (b) the relative reactivities of the Group 2 elements Mg → Ba shown by their redox reactions with: (i) oxygen (ii) water (iii) dilute acids • Reactions with acids will be limited to those producing a salt and hydrogen. (c) the trend in reactivity in terms of the first and second ionisation energies of Group 2 elements down the group • Definition of second ionisation energy is not required, but learners should be able to write an equation for the change involved. Reactions of Group 2 compounds (d) the action of water on Group 2 oxides and the 	<ul style="list-style-type: none"> • Apply Hess's Law to perform enthalpy changes. • Recall the factors that affect the rate of a chemical reaction. • Use Boltzman distribution curves to prove the effect of temperature and concentration on the rate of a chemical reaction. • Apply Le Chateliers principle to choose the ideal conditions for a range of chemical reactions. • Apply K_c equation and calculate K_c. 	
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<p>approximate pH of any resulting solutions, including the trend of increasing alkalinity</p> <ul style="list-style-type: none">• uses of some Group 2 compounds as bases, including equations, for example (but not limited to): (i) $\text{Ca}(\text{OH})_2$ in agriculture to neutralise acid soils (ii) $\text{Mg}(\text{OH})_2$ and CaCO_3 as 'antacids' in treating indigestion <p>Halogens</p> <ul style="list-style-type: none">• the outer shell s^2p^5 electron configuration and the gaining of one electron in many redox reactions to form 1^- ions Throughout this section, explanations of redox reactions should emphasise electron transfer and oxidation number changes and include full and ionic equations.• the trend in reactivity of the halogens Cl_2, Br_2 and I_2, illustrated by reaction with other halide ions Including colour change in aqueous and organic solutions.• explanation of the trend in reactivity shown in (c), from the decreasing ease of forming 1^- ions, in terms of attraction, atomic radius and electron shielding (e) explanation of the term disproportionation as oxidation and reduction of the same element, illustrated by: (i) the reaction of chlorine with water as used in water treatment (ii) the reaction of chlorine with cold, dilute aqueous sodium hydroxide, as used to form bleach• the benefits of chlorine use in water treatment (killing bacteria) contrasted with associated risks (e.g. hazards of toxic chlorine gas and possible risks from		
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<p>formation of chlorinated hydrocarbons) HSW9,10,12 Decisions on whether or not to chlorinate water depend on balance of benefits and risks, and ethical considerations of people's right to choose.</p> <ul style="list-style-type: none">• Consideration of other methods of purifying drinking water. Characteristic reactions of halide ions (g) the precipitation reactions, including ionic equations, of the aqueous anions Cl^-, Br^- and I^- with aqueous silver ions, followed by aqueous ammonia, and their use as a test for different halide ions. <p>Qualitative analysis</p> <ul style="list-style-type: none">• qualitative analysis of ions on a test-tube scale; processes and techniques needed to identify the following ions in an unknown compound: anions: • CO_3^{2-}, by reaction with $\text{H}^+(\text{aq})$ forming $\text{CO}_2(\text{g})$ (see 2.1.4 c) • SO_4^{2-}, by precipitation with $\text{Ba}^{2+}(\text{aq})$ • Cl^-, Br^-, I^- (see 3.1.3 g) (ii) cations: NH_4^+, by reaction with warm $\text{NaOH}(\text{aq})$ forming NH_3. <p>Physical Chemistry</p> <ul style="list-style-type: none">• explanation that some chemical reactions are accompanied by enthalpy changes that are exothermic (ΔH, negative) or endothermic (ΔH, positive) (b) construction of enthalpy profile diagrams to show the difference in the enthalpy of reactants compared with products• qualitative explanation of the term activation energy, including use of enthalpy profile diagrams M3.1 Activation energy in terms of the minimum energy required for		
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<p>a reaction to take place. (d) explanation and use of the terms: (i) standard conditions and standard states (physical states under standard conditions) (ii) enthalpy change of reaction (enthalpy change associated with a stated equation, $\Delta_r H$) (iii) enthalpy change of formation (formation of 1 mol of a compound from its elements, $\Delta_f H$) (iv) enthalpy change of combustion (complete combustion of 1 mol of a substance, $\Delta_c H$) (v) enthalpy change of neutralisation (formation of 1 mol of water from neutralisation, $\Delta_{neut}H$)</p> <ul style="list-style-type: none">• Definitions required for enthalpy changes of formation, combustion and neutralisation only. Standard conditions can be considered as 100 kPa and a stated temperature, 298 K. (e) determination of enthalpy changes directly from appropriate experimental results, including use of the relationship: $q = mc\Delta T$• explanation of the term average bond enthalpy (as the breaking of 1 mol of bonds in gaseous molecules) (ii) explanation of exothermic and endothermic reactions in terms of enthalpy changes associated with the breaking and making of chemical bonds (iii) use of average bond enthalpies to calculate enthalpy changes and related quantities• Learners are expected to understand that an actual bond enthalpy may differ from the average value. Hess' law and enthalpy		
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<p>cycles (g) Hess' law for construction of enthalpy cycles and calculations to determine indirectly: (i) an enthalpy change of reaction from enthalpy changes of combustion (ii) an enthalpy change of reaction from enthalpy changes of formation (iii) enthalpy changes from unfamiliar enthalpy cycles</p> <p>Rates</p> <ul style="list-style-type: none">• the effect of concentration, including the pressure of gases, on the rate of a reaction, in terms of frequency of collisions (b) calculation of reaction rate from the gradients of graphs measuring how a physical quantity changes with• Suitable physical quantities to monitor could include concentration, gas volume, mass, etc. Catalysts (c) explanation of the role of a catalyst: (i) in increasing reaction rate without being used up by the overall reaction (ii) in allowing a reaction to proceed via a different route with lower activation energy, as shown by enthalpy profile diagrams Details of processes are not required. (d) (i) explanation of the terms homogeneous and heterogeneous catalysts• qualitative explanation of the Boltzmann distribution and its relationship with activation energy(g) explanation, using Boltzmann distributions, of the qualitative effect on the proportion of molecules exceeding the activation energy and hence		
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the reaction rate, for: (i) temperature changes (ii) catalytic behaviour

Dynamic equilibrium and le Chatelier's principle

- explanation that a dynamic equilibrium exists in a closed system when the rate of the forward reaction is equal to the rate of the reverse reaction and the concentrations of reactants and products do not change (b) le Chatelier's principle and its application for homogeneous equilibria to deduce qualitatively the effect of a change in temperature, pressure or concentration on the position of equilibrium
- Use of le Chatelier's principle to explain effect of factors on the position of equilibrium. (c) explanation that a catalyst increases the rate of both forward and reverse reactions in an equilibrium by the same amount resulting in an unchanged position of equilibrium
- the techniques and procedures used to investigate changes to the position of equilibrium for changes in concentration and temperature.
- explanation of the importance to the chemical industry of a compromise between chemical equilibrium and reaction rate in deciding the operational conditions HSW6 Balancing the effects of equilibrium, rate, safety and economics to determine the conditions used in industrial reactions e.g. Haber process.

<ul style="list-style-type: none"> equilibrium constant, K_c (f) expressions for the equilibrium constant, K_c, for homogeneous reactions and calculations of the equilibrium constant, K_c, from provided equilibrium concentrations estimation of the position of equilibrium from the magnitude of K_c. <p>Practical Skills:</p>		
<p>Careers Link: Forensics and police work. Environmental scientists.</p> <p>Homework SENECA learning and examination style questions to support learning and improve skill. Homework booklets. Research and further reading.</p>	<p>Enrichment Students will be taught about the role of energetics in industries such as chemical and thermal engineering</p>	<p>MY PB Social Me- active listening, speaking effectively, working with others Practical work will require aspects of the social me strand Thinking Me – evaluating & creativity Evaluation will be utilised when assessing data from investigations This is Me – Resilience, responsibility, self-motivation, integrity, self-management Students will need to demonstrate resilience and self-management when looking at the assessed points across the lessons</p>

Chemistry Medium Term Overview			
Year 9	<i>Summer Term 3</i>	Unit Title: End of Year examinations and Rates	No of Lessons: 22
Overview	<p>.</p> <p>The largely qualitative treatment of reaction rates encountered in Module 3 is developed within a quantitative and graphical context. This section also allows learners to develop practical quantitative techniques involved in the determination of reaction rates. There are many opportunities for developing mathematical skills, including use of logarithms and exponents, when studying the content of this section and when carrying out quantitative practical work.</p>		

Assessment	Breadth and depth AS papers to be sat as a mock examination.	
<p><u>Essential Knowledge (what must students know):</u></p> <p>Revision to consolidate learning from the past two terms that will be examined as 2 end of year papers</p> <p><u>Practical Skills:</u> PAGs to include the measurement of rate from initial and continuous methods..</p>	<p><u>Essential Skills (what must students be able to demonstrate):</u></p> <p>Students will be able to:</p> <ul style="list-style-type: none"> • Identify and fill curriculum gaps through revision activities. • Intervention will close all curriculum gaps before moving on to module 5 – Rates topic. • Use data and graphs to determine orders of reactions and then calculate K values. • Use the rate equation to determine units for K. • Carry our two PAG activities measure rate from initial and continuous methods.. • Determine possible rate determining steps. • Use data to draw out graphs and apply the Arrhenius equation to calculate E_a and A values. 	<p>Lessons:</p> <ol style="list-style-type: none"> 1. Revision for Mock examinations 2. Mocks 3. Mocks 4. Mocks 5. Mocks 6. Mocks 7. Intervention 8. Intervention 9. Intervention 10. Intervention 11. Intervention 12. The rate equation. Orders and K 13. The rate equation. Orders and K 14. Concentration – time graphs 15. Rate – concentration graphs – initial rate 16. RDS 17. Arrhenius equation 18. PAG 10.1 19. PAG 10.1 20. PAG 10.3 21. PAG 10.3 22. Rates examination questions
<p><u>Careers</u></p> <p>Environment scientist. Thermodynamic engineer. Chemical engineer. Particle physicist.</p>	<p><u>Enrichment.</u></p> <p>Students will have the opportunity to visit Keele university for a session on spectroscopy. There is also a chance to visit Geneva.</p>	<p><u>MY PB</u></p> <p>Social Me- active listening, speaking effectively, working with others Practical work will require aspects of the social me strand</p> <p>Thinking Me – evaluating & creativity</p>

<p>Homework SENECA learning and examination style questions to support learning and improve skill. Intervention to close examination gaps.</p>		<p>Evaluation will be utilised when assessing data from investigations This is Me – Resilience, responsibility, self-motivation, integrity, self-management Students will need to demonstrate resilience and self-management when looking at the assessed points across the lessons</p>
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