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 9

. 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 derevatives. 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 9	**Autumn Term 1**	**Unit Title: Particle model and methods of separation.**	**No of Lessons: 20**
Overview/Intent **Assessment**	• Develop scientific knowledge and conceptual understanding through the specific disciplines of Chemistry. • Develop understanding of the nature, processes and methods of science, through different types of scientific enquiries that help them to answer scientific questions about the world around them. • Develop and learn to apply observational, practical, modelling, enquiry and problem solving skills in the laboratory, in the field and in other learning environments. • Develop their ability to evaluate claims based on science through critical analysis of the methodology, evidence and conclusions, both qualitatively and quantitatively.		
<u>Essential Knowledge (what must students know):</u> • Particle Theory • Building of word and symbol equations • Methods of separation **Terminology:** **Atomic Theory:** Particle, Atom, element, compound, mixture, protons, neutrons, electrons	**<u>Essential Skills (what must students be able to demonstrate):</u>** **Students will be able to:** • Identify the different variables in an experiment and choose the best way to show the data collected.	**Lessons:** 1. Base line test to obtain data to allow measurement of progress 2. Data – types of data and variables 3. Particle theory 4. Physical changes 5. Chemical changes 6. Atoms, elements and compounds	

Practical equipment: Learn the names of the equipment used in Chemistry **Separation:** Distillation and fractional distillation, chromatography, stationary phase, mobile phase, RF calculations **Maths skills:** plotting graphs, algebra – rearranging equations WS 1.1 Understand how scientific methods and theories develop over time. Recognise/draw/interpret diagrams. Translate from data to a representation with a model. Use models in explanations, or match features of a model to the data from experiments or observations that the model describes or explains. Make predictions or calculate quantities based on the model or show its limitations. Give examples of ways in which a model can be tested by observation or experiment. All substances are made of atoms. An atom is the smallest part of an element that can exist. Atoms of each element are represented by a chemical symbol, eg O represents an atom of oxygen, Na represents an atom of sodium. There are about 100 different elements. Elements are shown in the periodic table. Compounds are formed from elements by chemical reactions. Chemical reactions always involve the formation of one or more new substances, and often involve a detectable energy change. Compounds contain two or more elements chemically combined in fixed proportions and can be represented by formulae using the symbols of the atoms from which they were formed. Compounds can only be separated into elements by chemical reactions. Chemical reactions can be	• Describe and explain the particle models for solids, liquids and gases including arrangement and movement. • Make links to the particle models and use this to explain how solids, liquids and gases behave. • Explain the energy associated with solids, liquids and gases. • Recognise the difference between a physical and chemical change. • State the changes of state for physical changes. • Give examples of a sign of a chemical change. • Recognise the difference between an atom, element, molecule, compound and mixture. • Build word and symbol equations from text. • Use algebra to rearrange formula to calculate a range of equations. • Understand the arrangement of the elements in the periodic table. • State the work carried out by Newlands and Mendeleev on the periodic table. • suggest suitable purification techniques given information about the substances involved • suggest chromatographic methods for distinguishing pure from impure substances	7. Word equations 8. Symbol equations 9. Algebra – rearranging equations 10. Test 11. Intervention 12. The periodic table 13. Developing the periodic table 14. Shipwrecked 15. Distillation 16. Mean, mode and median 17. Chromatography 18. Badger task – Burning magnesium 19. Probability 20. Significant figures

represented by word equations or equations using symbols and formulae. Students will be supplied with a periodic table for the exam and should be able to: • use the names and symbols of the first 20 elements in the periodic table, the elements in Groups 1 and 7, and other elements in this specification • name compounds of these elements from given formulae or symbol equations • write word equations for the reactions in this specification • write formulae and balanced chemical equations for the reactions in this specification. (HT only) write balanced half equations and ionic equations where appropriate. A mixture consists of two or more elements or compounds not chemically combined together. The chemical properties of each substance in the mixture are unchanged. Mixtures can be separated by physical processes such as filtration, crystallisation, simple distillation, fractional distillation and chromatography. These physical processes do not involve chemical reactions and no new substances are made. Students should be able to: • describe, explain and give examples of the specified processes of separation • suggest suitable separation and purification techniques for mixtures when given appropriate information. **Common misconceptions** Learners commonly have difficulty understanding the difference between atoms, elements and molecules. Students will be taught that a molecule is still classed as an element and not a compound if it contains only one type of atom.	• interpret chromatograms, including measuring Rf values • recall that chromatography involves a stationary and a mobile phase and that separation depends on the distribution between the phases • Recognise the best ways to represent a molecule and explain how to improve it. • Make links to the particle models and use this to explain how solids, liquids and gases behave. • Explain the energy associated with solids, liquids and gases. • Learn how to use a Bunsen burner correctly and safely. • Recognise specific pieces of laboratory equipment linked to methods of separation • use melting point data to distinguish pure from impure substances • Work safely in a laboratory.	

Practical Skills: Students will carry out a range of investigations and learn the key terms such as control, dependant and independent variable.		
Careers Links: Nuclear physics with particle models. Laboratory work. Analytical chemist. Medicinal chemist. Forensic Scientist. **Homework** SENECA learning and examination style questions to support learning and improve skill. Closing curriculum gaps using Cognito.	**Enrichment:** Students will be taught about the work carried out at CERN which is an educational visit. The atomic model is a developing model and how the Large Hadron Collider has lead to the discovery of the 'God' particle – the Higgs Boson.	**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

Chemistry **Medium Term Overview**

<table>
<tr><td>Year 9</td><td>Spring Term 2</td><td colspan="2">Unit Title: Calculating RFM and linking to empirical formulae, equations and Acid base Chemistry</td><td>No of Lessons: 14</td></tr>
<tr><td>Overview

Assessment</td><td colspan="4">Develop scientific knowledge and conceptual understanding through the specific disciplines of Chemistry.
• Develop understanding of the nature, processes and methods of science, through different types of scientific enquiries that help them to answer scientific questions about the world around them.
• Develop and learn to apply observational, practical, modelling, enquiry and problem solving skills in the laboratory, in the field and in other learning environments.
• Develop their ability to evaluate claims based on science through critical analysis of the methodology, evidence and conclusions, both qualitatively and quantitatively

Homeworks and end of unit test</td></tr>
<tr><td colspan="2"><u>Essential Knowledge (what must students know):</u>
The relative formula mass (Mr) of a compound is the sum of the relative atomic masses of the atoms in the numbers shown in the formula. In a balanced chemical equation, the sum of the relative formula masses of the reactants in the quantities shown equals the sum of the relative formula masses of the products in the quantities shown. Students should be able to calculate the percentage by mass in a compound given the relative formula mass and the relative atomic masses
For 200 million years, the proportions of different gases in the atmosphere have been much the same as they are today: • about four-fifths (approximately 80%) nitrogen • about one-fifth (approximately 20%) oxygen • small proportions of various</td><td colspan="2"><u>Essential Skills (what must students be able to demonstrate):</u>

Students will be able to:
Calculate the relative formula mass of a range of compounds and molecules using the periodic table
Use empirical formula to work out the identity of a compound or molecule
Know the relationship between pH number and the meaning in terms of acid, alkali or neutral.
Understand that there are a range of indicators and their colours in a range of pH.
Be able to predict the names of salts from acid, base reactions.</td><td>Lessons:
Calculating Relative Formula Mass.
Empirical formula and mass calculations
pH scale
Neutralisation
Acids and metal reactions
Indicators
Make your own indicator
Revision
Acids and bases test
Investigating dandelion populations – working with data
HSW Technician in trouble
History of the atmosphere
Our evolving atmosphere
Greenhouse gases</td></tr>
</table>

other gases, including carbon dioxide, water vapour and noble gases. • Theories about what was in the Earth's early atmosphere and how the atmosphere was formed have changed and developed over time. Evidence for the early atmosphere is limited because of the time scale of 4.6 billion years. One theory suggests that during the first billion years of the Earth's existence there was intense volcanic activity that released gases that formed the early atmosphere and water vapour that condensed to form the oceans. At the start of this period the Earth's atmosphere may have been like the atmospheres of Mars and Venus today, consisting of mainly carbon dioxide with little or no oxygen gas. Volcanoes also produced nitrogen which gradually built up in the atmosphere and there may have been small proportions of methane and ammonia. When the oceans formed carbon dioxide dissolved in the water and carbonates were precipitated producing sediments, reducing the amount of carbon dioxide in the atmosphere. No knowledge of other theories is required. Students should be able to, given appropriate information, interpret evidence and evaluate different theories about the Earth's early atmosphere. **Terminology:**	• Understand that there are a wide range of indicators and they are used dependant on pH range. • Some plants are indicator plants and will change colour dependant on the pH of the soil they are in. • Know the composition of Earths atmosphere. • Know the sequence of the events that led to the formation of the atmosphere we know today. • Explain the effect of greenhouse gases on global warming.	

Equations: Reactants, products. **Acids and bases** **pH scale** **Indicator** **Atmosphere** **Practical Skills:** Students will carry out a range of investigations and learn the key terms such as control, dependant and independent variable. Students will learn how to work safely with acids and alkalis.		
Careers Link: Forensics and police work. Environmental scientists. Volcanologist. **Homework** SENECA learning and examination style questions to support learning and improve skill.	**Enrichment** Students will be taught about the role of acids and bases in salt production.	**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

Chemistry **Medium Term Overview**			
Year 9	***Summer Term 3***	**Unit Title: Energetics and atomic structure**	**No of Lessons: 14**

Overview	**.** Develop scientific knowledge and conceptual understanding through the specific disciplines of Chemistry. • Develop understanding of the nature, processes and methods of science, through different types of scientific enquiries that help them to answer scientific questions about the world around them. • Develop and learn to apply observational, practical, modelling, enquiry and problem solving skills in the laboratory, in the field and in other learning environments. • Develop their ability to evaluate claims based on science through critical analysis of the methodology, evidence and conclusions, both qualitatively and quantitatively
Assessment	Assessments and end of topic tests.

<u>Essential Knowledge (what must students know):</u>	**<u>Essential Skills (what must students be able to demonstrate):</u>**	**Lessons:**
• Carbon monoxide is a toxic gas. It is colourless and odourless and so is not easily detected. Sulfur dioxide and oxides of nitrogen cause respiratory problems in humans and cause acid rain. Particulates cause global dimming and health problems for humans. Students should be able to describe and explain the problems caused by increased amounts of these pollutants in the air. • distinguish between exothermic and endothermic reactions on the basis of the temperature change of the surroundings • evaluate uses and applications of exothermic and endothermic reactions given appropriate information. • The relative electrical charges of the particles in atoms are: In an atom, the number of electrons is equal to the number of protons in the nucleus. Atoms have no	**Students will be able to:** • Link the human impacts of deforestation and burning fossil fuels and animal consumption to the increased levels of carbon dioxide and other greenhouse gases • How global warming leads to climate change, shifting of the seasons and loss of habitats. • Predict wether a reaction is exothermic or endothermic from experimental data. • Draw energy profile diagrams for both exothermic and endothermic reactions. • describe how and why the atomic model has changed over time to include the models of Dalton, Thomson, Rutherford, Bohr, Geiger and Marsden	1. Assessments 2. Intervention 3. Global climate change 4. Atmospheric pollution 5. Summary questions 6. Intervention 7. Exothermic and endothermic reactions 8. Energy profiles 9. Energy calculations 10. Atomic structure 11. Developing the atomic model 12. Electron arrangement 13. PNE and the periodic table 14. Topic review

overall electrical charge. The number of protons in an atom of an element is its atomic number. All atoms of a particular element have the same number of protons. Atoms of different elements have different numbers of protons. Students should be able to use the nuclear model to describe atoms. **Terminology:** **Green Chemistry**: Greenhouse gases, global warming, pollution, climate change. **Exothermic and endothermic.** **Protons** **Neutrons** **Electrons** **Variables:** Dependant, independent, **Practical Skills:** Students will carry out a range of investigations and learn the key terms such as control, dependant and independent, control. .	• Use the periodic table to determine numbers of protons, neutrons and electrons in any atom. • Use Bohrs model to draw electron arrangement diagrams for the first 20 elements. • Link atomic structure to the periodic table.	
<u>Careers</u> Environment scientist. Thermodynamic engineer. Chemical engineer. **Homework**	**<u>Enrichment.</u>** Students will carry out a range of activities looking at how science works. These essential skills will support the students as they progress into their GCSE studies.	**<u>MY PB</u>** **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

SENECA learning and examination style questions to support learning and improve skill.		**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