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:

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 and atomic theory. Introduction to methods of separation	Introduction to methods of separation	Investigations into methods of separation.	Formulae and equations	Acid – Base reactions	Pollution and climate change
10	Atomic structure and bonding	Properties of materials	Equations and molar calculations	Energetics. Acid base theory and pH	Electrolysis	Periodicity – Group 1, 7, 0 and transition metal chemistry
11	Equilibria and extracting metals	Corrosion, Alloys and Mock examinations	Organic Chemistry	Interpreting and interacting with Earth systems.	Examinations	Examinations
12						
13						

<table>
<tr><th colspan="4">Chemistry: Medium Term Overview</th></tr>
<tr><td>Year 11</td><td>Autumn Term 1</td><td>Unit Title: Equilibrium and metal extraction</td><td>No of Lessons: 28</td></tr>
<tr><td>Overview/Intent

Assessment</td><td colspan="3">• 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.
Learners should be familiar with the simple (Dalton) atomic model. They should be familiar with the principles underlying the Mendeleev Periodic Table and the modern Periodic Table including periods and groups, and metals and non-metals. Learners should have some knowledge of the properties of metals and non-metals including the chemical properties of metal and non-metal oxides with respect to acidity.</td></tr>
<tr><td colspan="2"><u>Essential Knowledge (what must students know):</u>

Terminology:
Equilibrium: Dynamic equilibrium, concentration, pressure, temperature, stoichiometry
NPK: Fertilisers
Extracting metals: Carbon reduction, reactivity series, electrolysis, phytomining, bioleaching.
Corrosion: Rusting, sacrificial protection.
Changing state: Inter- molecular forces (IMFs), sublimation, deposition.</td><td><u>Essential Skills (what must students be able to demonstrate):</u>

Students will be able to:
• recall that some reactions may be reversed by altering the reaction conditions
• recall that dynamic equilibrium occurs in a closed system when the rates of forward and reverse reactions are equal</td><td>Lessons:

1. Reversible reactions
2. Equilibrium
3. Choosing reaction condisions
4. The Haber process
5. The Contact Process
6. Fertilisers
7. Making fertilisers
8. Making Ethanol
9. Test
10. QLAs and intervention</td></tr>
</table>

Formulae: element, compound, formulation, diatomic. **Equiibrium Summary** In a reaction, when the rate of the forward reaction equals the rate of the backwards reaction, the reaction in a closed system is said to be in equilibrium. Underlying knowledge and understanding Learners will be familiar with representing chemical reactions using formulae and using equations. **Common misconceptions** Learners often do not recognise that when a dynamic equilibrium is set up in a reaction the concentration of the reactants and products remain constant. They think that the concentrations of all substances are equal. Learners also sometimes perceive a dynamic equilibrium as two reactions. **Metal extraction Summary** Historically, new materials have been developed through trial and error, experience etc. but as our understanding of the structure of materials and chemical processes has improved we are increasing our ability to manipulate and design new materials. Industry is continually looking to make products that have a better performance and are sustainable to produce. This section also explores the extraction of raw materials and their use in making new products. Underlying knowledge and understanding Learners should be familiar with the properties of ceramics, polymers and composites. They should have	• predict the effect of changing reaction conditions on equilibrium position and suggest appropriate conditions to produce as much of a particular product as possible • explain, using the position of carbon in the reactivity series, the principles of industrial processes used to extract metals, including extraction of a non-ferrous metal • explain why and how electrolysis is used to extract some metals from their ores • evaluate alternative biological methods of metal extraction • explain the trade-off between rate of production of a desired product and position of equilibrium in some industrially important processes • interpret graphs of reaction conditions versus rate • explain how the commercially used conditions for an industrial process are related to the availability and cost of raw materials and energy supplies, control of equilibrium position and rate • explain the importance of the Haber process in agricultural production • compare the industrial production of fertilisers with laboratory syntheses of the same products	11. Extracting metals 12. Extracting iron 13. Extracting Aluminium 14. Biological extraction 15. Alloys 16. Corrosion and reducing corrosion 17. Different materials and recycling materials 18. Revision for Mocks 19. Mock examinations 20. Intervention and QLA Analysis 21. Fractional distillation of crude oil 22. Alkanes and combustion

knowledge of the order of metals and carbon in the reactivity series. Learners should have met the method of using carbon to obtain metals from metal oxides. They should also be aware that the Earth has limited resources and the benefits of recycling materials. **Common misconceptions** Learners often think that chemical reactions will continue until all the reactants are exhausted. They also think that equilibrium is a static condition.	• recall the importance of nitrogen, phosphorus and potassium compounds in agricultural production • describe the industrial production of fertilisers as several integrated processes using a variety of raw materials • describe the basic principles in carrying out a life-cycle assessment of a material or product •	
Careers Links: Research. Laboratory work. Polymer scientists. Material scientists. Industrial chemist. Chemical engineer	**Enrichment:** Practical investigations to reinforce the scientific concepts presented.	**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 11	***Spring Term 2***	**Unit Title: Organic Chemistry and Green Chemistry**	**No of Lessons: 21**
Overview	**Develop practical investigation skills and confidently complete PAG sheets designed by LTO to enable good understanding of the terminology used in practical investigations.**		

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 PAG sheets and end of unit tests Mock Examinations

Essential Knowledge (what must students know):	**Essential Skills (what must students be able to demonstrate):**	**Lessons:**
Terminology: **Electrolysis:** Cation, anion, cathode, anode, molten, inert, discharge. **REDOX:** reduction, oxidation, reducing agent, Oxidising agent. **Acids:** Base, alkali, dissociation, ionisation, pH. **Periodicity**: Reactivity, stable, displacement. **Analysis**: Cation, anion. **Summary** Carbon chemistry is the basis of life on Earth. Organic chemistry is the basis of many of the materials we produce. Organic compounds are covalent in nature and react in a predictable pattern. Crude oil forms the basis of many useful by-products. Underlying knowledge and understanding Learners should be familiar with reactions and displayed formula. As our understanding of the structure of materials and chemical processes has improved we are	**Students will be able to:** • recognise functional groups and identify members of the same homologous series • name and draw the structural formulae, using fully displayed formulae, of the first four members of the straight chain alkanes, alkenes, alcohols and carboxylic acids • predict the formulae and structures of products of reactions of the first four and other given members of the homologous series of alkanes, alkenes and alcohols • recall the basic principles of addition polymerisation by reference to the functional group in the monomer and the repeating units in the polymer • explain the basic principles of condensation polymerisation reference to the functional groups of the	1. Alkenes 2. Cracking 3. Alcohols 4. Carboxylic acids 5. Addition polymerisation 6. Condensation Polymerisation 7. Biological polymers 8. Producing electricity from chemicals 9. TEST 10. QLA Intervention. 11. Forming the atmosphere 12. Pollution of the atmosphere 13. Second assessment 14. Intervention 15. Potable water 16. Climate change 17. Green Chemistry evaluative questions. 18. PAG investigations revisited

increasing our ability to interpret and understand chemical and earth systems. Understanding how we interact with them is very important to our survival as a species. This section starts with the history of the atmosphere and moves on to how human activity could be affecting its composition. Underlying knowledge and understanding Learners should have some understanding of the composition of the Earth, the structure of the Earth, the rock cycle, the carbon cycle, the composition of the atmosphere and the impact of human activity on the climate. **Common misconceptions** Learners tend not to bring the concepts from general chemistry in their study of organic chemistry. They have difficulty identifying functional groups and naming and drawing the compounds. Learners think that the atmosphere is large and that small increases of carbon dioxide or a few degrees of temperature change do not make a difference to the climate. They may consider that global warming is caused by the ozone hole and that human activities alone cause the greenhouse effect.	monomers, the minimum number of functional groups within a monomer, the number of repeating units in the polymer, and simultaneous formation of a small molecule, e.g. a polyester or polyamide, using block diagrams to represent polymers • describe practical techniques to make a polymer by condensation • deduce the structure of an addition polymer from a simple alkene monomer and vice versa • recall that DNA is a polymer made from four different monomers called nucleotides and that other important naturally-occurring polymers are based on sugars and amino-acids • recall that it is the generality of reactions of functional groups that determine the reactions of organic compounds • describe the separation of crude oil by fractional distillation • explain the separation of crude oil by fractional distillation • describe the fractions as largely a mixture of compounds of formula CnH2n+2 which are members of the alkane homologous series • recall that a chemical cell produces a potential difference until the reactants are used up	

	• evaluate the advantages and disadvantages of hydrogen/oxygen and other fuel cells for given uses • interpret evidence for how it is thought the atmosphere was originally formed • describe the major sources of carbon monoxide, sulfur dioxide, oxides of nitrogen and particulates in the atmosphere and explain the problems caused by increased amounts of these substances • describe the principal methods for increasing the availability of potable water in terms of the separation techniques used	
Careers Link: Industrial chemist. Chemical engineer. Water treatment engineer Organic chemist, Pharmacist. Environmental scientist.		**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

<table>
<tr><td colspan="4">Chemistry Medium Term Overview</td></tr>
<tr><td>Year 11</td><td>Summer Term 3</td><td>Unit Title: Revision and examinations</td><td>No of Lessons: 12</td></tr>
<tr><td>Overview

Assessment</td><td colspan="3">. 2
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

PAG sheets and end of unit tests. Mock examinations.</td></tr>
<tr><td><u>Essential Knowledge (what must students know):</u>

1. Grades 8 and 8–8 1.1
To achieve Grades 8 and 8–8 candidates will be able to: • demonstrate relevant and comprehensive knowledge and understanding and apply these correctly to both familiar and unfamiliar contexts using accurate scientific terminology • use a range of mathematical skills to perform complex scientific calculations • critically analyse qualitative and quantitative data to draw logical, well-evidenced conclusions •</td><td colspan="2"><u>Essential Skills (what must students be able to demonstrate):</u>

Students will be able to: Scientific thinking
• understand how scientific methods and theories develop over time
• use models to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts
• discuss ethical issues arising from developments in science
• explain everyday and technological applications of science
• recognise the importance of peer review of results and of communicating results to a range of audiences
• make decisions based on the evaluation of evidence and arguments</td><td>Lessons:

1. Revision of C1 – use of the QLAs from the mock examinations and knowledge organisers
2. C1 Exam questions. Modelling WAGOLL
3. Revision of C2 – use of the QLAs from the mock examinations and knowledge organisers
4. C2 Exam questions. Modelling WAGOLL
5. Revision of C3 – use of the QLAs from the mock examinations and knowledge organisers
6. C3 Exam questions. Modelling WAGOLL</td></tr>
</table>

critically evaluate and refine methodologies, and judge the validity of scientific conclusions.

2. Grades 5 and 5–5 2.1 To achieve Grades 5 and 5–5 candidates will be able to: • demonstrate mostly accurate and appropriate knowledge and understanding and apply these mostly correctly to familiar and unfamiliar contexts, using mostly accurate scientific terminology • use appropriate mathematical skills to perform multi-step calculations • analyse qualitative and quantitative data to draw plausible conclusions supported by some evidence • evaluate methodologies to suggest improvements to experimental methods, and comment on scientific conclusions.

3. Grades 2 and 2–2 3.1 To achieve Grades 2 and 2–2 candidates will be able to: • demonstrate some relevant scientific knowledge and understanding using limited scientific terminology • perform basic calculations • draw simple conclusions from qualitative or quantitative data • make basic comments relating to experimental method.

AO1	**Demonstrate knowledge and understanding of:** • scientific ideas • scientific techniques and procedures.
AO2	**Apply knowledge and understanding of:** • scientific ideas • scientific enquiry, techniques and procedures.
AO3	**Analyse information and ideas to:** • interpret and evaluate • make judgements and draw conclusions • develop and improve experimental procedures.

Assessment Objective elements	
AO1	**Demonstrate knowledge and understanding of scientific ideas and scientific techniques and procedures.**
AO1.1	Demonstrate knowledge and understanding of scientific ideas.
AO1.2	Demonstrate knowledge and understanding of scientific techniques and procedures.
AO2	**Apply knowledge and understanding of scientific ideas and scientific enquiry, techniques and procedures.**
AO2.1	Apply knowledge and understanding of scientific ideas.
AO2.2	Apply knowledge and understanding of scientific enquiry, techniques and procedures.
AO3	**Analyse information and ideas to interpret and evaluate, make judgements and draw conclusions and develop and improve experimental procedures.**
AO3.1	Analyse information and ideas to interpret and evaluate.
AO3.1a	Analyse information and ideas to interpret.
AO3.1b	Analyse information and ideas to evaluate.
AO3.2	Analyse information and ideas to make judgements and draw conclusions.
AO3.2a	Analyse information and ideas to make judgements.

7. Revision of C4 – use of the QLAs from the mock examinations and knowledge organisers
8. C4 Exam questions. Modelling WAGOLL
9. Revision of C5 – use of the QLAs from the mock examinations and knowledge organisers
10. C5 Exam questions. Modelling WAGOLL
11. Revision of C6 – use of the QLAs from the mock examinations and knowledge organisers
12. C6 Exam questions. Modelling WAGOLL
