Chemistry Year 9 Curriculum Intent: During Key Stage 3 the aim of the chemistry curriculum is for students to have access to skills based learning opportunities. Our students will be presented with a broad and varied range of experiences that are centred on enquiry processes, taught and practised in a range of topics, based on the AQA KS3 curriculum. Scientific enquiry skills and subject specific knowledge are introduced and practised in a range of contexts so students make a seamless transition at the start of Year 10 when they begin studying for their GCSE chemistry examinations.

Chemistry Year 9 Curriculum:
There are 7 main foci that will be covered in Year 9 which incorporate many opportunities for pupils to work scientifically and to use and apply their mathematical skills.: **Magnesium: a case study**, to review and consolidate practical skills and concepts about chemical changes and the use of chemical notation that were introduced towards the end of Year 8. **Burning and combustion** – to develop ideas linked to the end of Y8 OCC and provide a chance for students to apply a range of skills linked to working scientifically and consider the potential problems caused by burning fuels. **Metals and patterns of reactivity**: – Review and application of chemical changes, particle model and energy with chances for students to extend their knowledge about metals and use evidence from a range of sources to recall and investigate the relative reactivity of different metals; **Reactions of alkali metals:** to introduce patterns in reactivity linked to metals in Group I and II in the periodic table and demonstrate how alkaline solutions can be prepared. **Neutralisation and salts:** continue to incorporate working scientifically skills using neutralisation reactions to prepare salts and use scientific vocabulary to develop the detail and accuracy of descriptions and explanations. Apply practical skills to plan and carry out an investigation **Reactivity and uses of metals**: – Explain how the physical properties and reactivity of metals determine how and for what they can be used. Make links between observations and secondary data. **Properties of materials**: – Review of the particle model and methods of separation to extend scientific ides in preparation for GCSE.

Autumn Term:
1. Oxidation and combustion reactions
2. Chemical reactions as the rearrangement of atoms
3. Identification of pure substances
4. Mixtures, including dissolving to form solutions, including the use of state symbols.
5. Representing chemical reactions using equations and symbol formulae
6. The production of carbon dioxide by human activity and the impact on climate
7. Exothermic and endothermic chemical reactions (qualitative)
8. Use and apply the particle model linked to chemical changes
9. The Periodic Table: periods and groups; metals and non-metals
10. How patterns in reactions can be predicted and explained with reference to the P.T.
11. The varying physical and chemical properties of different elements
12. The order of metals and carbon in the reactivity series
13. Interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions.
14. Evaluate data, showing awareness of potential sources of ***random*** and ***systematic error***.

Key Objectives Autumn Term - To be able to:
1. Use prior knowledge to **identify** elements; use symbols and **distinguish** between symbols for elements and formulae for compounds.
2. **Explain** observations, in which mass appears to be lost using the principle of conservation of mass.
3. Predict the products of the combustion decomposition of a give reactant and show the reaction as a word equation
4. **Construct** summary equations to summarise how elements in compounds are rearranged during a reaction to form new compounds/products
5. **Write** word equations to represent oxidation and displacement reactions.
6. **Describe** how chemical reactions are used as a source of energy. **Explain** why carbon dioxide is a pollutant
7. **Describe** the difference between exothermic and endothermic reactions
8. **Identify /deduce** the gases and new compounds produced when acids react with a metal
9. **Recall** and **use** the reactivity of metals and non-metals to **predict** the products formed from simple displacement reactions. (metal + acid, or metal + salt solution)
10. Make **connections** between particle theory, energy and collisions to **suggest and explain** how reactant chemicals are changed into new products.
11. Place an unfamiliar metal into the reactivity series based on information about its reactions.
12. Recall how the elements in a group all react in a similar way and sometimes show a pattern in reactivity.
13. Recall how as you go down a group and across a period the elements show patterns in physical properties.
14. Use data to describe a trend in physical properties; including those showing a pattern in physical properties to estimate a missing value for an element.
15. Use observations of a pattern in chemical reactions to predict the behaviour of an element in a group.
16. Use scientific theories and explanations to develop hypotheses.

Spring Term:
1. Use and apply the particle model linked to chemical changes.
2. Define acids, bases and alkalis in terms of neutralisation reactions
3. Use the pH scale and indicators for measuring acidity/alkalinity.
4. Chemical properties of metals, non-metals and metal and non-metal oxides with respect to acidity.
5. Recognise chemical properties of metal and non-metal oxides with respect to acidity.
6. Reactions of acids with bases and metals to produce salts.
7. Representing chemical reactions using formulae and equations.
8. Use and apply the particle model linked to chemical changes.
9. Suggest a suitable method to make a named salt.
10. Use techniques for separating mixtures: filtering, evaporation and distillation.
11. Develop a line of enquiry based on real world linked to prior knowledge and experience.
12. Make predictions using scientific knowledge and understanding.
13. Plan and design investigations to make observations and to test predictions, including ***identifying independent, dependent and control variables.***
14. Use appropriate techniques, apparatus and materials during laboratory work, paying attention to health and safety
15. Make and record observations and measurements; evaluate the ***reproducibility*** of a method and suggest improvements.
16. Present reasoned explanations using data linked to a prediction/hypothesis.

Key Objectives Spring Term - To be able to:
1. Use key scientific vocabulary and terminology to accurately **describe**, **explain, contrast and make comparisons** between observations and chemical ideas
2. **Deduce** the compounds made when a metal or metal compound reacts with an acid
3. **Identify** the gases produced when acids react with a metal or with a metal carbonate
4. **Represent** acidic, basic and neutral salts using their formulae, and **explain** what these show about the number and type of atoms present
5. Identify the best indicator to distinguish between solutions of different pH, using data provided.
6. Use data and observations to determine the pH of a solution and explain what this shows.
7. Describe a method for how to make a neutral solution from an acid and alkali.
8. **Explain** what happens during a neutralisation reaction and **write** equations to represent neutralisation reactions.
9. Given the names of an acid and an alkali, work out the name of the salt produced when they react.
10. Deduce the hazards of different alkalis and acids using data about their concentration and pH.
11. Estimate the pH of an acid based on information from reactions.
12. Explain how neutralisation reactions are used in a range of situations; including how acids react with metal oxides, metal carbonates and alkalis
13. Describe how acid rain is produced in terms of a chemical reaction between oxides and water.
14. **Describe** and **explain** how acid rain weathers rocks/building materials and affects living things**.**
15. **Recall** and **describe** the everyday uses of metals and explain how they are linked to their properties and reactivity.
16. **Recognise, describe** and **explain** observed changes of state during chemical changes using the particle model. (Use and apply state symbols – s, l, aq and g)
17. Accurately use key scientific vocabulary and terminology to **describe**, **explain, contrast and make comparisons** between observations and chemical ideas
18. Recognise the need for risk assessments then consult and act on appropriate sources of information.
19. Effectively represent information and ideas using appropriate symbols and flow diagrams in presenting explanations and arguments

Summer Term:
1. Exothermic and endothermic chemical reactions (qualitative)
2. Displacement reactions
3. Representing chemical reactions using formulae and equations, including state symbols
4. Choose appropriate techniques, apparatus and materials during laboratory work, paying attention to health and safety.
5. Ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience
6. Recognise that scientific methods and theories develop as scientists modify earlier explanations to take account of new evidence and ideas, together with the importance of publishing results and peer review

Key Objectives Summer Term - To be able to:
1. Justify the use of specific metals and non-metals for different applications, using data provided.
2. Use a particle model to **describe** and **explain** observations of chemical changes in which mass appears to be lost using the principle of conservation of matter.
3. Explain the properties of solids, liquids and gases based on the arrangement and movement of their particles.
4. Explain changes in states in terms of changes to the energy of particles.
5. Draw before and after diagrams of particles to explain observations about changes of state, gas pressure and diffusion.
6. Analyse and interpret solubility curves.

Key Performance Standards

1. Recall and use a wide range of chemical vocabulary accurately during discussion and in written work.
2. Make explicit links between scientific models and concepts from all areas of science.
3. Recall, describe and explain how changes in temperature affect the state of a range of materials.
4. Apply a particle model to describe and explain the behaviour of materials; elements, compounds and mixtures in a range of familiar and unfamiliar contexts.
5. Locate metallic and non-metallic elements on a copy of the periodic table.
6. Recall the properties of and uses of metals linked to their position in the reactivity series.
7. Use evidence from a range of sources to explain such things as the reactivity series of metals and neutralisation reactions.
8. Make links between chemical reactions and physical properties to describe and explain processes that are used to produce and purify a number of salts other than common salt.
9. Make links between observations and chemical particle models to explain how chemical reactants change into new products in every day contexts.
10. Use secondary and empirical evidence to present increasingly detailed and accurate explanations.
11. Apply an increasing range of chemical conventions, including formulae and state symbols, to present balanced symbol equations for a range of reactions in everyday contexts
12. Select and use apparatus and practical techniques to make and record observations and collect reproducible data to test hypothesis and predictions
13. With reference to a range of secondary sources, recall how scientists monitor and collect data, model global changes and identify the environmental impact of human activities.
14. Use chemical ideas to explain the effects of specific chemical reactions on the environment in terms of sustainable use of materials and the impact of burning fossil fuels.
15. Select equipment and develop methods with a high resolution to collect repeatable and reproducible observations and data.
16. Present data in formats to illustrate/identify trends and draw valid conclusions.
17. Recognise the limitations of collected data, evaluate equipment and procedures and be able to suggest changes.
18. Use numeracy skills to process and manipulate empirical and secondary data to develop or enhance explanations.
    a. Arithmetic and numerical calculations.
    b. Handling and presenting data.
    c. Use and application of algebra
    d. Graphs.
    e. Geometry.