Queen Elizabeth High School

	Combustion	The periodic table	Making materials	Metals and their uses	Reactivity
Key concepts	Combustion and oxidation reactions, including those of hydrocarbons, metals and non-metals. Exothermic reactions are introduced and students explore pollution of the air by the products of fossil fuel combustion.	Develop students' understanding of matter, atoms and chemical and physical change. Using the trends in the periodic table to make predictions about physical and chemical properties of elements and their compounds.	This unit looks at the manufacture, properties and uses of different types of materials including ceramic, polymer and composite materials. Looking at some of the problems caused by synthetic materials and possible solutions to these problems.	Review common physical properties of metals, and to introduce their main chemical properties. The idea that reactions can occur at different speeds is also illustrated and this leads to the introduction of the general reactivity series of metals.	Physical changes and gas pressure are reviewed, and then the reactivity series and a chemical method of preventing rusting are covered. Exothermic and endothermic reactions, followed by displacement reactions. The method of extraction of a metal. Calculation of percentage change is related to oxidation and thermal decomposition reactions.
Themes	Combustion engines	fireworks	Materials of the future	Metals used in building	Demolition
Challenge Support	Outcomes, questioning, tasks and worksheets in all lessons. Regular progress checks.	Outcomes, questioning, tasks and worksheets in all lessons. Regular progress checks.	Outcomes, questioning, tasks and worksheets in all lessons. Regular progress checks.	Outcomes, questioning, tasks and worksheets in all lessons. Regular progress checks.	Outcomes, questioning, tasks and worksheets in all lessons. Regular progress checks.
Literacy focus	Distinguish between information and explanation texts.	The use of sentences to explain ideas clearly.	Recognise the use of biased language in texts.	Using adjectives to accurately describe substances in science.	Active and passive voice.
Numeracy focus	Interpreting line graphs.	Identify anomalous results. Identify ranges. Use a variety of charts and graphs.	Calculating mean values and percentages. Bar charts, scatter graphs and line graphs.	Calculating mean values and percentages. Bar charts and line graphs.	Calculating percentages (increase or decrease and percentage change).
Cross-curricular links	History - industrial development/Industrial Revolution in the UK.	History – philosophy to science English – debating an issue.	Humanities – the use of materials through the ages/the finite nature of resources.	History – the Bronze and Iron Age and uses of available metals and alloys.	Geography – mining and metal extraction.
SMSC & MBV	Global warming/methods for controlling CO_2 emissions.	Cultural collaboration of the periodic table	The importance of recycling materials. Development of bionics		
ASSESSMENTS					

Out of school learning					

Scheme of Work **SUBJECT - CHEMISTRY** **YEAR – 8**

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Combustion				
Lesson	**Key concepts**	**Learning outcomes**	**Differentiation**	**Resource**
1	Burning fuels - introduces the unit in relation to combustion engines in cars. It compares a range of different types of engine and then focuses on the combustion reactions of hydrogen and of hydrocarbons, and the products formed.	B1 Use and understand word equations for chemical reactions B2 Describe the reactions of hydrogen and hydrocarbons with oxygen B3 Use word equations to model combustion reactions	Outcomes, questioning, tasks and worksheets in all lessons.	
2	Oxidation - Oxidation of non-metals and of metals. This is developed to introduce the law of conservation of mass during reactions, using oxidation as the example. The theory of phlogiston is included to help students consider how evidence can be interpreted in different ways.	B1 Describe oxidation reactions of metals and non-metals B2 Explain changes in mass seen in oxidation reactions B3 Compare how phlogiston and oxygen explain combustion		
3	Fire safety - discusses fire safety by interpreting the fire triangle and the importance of using the correct type of fire extinguisher for a particular type of fire.	B1 Recognise the three factors in the fire triangle B2 Use the fire triangle to explain how to control a fire B3 Identify hazard symbols for substances likely to cause fires		
4	Air pollution - incomplete combustion of fossil fuels and the impact of this on air pollution. The formation of acid rain after the release of sulfur dioxide and nitrogen oxides from fossil fuel combustion is also discussed.	B1 Describe complete and incomplete combustion B2 Describe pollutants that are formed by burning fuels B3 Explain how pollutants cause problems and how their effects can be reduced		
5	Global warming- looks at the role of carbon dioxide in the air in the development of the greenhouse effect and how the release of greater amounts of the gas from fossil fuel combustion is thought to be linked to global warming and climate change.	B1 Describe the greenhouse effect and how it is caused B2 Describe changes that may be caused by global warming B3 Explain how human activity may be causing global warming		

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The periodic table				
Lesson	**Key concepts**	**Learning outcomes**	**Differentiation**	**Resource**
1	Dalton's atomic model – reviews physical changes and properties. It introduces Dalton's atomic theory, the difference between elements and compounds, and the use of symbols to describe elements.	B1 Describe Dalton's atomic theory B2 Describe elements using physical properties B3 Write and identify chemical symbols for elements	Outcomes, questioning, tasks and worksheets in all lessons.	
2	Chemical properties - chemical changes and properties and the difference between these and physical changes and properties. It looks at using formulae to describe compounds and extends Dalton's theory to explain what happens during chemical reactions in terms of rearranging atoms and changes in mass.	B1 Explain the difference between physical and chemical changes and properties B2 Use atomic theory to explain what happens during chemical reactions B3 Write and interpret chemical formulae		
3	Mendeleev's table - looks at the properties of some of the main groups of elements (alkali metals, halogens and noble gases) and the work that led to the construction of the periodic table.	B2 Describe some typical properties of alkali metals, halogens and noble gases B1 Use the periodic table to find elements with similar properties B3 Describe how the periodic table is arranged		
4	Physical trends - starts by looking at melting points, boiling points and physical states. It then considers how typical physical properties of metals and non-metals show patterns within the modern periodic table.	B1 Explain melting, freezing and boiling points and use them to predict the state of a substance B2 Describe and identify trends in physical properties within the periodic table B3 Identify metals and non-metals by their properties and position in the periodic table		
5	Chemical trends -uses the formation and properties of oxides to show trends in both physical and chemical properties in the periodic table. It also shows how the periodic table can be used to make predictions about the properties of elements and compounds.	B1 Describe some common properties and uses of metals B2 Describe the reactions of some elements with water and oxygen B3 Identify trends and make predictions about chemical properties using the periodic table		

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Metals and their uses				
Lesson	**Key concepts**	**Learning outcomes**	**Differentiation**	**Resource**
1	Metal properties - reviews the physical properties of metals and non-metals. Ideas about chemical properties and equations are considered through simple reactions of metals and non-metals. The link between properties and uses is illustrated, including metals as catalysts.	B1 Describe some common properties and uses of metals Describe the reactions of some elements with water and oxygen Write word equations for the reactions of metals and non-metals B2 Write word equations for the reactions of metals and non-metals B3 Place metals in order of reactivity	Outcomes, questioning, tasks and worksheets in all lessons.	
2	Corrosion - introduces corrosion as an oxidation reaction of metals with oxygen, including the rusting of iron, and uses symbol and word equations to represent chemical change.	B1 Describe what happens during corrosion and rusting B2 Explain how metals can be protected from corrosion		
3	Metals and water - considers the different reactions of a range of metals with water and how the products of the reactions can be identified. The idea of the reactivity series is introduced. Once again chemical equations are used to model the reactions.	B1 Describe the reaction of metals with water B2 Place metals in order of reactivity B3		
4	Metals and acids - The reactions of metals with dilute acids are explored, leading to the formation of a reactivity series for metals.	B1 Describe the reactions of metals with acids		
5	Pure metals and alloys - introduces ideas about alloys and explains how their properties are different from the pure metals. Some revision of particle theory and changes of state are also included in the topic.	B1 Explain what alloys are and why they are used B2 Use models to explain the properties of alloys		

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Making materials				
Lesson	**Key concepts**	**Learning outcomes**	**Differentiation**	**Resource**
1	About ceramics - introduces examples of common ceramics like china, porcelain and glass, explains how their general properties make them useful and links the properties to their structures. It also briefly describes and compares the manufacture of glass and china/pottery.	B1 Name some examples of ceramics and their uses B2 Explain why certain ceramics have particular uses B3 Explain how properties of ceramics can depend on their structure	Outcomes, questioning, tasks and worksheets in all lessons.	
2	Polymers - introduces some examples of polymers and explains how their common properties make them useful. The topic considers how polymers are formed and how their structure helps to explain their properties. In particular, natural rubber and vulcanised rubber are used to explain how cross-links change the properties of materials. Some of the reactions involved are used to explain the difference between exothermic and endothermic changes.	B1 Name some examples and uses of polymers B2 Explain some of the main properties of polymers B3 Describe how polymers are made		
3	Composite materials - introduces examples of common composite materials, such as concrete, paper and glass-reinforced plastic, and explains how the properties of a composite can be more useful than its separate materials. The production of cement and concrete is explored. Some of the reactions involved, including decomposition reactions, are used as further examples of exothermic and endothermic changes.	B1 Explain composite materials, giving examples B2 Describe and justify the uses of some composite materials B3 Explain what happens in thermal decomposition, and exothermic and endothermic reactions		

Reactivity				
Lesson	**Key concepts**	**Learning outcomes**	**Differentiation**	**Resource**
1	Energy and reactions - reviews the combustion of hydrocarbons and the test for oxygen. Exothermic and endothermic reactions are introduced, with ideas about reactions that need initial energy input or constant heating. Some students may consider the energy changes involved in breaking and making bonds.	B1 Describe the test for oxygen B2 Classify changes as exothermic or endothermic B3 Explain why some reactions need a supply of energy	Outcomes, questioning, tasks and worksheets in all lessons.	
2	Displacement - is about displacement reactions. It starts with the thermite reaction, which will lead into metal extraction in lesson 3, and also discusses displacement reactions in solution.	B1 Describe displacement B2 Explain what happens in a displacement reaction B3 Predict whether a displacement reaction will occur		
3	Extracting metals - is about extracting metals from their ores. The method of extraction is related to the position of the metal in the reactivity series and the cost of the method.	B1 Explain why the method used to extract a metal is related to cost and the metal's reactivity B2 Describe how metals are extracted from their ores by heating with carbon or by electrolysis B3 Explain what happens in oxidation and reduction reactions		