Programme of study for Chemistry Year 11

Autumn (1st term)	Autumn (2nd term)	Spring (1st term)	Spring (2nd Term)	Summer (1st term)	Summer (2nd term)
Topic / Big Question: Chemistry of the atmosphere	Topic / Big Question: Using Resources .	Topic / Big Question: Using Resources and revision		Topic / Big Question: **Year 11 examinations**	
Skills (students should be able to do): 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 judgments and draw conclusions; develop and improve experimental procedures	Skills (students should be able to do): 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 judgments and draw conclusions; develop and improve experimental procedures	Skills (students should be able to do): 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 judgments and draw conclusions; develop and improve experimental procedures	Skills (students should be able to do): 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 judgments and draw conclusions; develop and improve experimental procedures	Skills (students should be able to do):	Skills (students should be able to do):

Key Learning Outcomes (students should know): Be able to:	Key Learning Outcomes (students should know): Be able to:	Key Learning Outcomes (students should know): Be able to:	Key Learning Outcomes (students should know):	Key Learning Outcomes (students should know):
Students should be able to, given appropriate information, interpret evidence and evaluate different theories about the Earth's early atmosphere. describe the main changes in the atmosphere over time and some of the likely causes of these changes Describe and explain the formation of deposits of limestone, coal, crude oil and natural gas. Students should be able to describe the greenhouse effect in terms of the interaction of short and long wavelength radiation with matter. Students should be able to recall two human activities that increase the amounts of each of	extract and interpret information about resources from charts, graphs and tables Use orders of magnitude to evaluate the significance of data. distinguish between potable water and pure water describe the differences in treatment of ground water and salty water Give reasons for the steps used to produce potable water. distinguish between potable water and pure water describe the differences in treatment of ground water and salty water Give reasons for the steps used to produce potable water. Students should be able to evaluate alternative	extract and interpret information about resources from charts, graphs and tables Use orders of magnitude to evaluate the significance of data. distinguish between potable water and pure water describe the differences in treatment of ground water and salty water Give reasons for the steps used to produce potable water. distinguish between potable water and pure water describe the differences in treatment of ground water and salty water Give reasons for the steps used to produce potable water. Students should be able to evaluate alternative biological methods of metal extraction, given appropriate information. Students should be able to carry out simple comparative LCAs for shopping bags made from plastic and paper. Students should be able to evaluate ways of reducing the use of limited resources, given appropriate information. describe experiments and interpret results to show that both air and water are necessary for rusting		

the greenhouse gases carbon dioxide and methane. evaluate the quality of evidence in a report about global climate change given appropriate information describe uncertainties in the evidence base Recognise the importance of peer review of results and of communicating results to a wide range of audiences. describe briefly four potential effects of global climate change Discuss the scale, risk and environmental implications of global climate change. describe actions to reduce emissions of carbon dioxide and methane • give reasons why actions may be limited	biological methods of metal extraction, given appropriate information. Students should be able to carry out simple comparative LCAs for shopping bags made from plastic and paper. Students should be able to evaluate ways of reducing the use of limited resources, given appropriate information. describe experiments and interpret results to show that both air and water are necessary for rusting Explain sacrificial protection in terms of relative reactivity. recall a use of each of the alloys specified Interpret and evaluate the composition and uses of alloys other than those specified given appropriate information. compare quantitatively the physical properties	Explain sacrificial protection in terms of relative reactivity. recall a use of each of the alloys specified Interpret and evaluate the composition and uses of alloys other than those specified given appropriate information. compare quantitatively the physical properties of glass and clay ceramics, polymers, composites and metals Explain how the properties of materials are related to their uses and select appropriate materials. Interpret graphs of reaction conditions versus rate MS 1a Recognise and use expressions in decimal form. apply the principles of dynamic equilibrium in Reversible reactions and dynamic equilibrium (page 59) to the Haber process explain the trade-off between rate of production and position of equilibrium Explain how the commercially used conditions for the Haber process are related to the availability and cost of raw materials and energy supplies, control of equilibrium position and rate. recall the names of the salts produced when phosphate rock is treated with nitric acid, sulfuric acid and phosphoric acid Compare the industrial production of fertilisers with laboratory preparations of the same compounds, given appropriate information.		

describe how carbon monoxide, soot (carbon particles), sulfur dioxide and oxides of nitrogen are produced by burning fuels Predict the products of combustion of a fuel given appropriate information about the composition of the fuel and the conditions in which it is used. Students should be able to describe and explain the problems caused by increased amounts of these pollutants in the air.	of glass and clay ceramics, polymers, composites and metals Explain how the properties of materials are related to their uses and select appropriate materials. Interpret graphs of reaction conditions versus rate MS 1a Recognise and use expressions in decimal form. apply the principles of dynamic equilibrium in Reversible reactions and dynamic equilibrium (page 59) to the Haber process explain the trade-off between rate of production and position of equilibrium Explain how the commercially used conditions for the Haber process are related to the availability and cost of raw materials and energy supplies, control of equilibrium position and rate.			

	recall the names of the salts produced when phosphate rock is treated with nitric acid, sulfuric acid and phosphoric acid Compare the industrial production of fertilisers with laboratory preparations of the same compounds, given appropriate information.			
Autumn Term – centrally planned, standardised and teacher marked piece(s) of work Linear assessment End of topic assessment on chemistry of the atmosphere		Spring Term – centrally planned, standardised and teacher marked piece(s) of work Linear assessment Required practical assessment	Summer Term – centrally planned, standardised and teacher marked piece(s) of work	

Building understanding: Rationale / breakdown for your sequence of lessons:

There are only two topics left to be taught. That was purposefully arranged so there is enough of an opportunity to revisit previous topics especially the areas which are difficult for students. The year starts with Chemistry of the atmosphere; this unit looks at how our atmosphere has evolved and how human activities lead to pollution issues and how to minimise the production of these pollutants. This links to the previous topic, as we previously looked at how to test for gases such as carbon dioxide and in this unit, we study more about the production of these type of pollutants and their impact on our atmosphere. After understanding the chemistry of the atmosphere, the topic of using resources can be introduced. This transition is logical because it connects the understanding of the environment to resource management and sustainability. Students can learn how the use of natural resources, such as minerals, fossil fuels, and water, has a direct impact on the atmosphere and the environment.

Once this topic is complete; question level analysis from the December linear exams to inform revision schedule for the remaining lessons.

Home – Learning:
Revision workbooks for all units are given to students to complete throughout the duration of unit delivery.

Reading / High Quality Text:
Students are encouraged to prior reading on topics. In lessons students are taught how to construct answers through use of writing frames and exemplar answers where extended writing is required and command words and keywords that are relevant to the topic are consistently assessed in lessons through questioning and exam practice.

Chemguide online reading resource is excellent for GCSE Chemistry students: https://www.chemguide.co.uk/gcsebook.html

Numeracy:
Recognise and use expressions in decimal form: Recognise and use expressions in standard form; Use ratios, fractions and percentages; Make estimates of the results of simple calculations.
Handling data: Use an appropriate number of significant figures; Find arithmetic means; Construct and interpret frequency tables and diagrams, bar charts and histograms; Make order of magnitude calculations
Algebra: Understand and use the symbols: =, <>, >, ∝ , ~ ;Change the subject of an equation; Substitute numerical values into algebraic equations using appropriate units for physical quantities
Graphs: Translate information between graphical and numeric form; Understand that y = mx + c represents a linear relationship; Plot two variables from experimental or other data; Determine the slope and intercept of a linear graph; interpret graphs to show changes in level of greenhouse gases. Use of tables to interpret materials for resources.

Enrichment / opportunities to develop cultural capital (including careers, WRL and SMSC):

Students have talks and workshops during science week.
SMSC:
Chemistry of the atmosphere: evolution of the atmosphere and the consequences of pollution to our environment.

Using resources: the importance of fertilisers and the demand for it due to the increasing World population; why is it important to recycle materials; which material is better to be used as a bag – plastic or paper? Discussions on which is better for the environment (LCA); where does our tap water come from?