Programme of study for Year 10 Chemistry

Autumn (1 st term)	Autumn (2 nd term)	Spring (1st term)	Spring (2 nd term)	Summer (1 st Term)	Summer (2 nd term)
Other timescale:	Other timescale:	Other timescale:	Other timescale:	Other timescale:	Other timescale:
From: September Io:	From: November	From: Jaunary To:	From: February Io:	From: April To: May	From: June To: July
Topic / Big Question:	Topic / Big Question:	Topic / Big Question:	April Topic / Big Question:	Topic / Big Question:	Topic / Big Question:
Quantitative chemistry	Topic / big Question.	Topic / big Question.		Topic / big Question.	TOPIC / big Question.
Chemical changes	Energy changes	Rate and extent of chemical changes	Organic chemistry	Chemistry of the atmosphere	Chemistry of the atmospheres continued
_	Skills(students should be	_	Skills(students should be		and revision
	able to do)	Skills(students should be	able to do):	Skills(students should be	
Skills(students should be	AO1: Demonstrate	able to do):	AO1: Demonstrate	able to do)	Skills(students should be
able to do):	knowledge and	AO1: Demonstrate	knowledge and	AO1: Demonstrate	able to do):
AO1: Demonstrate	understanding of: scientific	knowledge and	understanding of:	knowledge and	AO1: Demonstrate
knowledge and	ideas; scientific techniques	understanding of: scientific	scientific ideas; scientific	understanding of:	knowledge and
Understanding of: scientific	and procedures.	ideas; scientific fechniques	techniques and	scientific ideas; scientific	Understanding of: scientific
and procedures	and understanding of:	AO2: Apply knowledge and	AO2: Apply knowledge		and procedures
ΔO^2 : Apply knowledge	scientific ideas: scientific	understanding of: scientific	and understanding of:	ΔO^2 : Apply knowledge	ΔO^2 : Apply knowledge
and understanding of	enquiry techniques and	ideas: scientific enquiry	scientific ideas: scientific	and understanding of	and understanding of
scientific ideas: scientific	procedures.	techniques and procedures.	enquiry, techniques and	scientific ideas: scientific	scientific ideas: scientific
enquiry, techniques and	AO3: Analyse information	AO3: Analyse information	procedures.	enquiry, techniques and	enquiry, techniques and
procedures.	and ideas to: interpret and	and ideas to: interpret and	AO3: Analyse information	procedures.	procedures.
AO3: Analyse information	evaluate; make judgments	evaluate; make judgments	and ideas to: interpret	AO3: Analyse information	AO3: Analyse information
and ideas to: interpret and	and draw conclusions;	and draw conclusions;	and evaluate; make	and ideas to: interpret	and ideas to: interpret and
evaluate; make judgments	develop and improve	develop and improve	judgments and draw	and evaluate; make	evaluate; make judgments
and draw conclusions;	experimental procedures.	experimental procedures	conclusions; develop and	judgments and draw	and draw conclusions;
develop and improve			improve experimental	conclusions; develop and	develop and improve
experimental procedures			procedures	improve experimental	experimental procedures
				procedures.	
Key Learning Outcomes	Key Learning Outcomes	Key Learning Outcomes	Key Learning Outcomes	Key Learning Outcomes	Key Learning Outcomes
(students should know):	(students should know):	(students should know):	(students should know):	(students should know):	(students should know):
	distinguish botwoon	Be able to:	Be able to:	Be able to:	Koy Lograing Outcomos
Students should be able to	exothermic and		to recognise substances		(students should know):
explain reduction and	endothermic reactions on	calculate the mean rate of	as alkanes aiven their	Students should be able	Be able to:
oxidation in terms of loss or	the basis of the	a reaction from given	formulae in these forms.	information interpret	
gain of oxygen.	temperature change of	quantity of a reactant used		evidence and evaluate	Students should be able to
and the state of the state of the state of	the surroundings	or the quantity of a product	Students should be able	different theories about	given appropriate
recall and describe the		formed and the time taken	to explain how fractional	the Farth's early	information, interpret
nedctions, il driy, of	Evaluate uses and	• draw, and interpret,	distillation works in terms	atmosphere.	evidence and evaluate
calcium magnesium zinc	applications of exothermic	graphs showing the quantity	of evaporation and		different theories about the
iron and copper with water	and endothermic reactions	of product formed or	condensation.		Earth's early atmosphere.
or dilute acids and where	given appropriate	quantity of reactant used		describe the main	
appropriate, to place	draw simple reaction	up against time • draw	sudents should be able	changes in the	
	nofiles (energy level	tangents to the curves on	equations for the	atmosphere over time	describe the main changes
	diagrams) for exothermic	these graphs and use the	complete combustion of		in the atmosphere over
	alagranishior exoniternit	siope of the tangent as a			

these metals in order of	and endothermic reactions	measure of the rate of	hydrocarbons with a	and some of the likely	time and some of the likely
reactivity	showing the relative	reaction • (HT only)	aiven formula. Knowledge	causes of these changes	causes of these changes
,	energies of reactants and	calculate the gradient of a	of trends in properties of	0	5
ovalgin how the regativity	products, the activation	tangent to the curve on	hydrocarbons is limited to:	Describe and evolain the	Describe and evolatin the
explain now the reactivity	energy and the overall	these graphs as a measure	boiling points	Describe and explain the	Describe and explain the
of metals with water or	energy change with a	of rate of reaction at a	viscosity	formation of deposits of	formation of deposits of
dilute acids is related to	curved line to show the	specific time	• flammability	limestone, coal, crude oil	limestone, coal, crude oil
the tendency of the metal	corved line to show the	specific fille.		and natural gas.	and natural gas.
to form its positive ion	energy us me reaction		Students should be able		
	proceeds	Students should be able to		Students should be able	Students should be able to
deduce an order of		recall how changing factors	to balance chemical	to describe the	describe the greenhouse
reactivity of metals based	Use reaction profiles to	affects the rate of chemical	equations as examples of	greenhouse effect in	effect in terms of the
on experimental results	identity reactions as	reactions.	cracking given the	terms of the interaction of	interaction of short and
on experimental resolis.	exothermic or endothermic		formulae of the reactants	short and long	long wavelength radiation
		predict and explain using	and products. Students	wavelength radiation with	with matter
interpret or evaluate	Explain that the activation	collision theory the offects	should be able to give	matter	wiin maner.
specific metal extraction	energy is the energy	consider media	examples to illustrate the	maner.	
processes when given	needed for a reaction to	or changing conditions of	usefulness of cracking.		Students should be able to
appropriate information	occur.	concentration, pressure and		Students should be able	recall two human activities
		remperature on the rate of	They should also be able	to recall two human	that increase the amounts
identify the substances	Students should be able to	a reaction	to explain how modern	activities that increase the	of each of the greenhouse
which are oxidised or	calculate the energy		life depends on the uses	amounts of each of the	gases carbon dioxide and
reduced in terms of agin or	transferred in chemical	predict and explain the	of hydrocarbons.	greenhouse gases carbon	methane.
loss of oxygen	reactions using bond	effects of changes in the	describe the reactions	dioxide and methane.	
	energies supplied.	size of pieces of a reacting	and conditions for the		ovaluate the quality of
		solid in terms of surface	addition of hydrogen.	ovaluate the quality of	evaluate the quality of
write ionic equations for	Students should be able to	area to volume ratio	water and halogens to	evaluate the quality of	alabal climate change
displacement reactions	interpret data for relative		alkenes	about alobal alimata	giobal cilinate change
	reactivity of different		Giltorios		given appropriate
identify in a given reaction.	metals and evaluate the	Use simple ideas about	Draw fully displayed	change given	information
symbol equation or half		proportionality when using	structural formulae of the	appropriate information	
equation which species		collision theory to explain	first four members of the		describe uncertainties in
are oxidised and which are	ovaluate the use of	the effect of a factor on the	alkonos and the products	describe uncertainties in	the evidence base
reduced	evaluate the use of	rate of a reaction.	of their addition regations	the evidence base	
	nydrogen ider cells in		of their addition reactions		Recognise the importance
		Students should be able to	with hydrogen, water,	Pocogniso the	of poor review of results
explain reactions of acids	rechargeable cells and	identify catalysts in	chiorine, bromine and	importance of poor	and of communicating
in terms of gain or loss of	batteries	reactions from their effect	ioaine.	review of results and of	
electrons, that these are		on the rate of reaction and			
redox reactions	(HI only) write the half	because they are not	describe what happens		dudiences.
	equations for the electrode	included in the chemical	when any of the first four	d wide range of	
identify which species are	reactions in the hydrogen	equation for the reaction	alcohols react with	audiences.	describe briefly four
oxidised and which are	tuel cell.	Students should be able to	sodium, burn in air, are		potential effects of global
reduced in given chemical		explain catalytic action in	added to water, react	describe briefly four	climate change
equations		terms of activation energy	with an oxidising agent •	potential effects of global	
		icinis of demonion energy.	recall the main uses of	climate change	Discuss the scale risk and
			these alcohols.		environmental implications
predict products from		Students should be able to		Discuss the scale risk and	of global climate change
given reactants		make qualitative	Students are not	anvironmental	or giobal cirridie change.
		predictions about the effect	expected to write	implications of dobal	
		of changes on systems at	balanced chemical		describe actions to reduce
			equations for the	cimale change.	emissions of carbon
			reactions of alcohols		dioxide and methane •

use the formulae of	equilibrium when given	other than for combustion	describe actions to	give reasons why actions
common ions to deduce	appropriate information.	reactions.	reduce emissions of	may be limited
the formulae of salts.			carbon dioxide and	
	Students should be able to	Students should know the	methane • aive reasons	describe how carbon
		conditions used for	why actions may be	
Students should be able to	interpret appropriate given	fermentation of sugar	limited	monoxide, soot (carbon
describe how to make	data to predict the effect of		IIIIIeu	particles), sulfur dioxide
pure, dry samples of	a change in concentration	Using yeast. Students		and oxides of nitrogen are
named soluble salts from	of a reactant or product on	should be able to	describe how carbon	produced by burning fuels
information provided.	aiven reactions at	recognise alcohols from	monoxide, soot (carbon	, , ,
	equilibrium	their names or from given	particles) sulfur dioxide	
		formulae.	and oxides of nitrogen are	Predict the products of
describe the use of				combustion of a fuel given
universal indicator or a	Students should be able to	Recognise carboxylic	produced by burning rues	appropriate information
wide range indicator to	interpret appropriate given	acids from their names or		about the composition of
measure the approximate	data to predict the effect of		Predict the products of	the fuel and the conditions
pH of a solution	a change in temperature	from given formulae.	combustion of a fuel	in which it is used
	on given reactions at	Students do not need to	aiven appropriate	
		know the names of	information about the	
use the pH scale to identify	equilibrium	individual carboxylic acids		Students should be able to
acidic or alkaline solutions.		other than methanoic	composition of the fuel	describe and explain the
	Students should be able to	acid, ethanoic acid,	and the conditions in	problems caused by
	interpret appropriate given	propanoic acid and	which it is used.	increased amounts of
describe now to carry out	data to predict the effect of	butanois acid		these pollutants in the air
fitrations using strong acids		buidhoic áciá.	Students should be able	
and strong alkalis only	pressure changes on given			
(sulfuric, hydrochloric and	reactions at equilibrium	recognise addition	to describe and explain	To support and consolidate
nitric acids only) to find the		polymers and monomers	the problems caused by	scientific concepts
reacting volumes		from diagrams in the	increased amounts of	(knowledge and
accurately		forms shown and from the	these pollutants in the air.	understanding) This is done
according		presence of the functional		by applying and
		aroup $C=C$ in the		developing what is known
(HT Only) calculate the		monomers		developing what is known
chemical quantities in		monomers		and Understood of
titrations involving				abstract ideas and models.
concentrations in mol/dm3		araw alagrams to		Through practical work we
and in a/dm3		represent the formation of		are able to make sense of
and in granis.		a polymer from a given		new information and
		alkene monomer		observations and provide
use and explain the terms				insights into the
dilute and concentrated		Relate the repeating unit		development of scientific
(in terms of amount of		to the monomer		
substance), and weak and				miniking.
strong (in terms of the				
dogroo of ionisation) in		Students should be able		2. To develop investigative
		to explain the basic		skills. These transferable
reidiion io acias		principles of condensation		skills include:
		polymerisation by		 devising and
describe neutrality and		reference to the		investigating testable
relative acidity in terms of		functional arouns in the		questions
the effect on hydrogen ion		monomore and the		• identifying and
concentration and the				controlling variables
		repeating units in the		
		polymers.		 Analysing, interpreting
(whole numbers only).				and evaluating data.

Students should be able to			Students should be able		3. To build and master	
predict the products of the			to name the types of		practical skills such as:	
electrolysis of binary ionic			monomers from which		 using specialist 	
compounds in the molten			these naturally occurring		equipment to take	
state. They should also be			polymers are made.		measurements	
able to write ionic half					 handling and 	
equations.					manipulating equipment	
					with confidence and	
ovolain why a mixture is					fluency	
					 recognising hazards and 	
used as the electrolyte					planning how to minimise	
					risk	
explain why the positive						
electrode must be						
continually replaced.						
Students should be able to						
students should be able to						
predict the products of the						
electrolysis of aqueous						
solutions containing a						
single ionic compound.						
End of term 1 assessment to c	over:	End of term 2 assessment to c	over:	End of year assessment to a	cover:	
End of topic test chemical ch	anges	End of topic test on rate and	extent of chemical	End of topic test on chemis	try of the atmosphere	
End of topic test energy chan	ges	changes		End of year exam		
	-	End of topic test on organic c	hemistry			
Building understanding: Ration	ale / breakdown for your sec	mence of lessons.				
Building understanding: Ration	nale / breakdown for your sec	quence of lessons:		I		
Building understanding: Ration	nale / breakdown for your sec	quence of lessons:	he core principles of chemist	ry. This tonic covers the vario	us types of chemical reactions	
Building understanding: Ration	nale / breakdown for your sec vith chemical changes is logic	quence of lessons: cal as it introduces students to t	he core principles of chemist	ry. This topic covers the vario	us types of chemical reactions	
Building understanding: Ration Chemical Changes: Starting w and their characteristics, layin	nale / breakdown for your sec vith chemical changes is logic g the foundation for more ac	quence of lessons: cal as it introduces students to t lvanced concepts.	he core principles of chemist	ry. This topic covers the vario	us types of chemical reactions	
Building understanding: Ration Chemical Changes: Starting w and their characteristics, layin	nale / breakdown for your sec vith chemical changes is logic g the foundation for more ac	quence of lessons: cal as it introduces students to t lvanced concepts.	he core principles of chemist	ry. This topic covers the variou	us types of chemical reactions	
Building understanding: Ration Chemical Changes: Starting w and their characteristics, layin Energy Changes: After studen	nale / breakdown for your sec vith chemical changes is logic g the foundation for more ac ts have grasped chemical ch	quence of lessons: cal as it introduces students to t lvanced concepts. nanges, it's natural to move on	he core principles of chemist to energy changes. This topic	ry. This topic covers the various delves into the energy aspe	us types of chemical reactions cts of chemical reactions,	
Building understanding: Ration Chemical Changes: Starting w and their characteristics, layin Energy Changes: After studen including endothermic and ex	nale / breakdown for your sec vith chemical changes is logic g the foundation for more ac ts have grasped chemical ch kothermic reactions. It builds c	quence of lessons: cal as it introduces students to t lvanced concepts. nanges, it's natural to move on on the understanding of chemi	he core principles of chemist to energy changes. This topic cal reactions and introduces	ry. This topic covers the various delves into the energy aspe the concept of energy transf	us types of chemical reactions cts of chemical reactions, fer during reactions.	
Building understanding: Ration Chemical Changes: Starting w and their characteristics, layin Energy Changes: After studen including endothermic and ex	nale / breakdown for your sec vith chemical changes is logic g the foundation for more ac ts have grasped chemical ch kothermic reactions. It builds c	quence of lessons: cal as it introduces students to t lvanced concepts. nanges, it's natural to move on on the understanding of chemi	he core principles of chemist to energy changes. This topic cal reactions and introduces	ry. This topic covers the various delves into the energy aspe- the concept of energy transf	us types of chemical reactions cts of chemical reactions, fer during reactions.	
Building understanding: Ration Chemical Changes: Starting w and their characteristics, layin Energy Changes: After studen including endothermic and ex Rate and Extent of Chemical	nale / breakdown for your sec vith chemical changes is logic g the foundation for more ac ts have grasped chemical ch kothermic reactions. It builds c Changes: Once students hav	quence of lessons: cal as it introduces students to t lvanced concepts. nanges, it's natural to move on on the understanding of chemi e a solid understanding of che	he core principles of chemist to energy changes. This topic cal reactions and introduces mical reactions and energy c	ry. This topic covers the various delves into the energy aspe- the concept of energy transf	us types of chemical reactions cts of chemical reactions, fer during reactions. nd extent of chemical changes	
Building understanding: Ration Chemical Changes: Starting w and their characteristics, layin Energy Changes: After studen including endothermic and ex Rate and Extent of Chemical is the next logical step. This top	nale / breakdown for your sec vith chemical changes is logic g the foundation for more ac ts have grasped chemical ch kothermic reactions. It builds c Changes: Once students hav pic introduces the kinetics of r	quence of lessons: cal as it introduces students to t lvanced concepts. nanges, it's natural to move on on the understanding of chemi reactions, including factors affe	he core principles of chemist to energy changes. This topic cal reactions and introduces mical reactions and energy c ecting reaction rates, mechan	ry. This topic covers the various delves into the energy aspe- the concept of energy transf hanges, exploring the rate a hisms, and equilibrium. It prov	us types of chemical reactions cts of chemical reactions, fer during reactions. nd extent of chemical changes ides a more detailed look at the	
Building understanding: Ration Chemical Changes: Starting w and their characteristics, layin Energy Changes: After studen including endothermic and ex Rate and Extent of Chemical of is the next logical step. This top dynamics of chemical proces	nale / breakdown for your sec vith chemical changes is logic g the foundation for more ac ts have grasped chemical ch kothermic reactions. It builds c Changes: Once students hav pic introduces the kinetics of r ses.	quence of lessons: cal as it introduces students to t lvanced concepts. nanges, it's natural to move on on the understanding of chemi reactions, including factors affe	he core principles of chemist to energy changes. This topic cal reactions and introduces mical reactions and energy c ecting reaction rates, mechan	ry. This topic covers the various delves into the energy aspe- the concept of energy transf changes, exploring the rate a nisms, and equilibrium. It prov	us types of chemical reactions cts of chemical reactions, fer during reactions. nd extent of chemical changes ides a more detailed look at the	
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Building understanding: Ration Chemical Changes: Starting w and their characteristics, layin Energy Changes: After studen including endothermic and ex Rate and Extent of Chemical of is the next logical step. This top dynamics of chemical process Organic Chemistry: Organic c	nale / breakdown for your sec vith chemical changes is logic g the foundation for more ac ts have grasped chemical ch kothermic reactions. It builds c Changes: Once students hav pic introduces the kinetics of r ses.	quence of lessons: cal as it introduces students to t lvanced concepts. nanges, it's natural to move on on the understanding of chemi reactions, including factors affe on topics because it involves co	he core principles of chemist to energy changes. This topic cal reactions and introduces mical reactions and energy c ecting reaction rates, mechan omplex carbon-based comp	ry. This topic covers the various delves into the energy aspe- the concept of energy transf changes, exploring the rate a hisms, and equilibrium. It prov	us types of chemical reactions cts of chemical reactions, fer during reactions. nd extent of chemical changes ides a more detailed look at the ns, functional groups, and their	
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Reading / literacy:

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.

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: =, <>, >, \propto , ~ ;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; Draw and use the slope of a tangent to a curve as a measure of rate of change; interpret graphs for carbon dioxide production.

Geometry and trigonometry: Visualise and represent 2D and 3D forms including two dimensional representations of 3D objects; Calculate areas of triangles and rectangles, surface areas and volumes of cubes.

Enrichment / opportunities to develop cultural capital (including careers, WRL and SMSC): Chemistry related trips are arranged during science week.