

# Tarporley Sixth Form College

## Chemistry A Level

#### Programme of Study

Exam Board: AQA

100% Examination

Plus the practical endorsement

(Centre assessed)

NAME:	
TARGET	
GRADE	
ASPIRATIONAL	
GRADE	

Assessment:

Paper 1	Paper 2	Paper 3
Relevant Physical	Relevant Physical	Any content
chemistry topics	chemistry topics	Any practical skills
(sections 1.1 to 1.4, 1.6	(sections 1.2 to 1.6 and	
to 1.8 and 1.10 to 1.12)	1.9)	
Inorganic chemistry	Organic chemistry	
(Section 2.1 to 2.6)	(Section 3.1 to 3.16)	
Relevant practical skills	Relevant practical skills	
Written exam: 2 hours	Written exam: 2 hours	Written exam: 2 hours
105 marks	105 marks	90 marks
35% of A-level	35% of A-level	30% of A-level
Questions 105 marks of	Questions 105 marks of	Questions 40 marks of
short and long answer	short and long answer	questions on practical
questions	questions	techniques and data
		analysis 20 marks of
		questions testing across
		the specification 30
		marks of multiple
		choice questions



## Your Assessment Objectives:

AO1 Knowledge	Demonstrate knowledge and understanding of scientific ideas, processes, techniques and procedures	
AO2 Application	<ul> <li>Apply knowledge and understanding of scientific ideas, processes, techniques and procedures:</li> <li>in a theoretical context</li> <li>in a practical context</li> <li>when handling qualitative data</li> <li>when handling qualitative data</li> </ul>	
AO3 Analysis	<ul> <li>Analyse, interpret and evaluate scientific information, ideas and evidence, including in relation to issues, to:</li> <li>make judgements and reach conclusions</li> <li>develop and refine practical design and procedures.</li> </ul>	

#### Weighting of Assessment Objectives:

Assessment Objectives (AOs)	Paper 1 (approx. %)	Paper 2 (approx. %)	Paper 3 (approx. %)	Overall (approx. %)
AO1	30	30	32	30
AO2	48	48	34	45
AO3	22	22	34	25
Overall	35	35	30	100

20% of the overall assessment of A-level Chemistry will contain mathematical skills equivalent to Level 2 or above. At least 15% of the overall assessment of A-level Chemistry will assess knowledge, skills and understanding in relation to practical work.

# Your Key Topics over the Course:

Торіс	Key Content
1.1 Atomic	The chemical properties of elements depend on their atomic structure and on the
Structure	arrangement of electrons around the nucleus. The arrangement of electrons in orbitals is
	linked to the way in which elements are organised in the Periodic Table. Chemists can
	measure the mass of atoms and molecules to a high degree of accuracy in a mass
	spectrometer. The principles of operation of a modern mass spectrometer are studied.
1.2 Amount of	When chemists measure out an amount of a substance, they use an amount in moles. The
Substance	mole is a useful quantity because one mole of a substance always contains the same
	number of entities of the substance. An amount in moles can be measured out by mass in
	grams, by volume in dm <sup>3</sup> of a solution of known concentration and by volume in dm3 of a
	gas.
1.3 Bonding	The physical and chemical properties of compounds depend on the ways in which the
	compounds are held together by chemical bonds and by intermolecular forces. Theories
	of bonding explain how atoms or ions are held together in these structures. Materials
	scientists use knowledge of structure and bonding to engineer new materials with
	desirable properties.
1.4 Energetics	The enthalpy change in a chemical reaction can be measured accurately. It is important to
	know this value for chemical reactions that are used as a source of heat energy in
	applications such as domestic bollers and internal combustion engines.
1.5 KINETICS	The study of kinetics enables chemists to determine how a change in conditions affects
	the speed of a chemical reaction. Whilst the reactivity of chemicals is a significant factor
	and or the speed them up or slow them down
1 6 Equilibria	In contrast with kinetics, which is a study of how quickly reactions occur, a study of
1.0 Equilibria	equilibria indicates how far reactions will go Le Chatelier's principle can be used to
	nredict the effects of changes in temperature, pressure and concentration on the yield of
	a reversible reaction. The study of the equilibrium constant $K_{c}$ considers how the
	mathematical expression for the equilibrium constant enables us to calculate how an
	equilibrium vield will be influenced by the concentration of reactants and products.
1.7 Redox	Redox reactions involve a transfer of electrons from the reducing agent to the oxidising
Reactions	agent. The change in the oxidation state of an element in a compound or ion is used to
Reactions	identify the element that has been oxidised or reduced in a given reaction. Separate half-
	equations are written for the oxidation or reduction processes.
1.8 Thermo-	The further study of thermodynamics builds on the Energetics section and is important in
dynamics	understanding the stability of compounds and why chemical reactions occur. Enthalpy
	change is linked with entropy change enabling the free-energy change to be calculated.
1.9 Rate	In rate equations, the mathematical relationship between rate of reaction and
Equations	concentration gives information about the mechanism of a reaction that may occur in
	several steps.
1.10 Equilibrium	The further study of equilibria considers how the mathematical expression for the
Constant	equilibrium constant $K_p$ enables us to calculate how an equilibrium yield will be
	influenced by the partial pressures of reactants and products.
1.11 Electrode	Redox reactions take place in electrochemical cells where electrons are transferred from
Potentials and	the reducing agent to the oxidising agent indirectly via an external circuit. A potential
Electro-	difference is created that can drive an electric current to do work. Electrochemical cells
chemical Cells	nave very important commercial applications as a portable supply of electricity to power

provide energy to power a vehicle.           1.12 Acids and         Acids and bases are important in domestic, environmental and industrial contexts. Acidity in aqueous solutions is caused by hydrogen ions and a logarithmic scale, pH, has been devised to measure acidity. Buffer solutions, which can be made from partially neutralised weak acids, resist changes in pH and find many important industrial and biological applications.           2.1 Periodicilly         The rendoit Table provides chemists with a structured organisation of the known chemical elements from which they can make sense of their physical and chemical properties. The historical development of the Periodic Table and models of atomic structure provide good examples of how scientific ideas and explanations develop over time.           2.2 Group 2         The elements in Group 2 are called the alkaline earth metals. The trends in the solubilities of the hydroxides and the sulfates of these elements are linked to their use. Barium sulfate, magnesium hydroxide and magnesium sulfate have applications in medicines whils calcium hydroxide is used in agricuture to change soil pH, which is essential for good crop production and maintaining the food supply.           2.3 Group 7         The adogers in Group 7 are very reactive non-metals. Trends in their physical properties are examined and explained. Challenges in studying the properties of elements in this group include explaining the trends in ability of the halogens to behave as oxidising agents.           2.4 Period 3         The reactions of the Period 3 all enerties usits in different wasts. Some of these metals. Trends in their physical properties are standied in this section with opportunities for a wide range of practical noportunities to develop an in-depth understanding of how and why these reaction		electronic devices such as mobile phones, tablets and laptops. On a larger scale, they can
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3.5 Alcohols	Alcohols have many scientific, medicinal and industrial uses. Ethanol is one such alcohol and it is produced using different methods, which are considered in this section. Ethanol can be used as a biofuel.
3.6 Organic Analysis	Our understanding of organic molecules, their structure and the way they react, has been enhanced by organic analysis. This section considers some of the analytical techniques used by chemists, including test-tube reactions and spectroscopic techniques.
3.7 Optical Isomerism	Compounds that contain an asymmetric carbon atom form stereoisomers that differ in their effect on plane polarised light. This type of isomerism is called optical isomerism.
3.8 Aldehydes and Ketones	Aldehydes, ketones, carboxylic acids and their derivatives all contain the carbonyl group which is attacked by nucleophiles. This section includes the addition reactions of aldehydes and ketones.
3.9 Carboxylic Acids and Esters	Carboxylic acids are weak acids but strong enough to liberate carbon dioxide from carbonates. Esters occur naturally in vegetable oils and animal fats. Important products obtained from esters include biodiesel, soap and glycerol.
3.10 Aromatic Chemistry	Aromatic chemistry takes benzene as an example of this type of molecule and looks at the structure of the benzene ring and its substitution reactions.
3.11 Amines	Amines are compounds based on ammonia where hydrogen atoms have been replaced by alkyl or aryl groups. This section includes their reactions as nucleophiles.
3.12 Polymers	The study of polymers is extended to include condensation polymers. The ways in which condensation polymers are formed are studied, together with their properties and typical uses. Problems associated with the reuse or disposal of both addition and condensation polymers are considered.
3.13 Biochemical Molecules	Amino acids, proteins and DNA are the molecules of life. In this section, the structure and bonding in these molecules and the way they interact is studied. Drug action is also considered.
3.14 Organic Synthesis	The formation of new organic compounds by multi-step syntheses using reactions included in the specification is covered in this section.
3.15 Nuclear Magnetic Resonance Spectroscopy	Chemists use a variety of techniques to deduce the structure of compounds. In this section, nuclear magnetic resonance spectroscopy is added to mass spectrometry and infrared spectroscopy as an analytical technique. The emphasis is on the use of analytical data to solve problems rather than on spectroscopic theory.
3.16 Chroma- tography	Chromatography provides an important method of separating and identifying components in a mixture. Different types of chromatography are used depending on the composition of mixture to be separated.

#### Text Books

There are a variety of different books that you can use to study A level Chemistry. We recommend the Oxford Chemistry A Level text book as your main course companion. Other useful books include the CGP AQA Year 1 & 2 Complete revision and CGP Essential Maths Skills for A Level Chemistry.

You will find other text books in the school library, it is useful to look topics up in more than one book when you find something difficult.



# How your course is structured:

Year 12			
<ul><li>Physical Chemistry</li><li>Atomic Structure</li><li>Amount of Substance</li></ul>	Inorganic Chemistry <ul> <li>Periodicity</li> </ul>	<ul> <li>Organic Chemistry</li> <li>Introduction to Organic Chemistry</li> <li>Alkanes</li> </ul>	
	Christmas Holidays		
<ul><li>Physical Chemistry</li><li>Bonding</li><li>Energetics</li><li>Kinetics</li></ul>	Inorganic Chemistry • Group 2 Elements	Organic Chemistry Halogenalkanes Alkenes	
	Easter Holidays		
<ul><li>Physical Chemistry</li><li>Equilibria</li><li>Redox Reactions</li></ul>	Inorganic Chemistry <ul> <li>Group 7 Elements</li> </ul>	Organic Chemistry <ul> <li>Alcohols</li> <li>Organic Analysis</li> </ul>	
Summer Holidays			
	Year 13		
<ul> <li>Physical Chemistry</li> <li>Rate Equations</li> <li>Thermodynamics</li> <li>Equilibrium Constants</li> </ul>	Inorganic Chemistry <ul> <li>Transition Metals</li> </ul>	Organic Chemistry <ul> <li>Optical Isomerism</li> <li>Aldehydes and</li> <li>Ketones</li> <li>Carboxylic Acids</li> </ul>	
	Christmas Holidays		
<ul><li>Physical Chemistry</li><li>Acids and Bases</li></ul>	Inorganic Chemistry <ul> <li>Ions in Aqueous</li> <li>Solution</li> </ul>	Organic Chemistry <ul> <li>Aromatic Chemistry</li> <li>Amines</li> <li>Polymers</li> <li>Biochemical Molecules</li> </ul>	
Easter Holidays			
<ul> <li>Physical Chemistry</li> <li>Electrode Potentials and Electrochemical Cells</li> </ul>	<ul><li>Inorganic Chemistry</li><li>Period 3 Oxides</li></ul>	Organic Chemistry <ul> <li>Organic Synthesis</li> <li>nmr Spectroscopy</li> <li>Chromatography</li> </ul>	