

Pearson Edexcel AS and A level Chemistry

What's Changed?

Level	Topic	Spec Points	New Content Included	Content Not Included in the New Specification	Implications of the New Spec
AS	Topic 1 : Structure of the Atom and the Periodic Table	1-5			Greater clarity in terms of requirements for structure of the atom
AS	Topic 1 : Structure of the Atom and the Periodic Table	9	Predict mass spectra of diatomic molecules, including relative peak heights		
AS	Topic 1 : Structure of the Atom and the Periodic Table			Describe how a mass spectrometer works	
AS	Topic 1 : Structure of the Atom and the Periodic Table			Describe uses of mass spectrometers	
AS	Topic 1 : Structure of the Atom and the Periodic Table	15	Understand the fact that atomic emission spectra provide evidence for the existence of quantum shells		Could be linked to observations from flame tests
AS	Topic 1 : Structure of the Atom and the Periodic Table	17, 19	Specific requirement that candidates know each orbital holds up to two electrons		
AS	Topic 1 :	20			Additional detail to

	Structure of the Atom and the Periodic Table				exemplify specification requirements with regard to spin states in shells
AS	Topic 2A : Bonding	2	Understand the effects of ionic radius and charge on ionic bonding		Now an explicit statement rather than implied
AS	Topic 2A : Bonding	5	Understand reasons for trends in ionic radii		Emphasis on understanding such trends, rather than simply recalling them
AS	Topic 2A : Bonding	8			Examples of the kind of substances candidates may be expected to draw dot-and-cross diagrams for
AS	Topic 2A : Bonding			Born – Haber Cycles	Born-Haber cycles are now in the A level specification, but not the AS
AS	Topic 2A : Bonding	18,19	Properties of water due to hydrogen bonding		
AS	Topic 2B : Structure	25	Structure of graphene	Structure and applications of fullerenes and carbon nanotubes	
AS	Topic 2B : Structure	26, 27	Make predictions about bonding, structure and physical properties from given information		This was implied in the previous specification but is now summarised in parts 26 and 27
AS	Topic 4B : Group 7	9	Understand trends in physical properties in Group 7	No requirement to recall appearance of elements	Emphasis on understanding such trends, rather than simply recalling them
AS	Topic 4B : Group	10, 11	Understand trend in reactivity of		Emphasis on

	7		Group 7 elements		understanding such trends, rather than simply recalling them
AS	Topic 4B : Group 7			Iodine / thiosulfate titrations	Redox titrations are in the A level specification, not the AS
AS	Topic 4C : Analysis of Inorganic Compounds		Know reactions, including equations, for identifying; <ul style="list-style-type: none"> • carbonate ions • hydrogencarbonate ions • sulfate ions • ammonium ions 		Tests for halide ions are covered in Topic 4B
AS	Topic 5 : Formulae, Equations and Amounts of Substance	5	Be able to calculate empirical and molecular formulae from experimental data, including use of $pV=nRT$ for gases and volatile liquids	Understanding of the term 'parts per million'	Unit conversion may be required with $pV=nRT$
AS	Topic 5 : Formulae, Equations and Amounts of Substance			Specific requirement to carry out an experiment to find a formula or make a salt	Although not explicit in the new specification such experiments may form part of a comprehensive Scheme of Work
AS	Topic 6A : Introduction to Organic Chemistry	1-7			This is not an addition to the specification; it merely brings together key concepts into one section, rather than across several sections. Centres can decide whether to teach all this content initially, or

					introduce it during the teaching of particular functional groups
AS	Topic 6B: Alkanes	11-13	Understanding of specific pollutants formed during combustion of fuels and role of catalytic converters in reducing impact	Generic section on 'Green Chemistry' and role of CO ₂ in climate change	
AS	Topic 6B : Alkanes	17	Limitations of use of radical reactions in synthesis	Radical reactions in the Ozone Layer	Extension of radical mechanism to show formation of further substitution products
AS	Topic 6C : Alkenes	22 iv	Reaction of steam (with acid catalyst) to form alcohols		
AS	Topic 6C : Alkenes	24	Knowledge of relative stabilities of carbocations in electrophilic addition reactions is expected	Addition of Br and OH during reaction between alkenes and Br ₂ (aq)	
AS	Topic 6C : Alkenes	27, 29	Greater clarification of expectations required regarding the role of chemists in the sustainable use of polymers	Generic sections on 'Green Chemistry'	
AS	Topic 6D : Halogenoalkanes	32 iii	Reactions of halogenoalkanes with potassium cyanide to form nitriles	Discuss the uses of halogenoalkanes	Example of a reaction that is used to increase length of a carbon chain
AS	Topic 6E : Alcohols	38 ii	Specific guidance on halogenating agents for chloro-, bromo- and iodoalkanes	Understand why a metal halide and c.H ₂ SO ₄ is not used when making bromo- or iodoalkanes	
AS	Topic 6E : Alcohols	38 iv	Elimination reaction to form alkenes	Reaction of alcohols with sodium	
AS	Topic 6E : Alcohols	39	Extension of required practical techniques to allow preparation of a dry organic liquid (solvent extraction and drying)		
AS	Topic 7 : Modern Analytical			Only molecules that change their polarity can absorb IR.	

	Techniques I			IR absorption and greenhouse gases Use of IR to follow progress of reactions	
AS	Topic 8 : Energetics I	1	Standard conditions clearly defined	Recall definition of enthalpy change of atomisation	Atomisation is not required as Born-Haber cycles are no longer in AS. It is required in the A level
AS	Topic 9 : Kinetics I	1-9	Movement of some content from year 2 to year 1 in order to show progression in use of collision theory from GCSE		Quantitative treatment of graphs to determine rate of reaction using gradients
AS	Topic 10 : Equilibrium I	3	Evaluate data to explain need for a compromise between rate and yield		Similar to study of Haber Process in many GCSE courses
AS	Topic 10 : Equilibrium I	4	Deduce an expression for K_c		Calculations using K_c not expected at AS
A level	Topic 11 : Equilibrium II			Steps taken in industry to maximise atom economy and control reactions under economically viable conditions	
A level	Topic 12 : Acid-Base Equilibria	23	Understand difference in enthalpy change of neutralisation values for strong and weak acids	History of development of theories about acidity	Could be incorporated into Energetics II
A level	Topic 12 : Acid-Base Equilibria	24	Specific emphasis on role of carbonic acid and hydrogencarbonate ions in maintaining blood pH, rather than one of several possible examples	Role of buffers in food to prevent deterioration due to pH change	
A level	Topic 13A : Lattice Energy	1-8	Born-Haber Cycles		Not actually new to the specification but

					previously was in AS
A level	Topic 13B : Entropy	18-21	Calculation and use of Gibbs Free Energy to determine reaction feasibility		It will be helpful to link ΔS_{total} to ΔG
A level	Topic 14 : Redox II	6, 8-9	Clarification that candidates are expected to know how to set up a range of cells, represent them as cell diagrams and appreciate that changes in conditions will effect electrode potential		
A level	Topic 14 : Redox II	15	Understand the application of electrode potentials to storage cells	Demonstrate an understanding of the principles in modern breathalysers	No specific recall required of particular storage cells
A level	Topic 15A : Principles of Transition Metal Chemistry	10	Understand that colour changes in d-block metal ions depends on changes in oxidation number, ligand and coordination number	Discuss the evidence for electronic configurations of Sc to Zn in terms of successive ionisation energies	
A level	Topic 15A : Principles of Transition Metal Chemistry	4, 11-12, 17	Specific requirement to show understanding of the terms ligand and coordination number		This is now explicit rather than implied as in the previous specification. Understanding of terms such as monodentate, bidentate and multidentate is expected
A level	Topic 15A : Principles of Transition Metal Chemistry	16, 18-19	Specific role of cis-platin and haemoglobin in biological systems	Generic statement about uses of transition metals Development of new catalysts from transition metal / transition metal compounds	Knowledge of the structure of haem-group is not required
A level	Topic 15B : Reactions of Transition Metal	20-21	Redox reactions of vanadium	Reactions of Mn(II) and Zn(II) with NaOH(aq) and NH ₃ (aq)	Use of E_{cell} to predict reagents to carry out stepwise reduction of

	Elements				VO_2^+ to V^{2+}
A level	Topic 15B : Reactions of Transition Metal Elements	22-23	Specific description of reactions of chromium in different oxidation states	Generic statement 'study the redox chemistry of Cr(VI), Cr(III) and Cr(II)'	
A level	Topic 15B : Reactions of Transition Metal Elements	26	Specific description of ligand substitution reactions of copper	Generic statement 'investigate ligand exchange in copper complexes'	
A level	Topic 15B : Reactions of Transition Metal Elements	31-35	Specific description of catalytic processes involving transition elements and their compounds reactions of copper	Generic statement regarding catalytic behaviour and development of new catalysts	Emphasis on understanding these specific catalytic processes rather than recalling them
A level	Topic 17C: Carboxylic Acids			Esterification reactions in production of biodiesel and low-fat spreads	
A level	Topic 18A : Arenes - Benzene	2	Use of bonding model and bond lengths, in addition to hydrogenation data, to support delocalised model in benzene	X-ray diffraction and IR data to support delocalised model in benzene	
A level	Topic 18A : Arenes - Benzene	3	Resistance of benzene ring to bromination compared with alkenes	Reactions with fuming sulphuric acid and addition reactions (other than as evidence for structure)	
A level	Topic 18B: Amines, amides, amino acids and proteins	10	Understand reasons for differences in basicity of amines, given suitable data	Characteristic smell of amines	
A level	Topic 18B: Amines, amides, amino acids and proteins	11	Preparation of primary aliphatic amines	Preparation of azo-dyes Physical properties of polyamides	
A level	Topic 18C: Organic Synthesis	20	Use of Grignard Reagents to increase carbon chain length	Generic statement regarding importance of synthesis in research Combinatorial Chemistry	
A level	Topic 19A: Mass	1	Use of accurate molecular masses		e.g. similar products

	spectroscopy		from mass spectra to distinguish between possible structures		with the same M_r when expressed as a whole number, but different M_r when calculated to 4 d.p
A level	Topic 19B: Nuclear Magnetic Resonance	2-3	Use of ^{13}C NMR to find information about positions of carbon atoms in a molecule		As ^{13}C NMR spectra are simpler to interpret, it is suggested that it is studied before ^1H NMR
A level	Topic 19B: Nuclear Magnetic Resonance	5	Use of relative peak areas to identify number of protons in a particular environment Predict chemical shifts and splitting patterns in a given molecule	Effect of radio waves on nuclei Uses of NMR in medicine; e.g. non-invasive scanning Uses of microwaves for heating	No requirement to explain how NMR works Note: IR is not described in Topic 19, but is present in topic 7 (AS or A level Year 1)
A level	Topic 19C: Chromatography	7	Be able to calculate R_f values		