

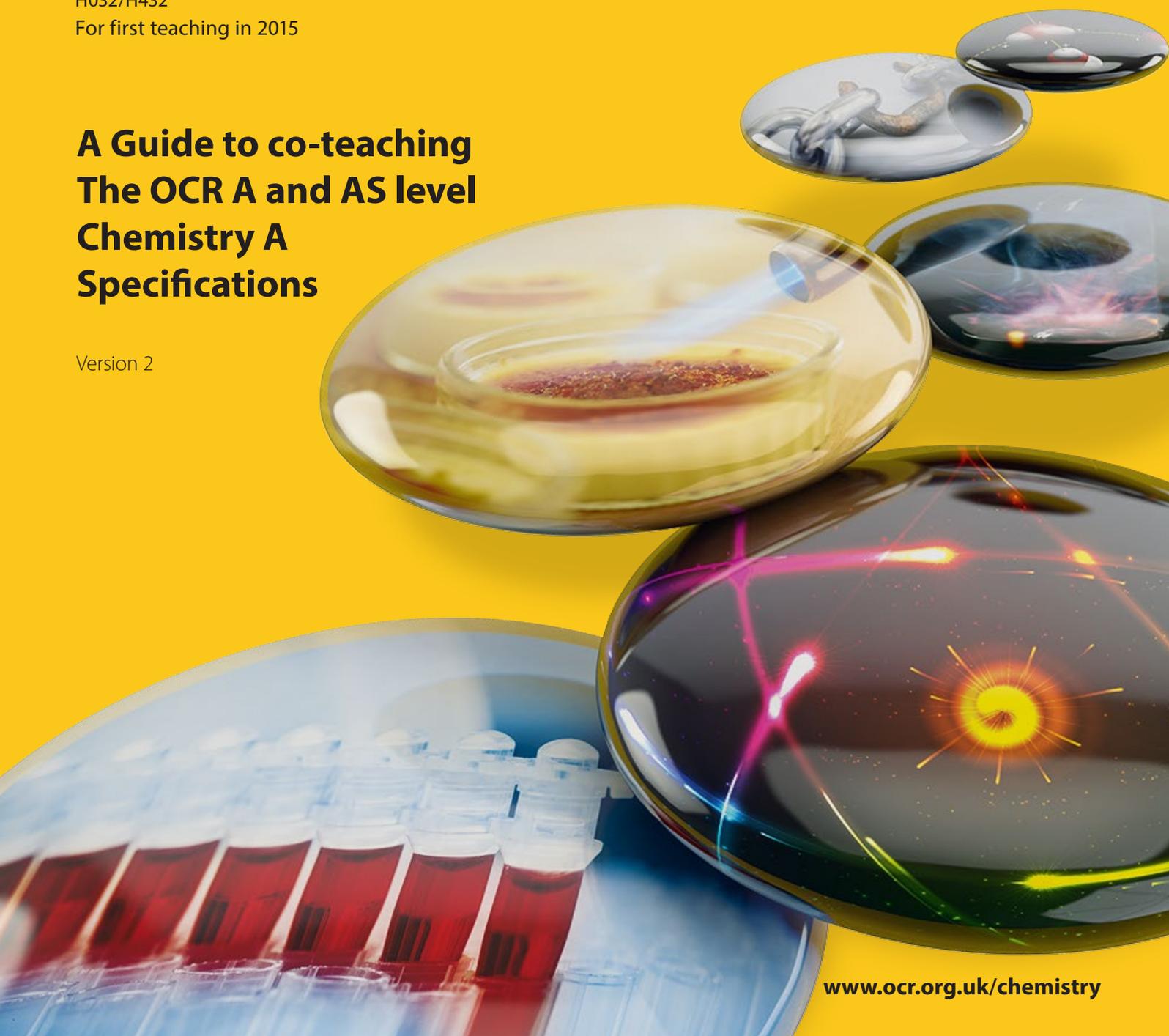
AS and A LEVEL
Co-teach Guide

CHEMISTRY A

H032/H432
For first teaching in 2015

**A Guide to co-teaching
The OCR A and AS level
Chemistry A
Specifications**

Version 2



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INTRODUCTION

The OCR AS and A Level specifications in Chemistry A are deliberately structured to facilitate co-teaching. As such they have been designed to be as accessible as possible for teachers.

- Both AS and A level specifications share the same: Assessment Objectives, assessment aims and learning outcomes. There is the same approach to the subject apparent at each level.
- The content of the AS Level specification is a subset of the content of the A Level specification, which can be taught in the first year of the A Level course. This allows AS and A Level learners to be taught together throughout the first year until the AS assessments.
- Assessment will contain the same question types (multiple choice questions, structured questions, extended response questions), allowing similar materials to be used in revision and exam preparation.
- The creative and innovative teaching and learning resources being developed by OCR will be equally useful for AS and A Level learners in the first year.



THE NEW QUALIFICATIONS

The AS in Chemistry A is a separate qualification to the GCE A Level in the subject. Its structure does, however, reflect that of the A Level. The content of the A Level in Chemistry A is divided into 6 teaching modules. The content of the AS Level in Chemistry A consists of the first four teaching modules of the full A level, with exception of the internally assessed practical skills covered in Module 1.

Learners are not required to sit the AS Level before proceeding to the A Level, as in the current 'legacy' system. If learners do take the AS Level and then move on to the A Level, this means that they will be reassessed on material that they have already covered at AS. The experience of sitting the AS Level could therefore be useful practice for taking the A Level components. This is true in terms of question types as well as content, as can be seen from the summaries of the papers for each qualification in the table below.

	AS paper 1 Breadth in chemistry	AS Paper 2 Depth in Chemistry	A level Paper 1 Periodic table, elements and physical chemistry	A level Paper 2 Synthesis and analytical techniques	A level Paper 3 Unified chemistry
Length/marks	1.5 hours/70	1.5 hours/70	2.25 hours/100	2.25 hours/100	1.5 hours/70
Multiple choice	20 marks	–	15 marks	15 marks	–
Structured questions	Yes	Yes	Yes	Yes	Yes
Extended response	No	Yes	Yes	Yes	Yes
Practical questions	Yes	Yes	Yes	Yes	Yes
Specification coverage	Section 1.1, Modules 2–4		Section 1.1, Modules 2,3,5	Section 1.1, Modules 2,4,6	Section 1.1, Modules 2–6

In addition to the three externally assessed examinations, the A Level assessment includes the Practical Endorsement, which is internally assessed by the centre and externally moderated. The Practical Endorsement is reported separately from the overall grade issued for the A Level, which is determined by performance in the examinations.

PRACTICAL SKILLS

Ofqual has decided that there will be no direct assessment of practical skills in AS Chemistry qualifications. There is therefore no internally assessed practical assessment in the OCR AS model. This does not mean that the development of practical skills should not form part of the teaching and learning at this level. Practical skills will be assessed in the written examinations at both AS and A Level.

OCR have embedded practical skills into the AS and A Level Chemistry A specifications, so that practical activities may be easily integrated into the teaching of the course, and will support the teaching and assessment of the content of both

AS and A Level Chemistry. AS learners will benefit from taking part in the practical activities, and will be able to count their performance (as long as adequate records are kept) towards the A Level Practical Endorsement if they decide to proceed to the full A Level after taking the AS examinations. OCR recommends that AS learners join in with any Practical Endorsement activities undertaken in the first year of the A Level course.

SUMMARY

Taken together, these factors all ensure that the AS and A Level in Chemistry A can be co-taught such that members of the same Year 12 (or equivalent) teaching group are able to follow the same Scheme of Learning – delivered by the same teacher or teachers – whether individual learners are planning:

- **either** to sit the subject at AS and then drop it completely
- **or** to sit AS Chemistry A with a view to going on to take A Level the following year
- **or** to go through to take A Level without sitting the AS exams at the 'half-way' stage.



SUGGESTED PLANNER

Below are two possible planners for teaching both years of the course, with the AS course co-taught alongside the first year of A Level. The first planner assumes a single teacher delivering the entire course, while the second planner assumes the course is delivered by two teachers with the content split equally. These planners will need to be adapted to fit the needs of the individual centre. It should always be possible to teach the AS and A Level at the same time within a centre.

Following these two planners is a third, which offers a suggestion for how to plan the A Level course if AS will *not* be co-taught.

N.B. In the tables the abbreviation 'PAG' stands for 'Practical Activity Group', and refers to the groups defined in appendix 5g of the A Level specification.

PLANNER 1: AS AND A LEVEL CO-TAUGHT BY ONE TEACHER

Timeline	Content	Notes
Throughout course	Module 1 – Development of practical skills in chemistry	Teaching of Specification Section 1.1 – Practical skills assessed in a written examination should be embedded in teaching throughout via supporting practical work, ideally combined with teaching of the practical techniques and procedure included in Modules 2–6. Carefully chosen practical work can be used to develop and assess competency in practical skills as part of the Practical Endorsement, as outlined in section 1.2.
Year 1, Term 1	Module 2 – Foundations in chemistry	Supporting practical work: <ul style="list-style-type: none"> • experiments requiring measurement of mass and volume (liquids, solutions and gases), and calculations related to amount of substance (PAG1) • (redox) reactions of acids • acid–base titrations (PAG2)
	Module 3, Section 3.1 – The periodic table	Supporting practical work: <ul style="list-style-type: none"> • reactions of Group 2 elements • reactions of halogens and halide displacement reactions • qualitative analysis of inorganic ions (PAG4)
Year 1, Term 2	Module 3, Section 3.2 – Physical chemistry	Supporting practical work: <ul style="list-style-type: none"> • determination of enthalpy changes (PAG3) • investigation of reaction rates (more extensive work on reaction rates in the second year of A Level will count towards PAG9 and PAG10) • investigation of changes to the position of equilibrium in response to changes in concentration, temperature and in the presence of a catalyst



Timeline	Content	Notes
Year 1, Term 2 (continued)	Module 4, Section 4.1 – Basic concepts and hydrocarbons; start Section 4.2 – Alcohols, haloalkanes and analysis	Sections 4.2.1 and 4.2.2 Supporting practical work: <ul style="list-style-type: none"> • reaction of bromine with cyclohexane and cyclohexene • reactions of alcohols • reactions of haloalkanes • qualitative analysis of organic functional groups (PAG7; more work may be done in the second year of A Level)
Year 1, Term 3	Module 4, complete Section 4.2	Sections 4.2.3 and 4.2.4 Supporting practical work: <ul style="list-style-type: none"> • synthesis and purification of an organic liquid (PAG5)
	Revision and preparation for AS exams	A Level learners not taking AS exams might use this period to consolidate A Level study at the midpoint of the course, or to complete trial exams as an indicator of progress. Additionally, learners might be given more extensive practical work – e.g. a more extended organic synthesis including risk assessment and analysis – to complete while AS candidates are revising; this will benefit skills development for the Practical Endorsement. Another strategy might be to study Module 5 Rates and to complete one of the rates investigations for the Practical Endorsement.
	Post AS exams	A Level learners (and AS candidates who are considering continuing with A Level) might start on the A Level modules.
Year 2, Term 1	Module 5 – Physical chemistry and transition elements	Supporting practical work: <ul style="list-style-type: none"> • investigation of reaction rates using both initial rate and continuous monitoring methods (PAG9, PAG10) • determination of quantities present in a mixture at equilibrium • measurement of pH (PAG11) • redox titrations • measurement of cell potentials (PAG8) • ligand substitution, precipitation and redox reactions for transition metal ions and complexes
Year 2, Term 2	Module 6 – Organic chemistry and analysis	Supporting practical work: <ul style="list-style-type: none"> • reactions of carbonyl compounds and esters • qualitative analysis of organic functional groups (PAG7) • synthesis and purification of an organic solid (PAG6) • completion of Practical Endorsement (if required; PAG12 if not yet completed)



Timeline	Content	Notes
Year 2, Term 3	Thorough revision and consolidation of all A Level content	Exam preparation

N.B. Centres may wish to switch teaching of Modules 5 and 6 in Year 2, enabling a more natural transition between the organic chemistry modules.

PLANNER 2: AS AND A LEVEL CO-TAUGHT BY TWO TEACHERS

Timeline	Content	Notes	
Throughout course	Module 1 – Development of practical skills in chemistry	Teaching of Specification Section 1.1 – Practical skills assessed in a written examination should be embedded in teaching throughout via supporting practical work, ideally combined with teaching of the practical techniques and procedures included in Modules 2–6. Carefully chosen practical work can be used to develop and assess competency in practical skills as part of the Practical Endorsement, as outlined in Section 1.2.	
	Teacher 1	Teacher 2	
	Content	Content	Notes
Year 1, Term 1	Module 2, Section 2.1.1 – Atomic structure and isotopes Section 2.1.3 – Amount of substance Section 2.1.4 – Acids	Module 2, Section 2.1.2 – Compounds, formulae and equations Section 2.2 – Electrons, bonding and structure Section 2.1.5 – Redox	Supporting practical work: • experiments requiring measurement of mass and volume (liquids, solutions and gases), and calculations related to amount of substance (PAG1) • reactions of acids • acid–base titrations (PAG2) Ideally, both teachers would finish teaching of Module 2 at the same time.
	Module 3, Section 3.1.1 – Periodicity Section 3.1.2 – Group 2	Module 4, Section 4.1.1 – Basic concepts of organic chemistry	Supporting practical work: • reactions of Group 2 elements Some practicals to support content in Teacher 1 strand could be carried out by Teacher 2 to break up the content in this strand.



Timeline	Content	Notes		
Year 1, Term 2	Module 3, Remainder of Section 3.1 Section 3.2.1 – Enthalpy changes Section 3.2.2 – Reaction rates	Supporting practical work: <ul style="list-style-type: none"> reactions of halogens and halide displacement reactions qualitative analysis of inorganic ions (PAG4) determination of enthalpy changes (PAG3) investigation of reaction rates (more extensive work on reaction rates in the second year of A Level will count towards PAG9 and PAG10) 	Module 4, Remainder of Section 4.1 Section 4.2.1 – Alcohols Section 4.2.2 – Haloalkanes	Supporting practical work: <ul style="list-style-type: none"> reaction of bromine with cyclohexane and cyclohexene reactions of alcohols reactions of haloalkanes qualitative analysis of organic functional groups (PAG7; more work may be done in the second year of A Level)
Year 1, Term 3	Module 3, Section 3.2.3 – Chemical equilibrium	Suggested practical work: <ul style="list-style-type: none"> investigation of changes to the position of equilibrium in response to changes in concentration, temperature and in the presence of a catalyst 	Module 4, Remainder of Section 4.2	Suggested practical work: <ul style="list-style-type: none"> synthesis of an organic liquid (PAG5)
	Revision and preparation for AS exams	<p>A Level learners not taking AS exams might use this period to consolidate A Level study at the midpoint of the course, or to complete trial exams as an indicator of progress.</p> <p>Additionally, learners might be given more extensive practical work – e.g. a more extended organic synthesis including risk assessment and analysis – to complete while AS candidates are revising; this will benefit skills development for the Practical Endorsement.</p> <p>Another strategy might be to study Module 5 Rates and to complete one of the rates investigations for the Practical Endorsement.</p>		
	Post AS exams	A Level learners (and AS candidates who are considering continuing with A Level) might start on the A Level modules.		



Timeline	Content		Notes	
Year 2, Term 1	Module 5, Section 5.1 – Rates, equilibrium and pH	Suggested practical work: <ul style="list-style-type: none"> investigation of reaction rates using both initial rate and continuous monitoring methods (PAG9, PAG10) determination of quantities present in a mixture at equilibrium measurement of pH (PAG11) 	Module 6, Section 6.1 – Aromatic compounds, carbonyls and acids Section 6.2.1 - Amines	Suggested practical work: reactions of carbonyl compounds and esters qualitative analysis of organic functional groups (PAG7)
Year 2, Term 2	Module 5, Section 5.2 – Energy Section 5.3 – Transition elements	Suggested practical work: <ul style="list-style-type: none"> redox titrations measurement of cell potentials (PAG8) ligand substitution, precipitation and redox reactions qualitative analysis of inorganic ions (PAG4) completion of Practical Endorsement (if required; PAG12 if not yet completed). 	Module 6, Remainder of Section 6.2 Section 6.3 – Analysis	Suggested practical work: <ul style="list-style-type: none"> synthesis of an organic solid (PAG6) qualitative analysis of organic functional groups (PAG7) completion of Practical Endorsement (if required; PAG12 if not yet completed).
Year 2, Term 3	Thorough revision and consolidation of all A Level content.	Exam preparation	Thorough revision and consolidation of all A Level content.	Exam preparation



PLANNER 3: LINEAR A LEVEL NOT CO-TAUGHT WITH AS

The following planner is intended to be very flexible. It illustrates how teaching of topics from Modules 3 and 5 (inorganic and physical chemistry), as well as topics from Modules 4 and 6 (organic and analytical chemistry) can be combined in a logical way. The order of the various topics can easily be changed to alternate the two strands; alternatively, the planner is straightforward to adapt for delivery by two teachers, with one teaching inorganic/physical and the other organic/analytical. In that case, see Planner 2 for a suggestion on how to split teaching of Module 2.

Timeline	Content	Notes
Throughout course	Module 1 – Development of practical skills in chemistry	Teaching of Specification Section 1.1 – Practical skills assessed in a written examination should be embedded in teaching throughout via supporting practical work, ideally combined with teaching of the practical techniques and procedures included in Modules 2–6. Carefully chosen practical work can be used to develop and assess competency in practical skills as part of the Practical Endorsement, as outlined in Section 1.2.
Year 1, Term 1	Module 2 – Foundations in chemistry	Supporting practical work: <ul style="list-style-type: none"> • experiments requiring measurement of mass and volume (liquids, solutions and gases), and calculations related to amount of substance (PAG1) • (redox) reactions of acids • acid–base titrations (PAG2).
	Module 3, Section 3.1 – The periodic table	Complete Sections 3.1.1, 3.1.2 and 3.1.3. Supporting practical work: <ul style="list-style-type: none"> • reactions of Group 2 elements • reactions of halogens and halide displacement reactions.
Year 1, Term 2	Module 5, start Section 5.2.3 – Redox and electrode potentials; Section 5.3 – Transition elements	From Section 5.2.3 only Redox and Redox titrations, to follow on from the redox content in Section 3.1. Supporting practical work: <ul style="list-style-type: none"> • redox titrations • ligand substitution, precipitation and redox reactions for transition metal ions and complexes.
	Module 3, Section 3.1.4 – Qualitative analysis; Module 5, Section 5.3.2 – Qualitative analysis	Supporting practical work: <ul style="list-style-type: none"> • qualitative analysis of inorganic ions (PAG4).



Timeline	Content	Notes
Year 1, Term 2 (continued)	Module 3, Section 3.2.1 – Enthalpy changes; Module 5, complete Section 5.2 – Energy	Combined teaching of all content on energetics. Supporting practical work: <ul style="list-style-type: none"> determination of enthalpy changes (PAG3).
	Module 3, Section 3.2.2 – Reaction rates	Supporting practical work: <ul style="list-style-type: none"> investigations of reaction rates.
Year 1, Term 3	Module 5, Section 5.1.1 – How fast?	Supporting practical work: <ul style="list-style-type: none"> investigation of reaction rates using both initial rate and continuous monitoring methods (PAG9, PAG10).
	Module 3, Section 3.2.3 – Chemical equilibrium; Module 5, Section 5.1.2 – How far?; Section 5.1.3 – Acids, bases and buffers	Combined teaching of all content on equilibrium, extending into acid–base equilibria. Supporting practical work: <ul style="list-style-type: none"> investigation of changes to the position of equilibrium in response to changes in concentration, temperature and in the presence of a catalyst determination of quantities present in a mixture at equilibrium measurement of pH (PAG11).
	Module 5, complete Section 5.2.3 – Redox and electrode potentials	Electrode potentials and Storage and fuel cells. Supporting practical work: <ul style="list-style-type: none"> measurement of cell potentials (PAG8).
	End-of-first year tests/mocks	
Year 2, Term 1	Module 4, Section 4.1 – Basic concepts and hydrocarbons	Supporting practical work: <ul style="list-style-type: none"> reaction of bromine with cyclohexane and cyclohexene.



Timeline	Content	Notes
Year 2, Term 1 (continued)	Module 4, Section 4.2.2 – Haloalkanes	Supporting practical work: • reactions of haloalkanes.
	Module 4, Section 4.2.1 – Alcohols; Module 6, Section 6.1.2 – Carbonyl compounds; Section 6.1.3 – Carboxylic acids and esters	Combined teaching of oxygen-containing organic classes. Supporting practical work: • reactions of alcohols • reactions of carbonyl compounds and esters.
Year 2, Term 2	Module 6, Section 6.1.1 – Aromatic compounds	
	Module 6, Section 6.2 – Nitrogen compounds, polymers and synthesis	Complete Sections 6.2.1, 6.2.2, 6.2.3 and 6.2.4.
	Module 4, Section 4.2.3 – Organic synthesis; Module 6, Section 6.2.5 – Organic synthesis	Supporting practical work: • synthesis of an organic liquid (PAG5) • synthesis of an organic solid (PAG6).



Timeline	Content	Notes
	Module 6, Section 6.3.1 – Chromatography and qualitative analysis; Module 4, Section 4.2.4 – Analytical techniques; Module 6 Section 6.3.2 – Spectroscopy	Teaching of all analytical techniques combined. Section 6.3.1 placed first so qualitative analysis follows from organic chemistry, and to allow combination of all content on spectroscopic techniques. Supporting practical work: <ul style="list-style-type: none">• qualitative analysis of organic functional groups (PAG7)• completion of Practical Endorsement (if required; PAG12 if not yet completed).
Year 2, Term 3	Thorough revision and consolidation of all A Level content	Exam preparation





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