A level Chemistry
Summer Transition Work

The Pearson Edexcel International Advanced Subsidiary in Chemistry and the Pearson Edexcel International Advanced Level in Chemistry are part of a suite of International Advanced Level qualifications offered by Pearson. These qualifications are not accredited or regulated by any UK regulatory body.

Structure

The Pearson Edexcel International Advanced Subsidiary in Chemistry and the Pearson Edexcel International Advanced Level in Chemistry are modular qualifications. The Advanced Subsidiary can be claimed on completion of the International Advanced Subsidiary (IAS) units. The International Advanced Level can be claimed on completion of all the units (IAS and IA2 units).

Content

The content is relevant for students who have achieved a GCSE in Chemistry and who want to study the subject at a higher level. The content has been updated from the previous Pearson Edexcel International Advanced Subsidiary in Chemistry and Pearson Edexcel International Advanced Level in Chemistry qualifications. It covers major chemistry topics, including molar calculations, structure and bonding, energetics, rates, equilibria, Group chemistry, transition metals and a range of organic chemistry; and associated experimental skills.

Assessment

Assessment consists of three written papers at IAS level that are externally assessed. The International A level consists of three further written papers that are externally assessed.

Qualification aims and objectives

The aims and objectives of these qualifications are to enable students to develop:

- essential knowledge and understanding of different areas of the subject and how they relate to each other
- a deep appreciation of the skills, knowledge and understanding of scientific methods
- competence and confidence in a variety of practical, mathematical and problem-solving skills
- their interest in and enthusiasm for the subject, including developing an interest in further study and careers associated with the subject.
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Qualification overview

Pearson Edexcel International Advanced Subsidiary in Chemistry This qualification consists of three externally examined units. The International Advanced Subsidiary (IAS) is the first half of the International Advanced Level qualification and consists of three IAS units – Units 1, 2 and 3. This qualification can be awarded as a discrete qualification or can contribute 50% towards the International Advanced Level qualification. The qualification will include questions that target mathematics at Level 2 or above (see Appendix 6: Mathematical skills and exemplifications). Overall, a minimum of 20% of the marks across the papers will be awarded for mathematics at Level 2 or above.

Pearson Edexcel International Advanced Level in Chemistry This qualification consists of six externally examined units. The International Advanced Level consists of the three IAS units (Units 1, 2 and 3) plus three IA2 units (Units 4, 5 and 6). Students wishing to take the International Advanced Level must, therefore, complete all six units. The qualification will include questions that target mathematics at Level 2 or above (see Appendix 6: Mathematical skills and exemplifications). Overall, a minimum of 20% of the marks across the papers will be awarded for mathematics at Level 2 or above.

IAS **Unit 1: Structure, Bonding and Introduction to Organic Chemistry**	***Unit code: WCH11/01**	
Externally assessed Written examination: 1 hour and 30 minutes Availability: January, June and October First assessment: January 2019 80 marks	40% of the total IAS	20% of the total IAL

Content overview

- Formulae, Equations and Amount of Substance
- Atomic Structure and the Periodic Table
- Bonding and Structure
- Introductory Organic Chemistry and Alkanes
- Alkenes

Assessment overview

- This paper has two sections:
  - Section A: multiple choice questions
  - Section B: mixture of short-open, open-response and calculation questions.
- This paper will include a minimum of 18 marks that target mathematics at Level 2 or above (see *Appendix 6: Mathematical skills and exemplifications*).
- Students will be expected to apply their knowledge and understanding of experimental methods in familiar and unfamiliar contexts.

IAS **Unit 2: Energetics, Group Chemistry, Halogenoalkanes and Alcohols**	***Unit code: WCH12/01**	
Externally assessed Written examination: 1 hour and 30 minutes Availability: January, June and October First assessment: June 2019 80 marks	40% of the total IAS	20% of the total IAL

Content overview

- Energetics
- Intermolecular Forces
- Redox Chemistry and Groups 1, 2 and 7
- Introduction to Kinetics and Equilibria
- Organic Chemistry: Alcohols, Halogenoalkanes and Spectra

Assessment overview

- This paper has three sections:
  - Section A: multiple choice questions
  - Section B: mixture of short-open, open-response, calculations and extended-writing questions
  - Section C: contemporary context question.
- This paper will contain questions that require information from the Data Booklet (see *Appendix 9*).
- This paper will include a minimum of 18 marks that target mathematics at Level 2 or above (see *Appendix 6: Mathematical skills and exemplifications*).
- Students will be expected to apply their knowledge and understanding of experimental methods in familiar and unfamiliar contexts.
- This paper may contain some synoptic questions which require knowledge and understanding from Unit 1.

IAS **Unit 3: Practical Skills in Chemistry I**	***Unit code: WCH13/01**	
Externally assessed Written examination: 1 hour and 20 minutes Availability: January, June and October First assessment: June 2019 50 marks	20% of the total IAS	10% of the total IAL

Content overview

Students are expected to develop experimental skills, and a knowledge and understanding of experimental techniques, by carrying out a range of practical experiments and investigations while they study Units 1 and 2.

This unit will assess students' knowledge and understanding of experimental procedures and techniques that were developed in Units 1 and 2.

Assessment overview

- This paper may include short-open, open-response and calculation questions.
- This paper will include a minimum of 6 marks that target mathematics at Level 2 or above (see *Appendix 6: Mathematical skills and exemplifications*).
- Students will be expected to apply their knowledge and understanding of practical skills to familiar and unfamiliar situations.

IA2 **Unit 4: Rates, Equilibria and Further Organic Chemistry**	***Unit code: WCH14/01**	
Externally assessed Written examination: 1 hour and 45 minutes Availability: January, June and October First assessment: January 2020 90 marks	40% of the total IA2	20% of the total IAL

Content overview

- Kinetics
- Entropy and Energetics
- Chemical Equilibria
- Acid-base Equilibria
- Organic Chemistry: Carbonyls, Carboxylic Acids and Chirality

Assessment overview

- This paper has three sections:
  - Section A: multiple choice questions
  - Section B: mixture of short-open, open-response, calculations and extended-writing questions
  - Section C: data or calculation question.
- This paper will contain questions that require information from the Data Booklet (see *Appendix 9*).
- This paper will include a minimum of 22 marks that target mathematics at Level 2 or above (see *Appendix 6: Mathematical skills and exemplifications*).
- Students will be expected to apply their knowledge and understanding of experimental methods in familiar and unfamiliar contexts.
- This paper may contain some synoptic questions which require knowledge and understanding from Units 1 and 2.

IA2 **Unit 5: Transition Metals and Organic Nitrogen Chemistry**	***Unit code: WCH15/01**	
Externally assessed Written examination: 1 hour and 45 minutes Availability: January, June and October First assessment: June 2020 90 marks	40% of the total IA2	20% of the total IAL

Content overview

- Redox Equilibria
- Transition Metals and their Chemistry
- Organic Chemistry: Arenes
- Organic Nitrogen Compounds: Amines, Amides, Amino Acids and Proteins
- Organic Synthesis

Assessment overview

- This paper has three sections:
  - Section A: multiple choice questions
  - Section B: mixture of short-open, open-response, calculations and extended-writing questions
  - Section C: contemporary context question.
- This paper will contain questions that require information from the Data Booklet (see *Appendix 9*).
- This paper will include a minimum of 18 marks that target mathematics at Level 2 or above (see *Appendix 6: Mathematical skills and exemplifications*).
- Students will be expected to apply their knowledge and understanding of experimental methods in familiar and unfamiliar contexts.
- This paper may contain some synoptic questions which require knowledge and understanding from Units 1, 2 and 4.

IA2 **Unit 6: Practical Skills in Chemistry II**	***Unit code: WCH16/01**	
Externally assessed Written examination: 1 hour and 20 minutes Availability: January, June and October First assessment: June 2020 50 marks	20% of the total IA2	10% of the total IAL
Content overview Students are expected to develop further the experimental skills and the knowledge and understanding of experimental techniques that they acquired in Units 1 and 2 (tests for anions and cations, gases and organic functional groups) by carrying out a range of practical experiments and investigations while they study Units 4 and 5. This unit will assess students' knowledge and understanding of the experimental procedures and techniques that were developed in Units 4 and 5.		
Assessment overview • This paper may include short-open, open-response and calculation questions. • This paper will include a minimum of 6 marks that target mathematics at Level 2 or above (see *Appendix 6: Mathematical skills and exemplifications*). • Students will be expected to apply their knowledge and understanding of practical skills to familiar and unfamiliar situations.		

Assessment information

Assessment requirements

The Pearson Edexcel International Advanced Subsidiary in Chemistry consists of three externally-examined units.

The Pearson Edexcel International Advanced Level in Chemistry consists of six externally-examined units.

Students must complete all assessments.

Please see the *Assessment availability and first award* section for information on when the assessment for each unit will be available from.

Unit	IAS or IA2	Assessment information	Number of raw marks allocated in the unit
Unit 1: Structure, Bonding and Introduction to Organic Chemistry	IAS	Externally assessed Written examination: 1 hour and 30 minutes Availability: January, June and October First assessment: January 2019	80 marks
Unit 2: Energetics, Group Chemistry, Halogenoalkanes and Alcohols	IAS	Externally assessed Written examination: 1 hour and 30 minutes Availability: January, June and October First assessment: June 2019	80 marks
Unit 3: Practical Skills in Chemistry I	IAS	Externally assessed Written examination: 1 hour and 20 minutes Availability: January, June and October First assessment: June 2019	50 marks

Unit	IAS or IA2	Assessment information	Number of raw marks allocated in the unit
Unit 4: Rates, Equilibria and Further Organic Chemistry	IA2	Externally assessed Written examination: 1 hour and 45 minutes Availability: January, June and October First assessment: January 2020	90 marks
Unit 5: Transition Metals and Organic Nitrogen Chemistry	IA2	Externally assessed Written examination: 1 hour and 45 minutes Availability: January, June and October First assessment: June 2020	90 marks
Unit 6: Practical Skills in Chemistry II	IA2	Externally assessed Written examination: 1 hour and 20 minutes Availability: January, June and October First assessment: June 2020	50 marks

Assessment objectives and weightings

		% in IAS	% in IA2	% in IAL
AO1	Demonstrate knowledge and understanding of science.	34–36	29–31	32–34
AO2	(a) Application of knowledge and understanding of science in familiar and unfamiliar contexts.	34–36	33–36	33–36
	(b) Analysis and evaluation of scientific information to make judgements and reach conclusions.	9–11	14–16	11–14
AO3	Experimental skills in science, including analysis and evaluation of data and methods.	20	20	20

The Grading Scale

How are Edexcel International A levels marked and graded?

Edexcel International A levels are modular qualifications made up of four or six separate units. You can complete individual units at different times throughout your course.

Usually, you'll do half of the units in your first year of college or sixth form – this is your International AS level. You'll then complete the remaining units in your second year of college or sixth form – this is your International A2.

You'll be issued a UMS mark and grade for each unit and then when you complete the course you'll 'cash in' to get an overall International AS or International A level grade.

- International AS units and cash-ins are graded A to E.
- International A2 units are graded A to E, but we publish the theoretical A* boundary.
- International A Level cash-ins are graded A* to E.

If you don't get enough marks to pass with an E you'll be awarded a U, which means 'unclassified'.

What are raw and UMS marks?

The 'raw' mark is the actual mark you achieve on an exam or for your coursework.

UMS stands for 'Uniform Mark Scale' and the UMS mark is a conversion of your raw mark used to indicate how well you did in a unit.

In modular qualifications, units can be taken at different times throughout the course. Question papers and coursework tasks may vary slightly in difficulty from year to year. For example, a score of 53 raw marks in one paper for one exam session might represent the same level of achievement as a raw mark of 49 in the following exam session. The Uniform Mark Scale (UMS) ensures that these two raw marks receive the same value when contributing to the final grade.

If you would like to know your raw mark for a particular unit, you will need to speak to the exams officer at your school or college or use our mark converter.

Unit results

Candidates will receive a uniform mark between 0 and the maximum uniform mark for each unit.

The uniform marks at each grade threshold for each unit are:

Units 1, 2, 4 and 5

Unit grade	**Maximum uniform mark**	**A**	**B**	**C**	**D**	**E**
	120	**96**	**84**	**72**	**60**	**48**

Units 3 and 6

Unit grade	**Maximum uniform mark**	**A**	**B**	**C**	**D**	**E**
	60	**48**	**42**	**36**	**30**	**24**

Qualification results

The minimum uniform marks required for each grade:

International Advanced Subsidiary (cash-in code: XCH11)

Qualification grade	Maximum uniform mark	A	B	C	D	E
	300	240	210	180	150	120

Students with a uniform mark in the range 0–119 will be Unclassified (U).

International Advanced Level (cash-in code: YCH11)

Qualification grade	Maximum uniform mark	A	B	C	D	E
	600	480	420	360	300	240

Students with a uniform mark in the range 0–239 will be Unclassified (U).

To be awarded an A*, students will need to achieve an A for the International Advanced Level qualification (at least 480 uniform marks) and at least 90% of the total uniform marks available across the IA2 units combined (at least 270 uniform marks).

Resources:

Below are some useful websites, YouTube links and books you can use throughout your A level (IAS/IAL) course to help you with independent study:

- Pearson Edexcel International AS/A Level Chemistry – Student Book
- Active Learn – Online platform
- CGP Edexcel International A-level Chemistry Revision guide
- CGP Edexcel International A-level–Workbook – Exam Practice. Websites:
- Save My Exams: https://www.savemyexams.com/as/chemistry/edexcel/16/revision-notes/
- Physics and Maths Tutor: https://www.physicsandmathstutor.com/chemistry-revision/a-leveledexcel-ial/
- Notes: https://megalecture.com/as-chemistry-notes-worksheets/
- Pearson Active learn: https://www.pearsonactivelearn.com/app/library/ebook?id=ODI2NzAzfGJvb2t8MXww

Summer Assignment

Important vocabulary for practical work

You will have come across most of the words used in practical work in your GCSE studies. It is important that you use the right definition for each word.

Activity 1

Accurate	A statement suggesting what may happen in the future.
Data	An experiment that give the same results when a different person carries it out, or a different set of equipment is ued.
Precise	A measurement that is close to the true value.
Prediction	An experiment that gives the same results when the same experimenter uses the same method and equipment.
Range	Physical, chemical or biological quantities or characteristics.
Repeatable	A variable that is kept constant during an experiment.
Reproducible	A variable that is measured as the outcome of an experiment.
Resolution	This is the smallest change in the quantity being measured of a measuring instrument that give a perceptible change in the reading.
Uncertainty	The interval within the true value can be expected to lie.
Variable	The spread of data, showing the maximum and minimum values of the data.
Control variable	Measurements where repeated measurements show very little spread.
Dependent variable	Information, in any form, that has been collected.

Atomic structure and the Periodic Table

Complete the following sentences and definitions to give a summary of this topic.

Structure of an atom

1. The nucleus contains …

2. The electrons are found in the …

3. To work out the number of each sub-atomic particle in an atom we use the Periodic Table (PT). The number of protons is given by … In a neutral atom the number of electrons is …

4. To work out the number of neutrons we …

Vocabulary

State what is meant by the following terms.

1. Relative atomic mass

2. Relative molecular mass

3. Isotope

4. Relative isotopic mass

Structure of an ion

When an atom becomes an ion, only the number of _____changes. For positive ions this _____ by the number equivalent to the charge on the ion. For negative ions this _____by the number equivalent to the charge on the ion.

Orbitals and electron configuration

Research answers you are unsure of (some of this is A-Level)

Complete the following table:

Quantum shell	Maximum number of electrons	Types of orbitals	Total number of orbitals	Electron configuration
$n = 1$				
$n = 2$				
$n = 3$				
$n = 4$				

Sketch the shape of s and p orbitals

s

p

Quantitative chemistry

Write the chemical formula of the following

Copper(II) sulfate	
Nitric acid	
Copper(II) nitrate	
Sulfuric acid	
Sodium carbonate	
Aluminium sulfate	
Ammonium nitrate	
Nitrogen dioxide	
Sulfur dioxide	
Ammonia	
Ammonium sulfate	
Potassium hydroxide	
Calcium hydroxide	

Chemical equations

Write: (a) the chemical equation and (b) the ionic equation for each of the following reactions.

1. Magnesium with sulfuric acid

2. Calcium carbonate with nitric acid

3. Hydrochloric acid with sodium hydroxide

4. Aqueous barium chloride with aqueous sodium sulfate

5. Aqueous sodium hydroxide with sulfuric acid

6. Aqueous silver nitrate with aqueous magnesium chloride

7. Solid magnesium oxide with nitric acid

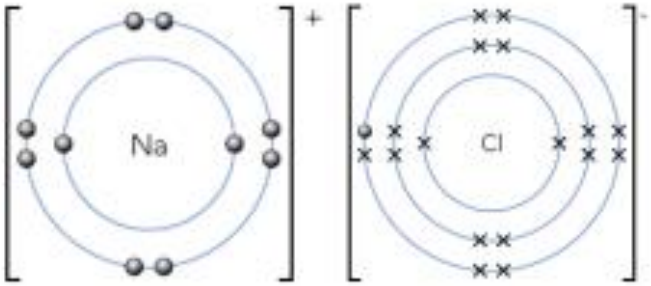
8. Aqueous copper(II) sulfate with aqueous sodium hydroxide

9. Aqueous lead(II) nitrate with aqueous potassium iodide

10. Aqueous iron(III) nitrate with aqueous sodium hydroxide

Structure and bonding

Use knowledge of the structure of sodium chloride



1. Complete the table:

Property	Why?
Does not conduct electricity when solid.	
Conducts electricity when molten or in aqueous solution.	
	The ions are held by strong electrostatic forces of attraction and a large amount of energy is needed to overcome the attractions.
	The ions are tightly packed together.