

Location:

Trainer:

INTERNATIONAL GCSE 2017

GETTING READY TO TEACH CHEMISTRY AND DOUBLE AWARD SCIENCE (CHEMISTRY)



Aims and Objectives

1. Specification content and structure
2. Changes, practical work, mathematical skills, command words
3. Assessment and grading
4. SAMs and exemplar student work
5. Support and published resources

Today's Agenda

0930 – 1000	Arrival and registration, tea and coffee
1000 – 1010	Welcome and introductions
1010 – 1110	Session 1 – Specification structure, content, changes
1110 – 1130	Morning break
1130 – 1300	Session 2 – Specification delivery, practical, maths
1300 – 1400	Lunch
1400 – 1530	Session 3 – SAMs, student exemplar work, resources
1530 – 1600	Plenary and departure

Getting to know you

Are you:

- new to teaching or do you have many years' experience?
- currently teaching Edexcel International GCSE Chemistry?
- do you also teach Science(Double Award)?
- new to teaching the current 4CH0 specification?

Our suite of International GCSEs

Our International
GCSE Science
specifications

EXAM SERIES
January
May / June

BIOLOGY

CHEMISTRY

PHYSICS

SCIENCE (DOUBLE AWARD)

SCIENCE (SINGLE AWARD) - NEW!!

In addition, there is also an International GCSE in Human Biology

Dates for the new specifications

- New specifications (Chemistry is 4CH1) are designed for first teaching in **September 2017**
- Some schools teach over 3 years, so the specification has been available for first teaching from **September 2016**
- Examinations available in **January** and **May/June** each year after the first exam series in **May/June 2019**

Overview of dates

SEPTEMBER 2016	SEPTEMBER 2017	MAY / JUNE 2018	MAY / JUNE 2019
<p>"LEGACY"</p> <p>Yr 10 / 4th Form continue with current specifications</p>	<p>"LEGACY"</p> <p>Yr 11 / 5th Form continue with current specifications</p>	<p>"LEGACY"</p> <p>Final summer exam series for Current specifications</p>	<p>"LEGACY"</p> <p>NO EXAMINATION SERIES FOR CURRENT SPECIFICATIONS</p>
<p>"NEW"</p> <p>Yr 9 / 3rd Form embark on new specifications</p>	<p>"NEW"</p> <p>All students* now being taught new specifications * except students being taught over 1 year</p>	<p>JANUARY 2019</p> <p>"LEGACY"</p> <p>Final resit series</p>	<p>"NEW"</p> <p>First exam series for new specifications</p>

INTERNATIONAL GCSE CHEMISTRY 2017

Science (Double Award)
Science (Single Award)



Science (Double Award) – 4SD0

- The grouping of topics in a more logical way has led to more changes here than in separate sciences
- Students sit Paper 1 in Biology, Chemistry and Physics (each 2 hours – 110 marks)
- Students achieve two grades, based on performance across all three papers
- The two grades may be the same or different: (9-9 is the highest, then 9-8, 8-8, 8-7, etc)
- Students may still progress to A level

Science (Single Award) – 4SS0

The features of this new qualification:

- Half the content of the Double Award specification
- Involves a 1-hour and 10-minute paper in each science
- Students achieve a single grade, based on performance across all three papers
- Not intended for progression to A level

Science (Single Award) – 4SS0

- Single Award 1 grade; half of the double award
- Double Award 2 grades; 2/3rds of each separate science
- Separate: Biology, Chemistry, Physics 3 grades; 1 for each science taken

Any questions about the structure?



INTERNATIONAL GCSE CHEMISTRY

Specification content – 4CH1



Key changes from 4CH0 to 4CH1

- Changes ensure comparability with reformed UK GCSE specifications
- Suitable preparation for progression to reformed UK and International A levels
- Content rearranged into 4 sections instead of 5
- Less Industrial Chemistry content (old section 5)
- More organic chemistry
- 'Embedded' practicals (core practicals)
- Some changes in meanings of command words to achieve consistency across all new science specifications
- Teach all bullet points – those in **bold** are Chemistry only

Current Chemistry (4CH0) content summary

There are currently 5 sections:

Principles of Chemistry

- States
- Atoms / structure
- RFM/moles
- Formulae & equations
- Bonding
- Electrolysis

Chemistry of the elements

- Periodic table
- Groups 1 & 7
- Oxygen/oxides
- H₂ & water
- Reactivity series
- Acids & salts
- Tests for ions & gases

Organic Chemistry

- Introduction
- Alkanes
- Alkenes
- Ethanol

Physical Chemistry

- Acids, alkalis, salts
- Energetics
- Rates
- Equilibria

Chemistry in Society

- Extraction of metals
- Crude oil
- Synthetic polymers
- Industrial manufacture

New Chemistry (4CH1) content summary

There are now 4 sections in the specification instead of 5

Principles of Chemistry

- States of matter
- Mixtures etc
- Atomic structure
- Periodic Table
- Equations and calculations
- Bonding
- Electrolysis

Inorganic Chemistry

- Groups 1 & 7
- Reactivity series
- Gases in the atmosphere
- Reactivity series
- Metal extraction & uses
- Acids alkalis & titrations
- Salt preparation
- Chemical tests

Physical Chemistry

- Energetics
- Rates of reaction
- Reversible reactions and equilibria

Organic Chemistry

- Introduction
- Crude oil
- Alkanes
- Alkenes
- Alcohols
- Carboxylic acids
- Esters
- Polymers

Additions to Chemistry Topic 1

**Bold and (C) refer to separate science Chemistry
(these topics are not tested in Paper 1)**

- **Solubility (g/100g); plot and interpret solubility curves (C)**
- R_f values and use in identifying components in a mixture
- **Meaning of anion, cation (C)**

Additions to Chemistry Topic 2 & 3

**Bold and (C) refer to separate science Chemistry
(these topics are not tested in Paper 1)**

- **Explaining the trend in Group 7 reactivity (C)**
- **Comment on metal extractions given appropriate info (C)**
- **Uses of Cu, steel (in addition to Al & Fe) (C)**
- **Alloys – properties (C)**
- Flame test for Cu^{2+}
- **Reaction profiles showing ΔH and E_{act} (C)**

Additions to Chemistry Topic 4

Organic

- Using EF, MF, general formula, structural, displayed formulae
- Meaning of homologous series, functional group & isomerism
- IUPAC nomenclature for compounds up to C₆
- Structural and displayed formulae from molecular formula
- Classification of reactions as: substitution, addition, combustion

Additions to Chemistry Topic 4

Organic

- **Alcohols up to C₄; oxidation using K₂Cr₂O₇ (C)**
- **Carboxylic acids; naming up to C₄ and reactions (C)**
- **Esters – structural and displayed formulae - identifying name and formula of alcohol and carboxylic acid used (C)**
- Repeat unit in PTFE
- **Polyesters to include deducing structures of monomers from repeat unit; biodegradability (C)**

Deletions in Chemistry 1

- **Avogadro number (C)**
- **Faraday calculations (C)**
- **Differences between HCl(g) and HCl(aq) (C)**
- **Differences between HCl in water and methylbenzene (C)**
- Lab preparation of oxygen and carbon dioxide
- Properties and uses of carbon dioxide

Deletions in Chemistry 2

- Details of extraction of iron, using a blast furnace*
- Details of the extraction of aluminium*
- Haber process and uses of ammonia
- Choice of method of manufacture of ethanol
- **Contact process and uses of H_2SO_4 (C)**
- **Industrial electrolysis of sodium chloride solution (C)**

* In Chemistry, general principles are expected, but not specific knowledge of individual extractions
No extraction and use of metals in Double Award

What is moving from DA to Chemistry?

Some topics are moving from **Double Award** into **Chemistry**:

1. Principles of Chemistry

- Solubility; units and curves
- Titration calculations
- Gas volume calculations
- Metallic bonding
- Electrolysis

What is moving from DA to Chemistry?

Some topics are moving from **Double Award** into **Chemistry**:

2. Inorganic Chemistry

- Trends in Group 1 and Group 7 reactions in terms of electron configuration
- Extraction and uses of metals; properties of alloys
- Preparation of soluble salts by titration
- Preparation of insoluble salts by precipitation

What is moving from DA to Chemistry?

Double Award into **Chemistry** (continued):

3. Physical Chemistry

- Energy level diagrams, reaction profiles showing ΔH and activation energy
- Breaking bonds (endo) and making bonds (exothermic)
- Calculate enthalpy changes using bond energies
- Characteristics of dynamic equilibria
 - Changing conditions and effect on equilibrium position
 - Effect of catalyst

What is moving from DA to Chemistry?

New topics in Chemistry:

4. Organic Chemistry

- Alcohols
- Carboxylic acids
- Esters
- Condensation polymers, including deducing structures of monomers from repeat unit and vice versa.

ACTIVITY 1

Your first Activity is to consider how a question from a 4CH0 question paper can be modified for students studying 4CH1

You will need:

- Activity 1 Task
- Activity 1 Question

from your pack

Any questions about the content?



MORNING BREAK!

Please be back in 20 minutes

INTERNATIONAL GCSE CHEMISTRY 2017

Practical skills



Definitions of practical terms

- There has been much confusion about the meanings of some scientific terms used in practical work
e.g. accuracy and precision are often confused
many do not understand the difference between reliability, repeatability and reproducibility
- At GCSE level it isn't always appropriate to make fine distinctions between all such terms
- The current definitions document will be revised to outline the meanings of the terms that we expect International GCSE science students to be familiar with

Practicals in the specification

- The specification includes embedded (core) practicals, 12 in Chemistry, 8 in Dual Award- **see Core Practical Guide**
- It also includes a list of experimental skills that students are expected to acquire
- Further suggestions for practical work appear in **Appendix 6** (see page 47 of specification-reproduced in your pack)
- Questions on exam papers test practical skills, rather than recall of specific techniques – so they may be in the context of any practical activity (15% of marks)

Embedded practicals

- do students have to do them?

- The simple answer is no - but it needs to be remembered that some examination questions assume that students have detailed knowledge of practical techniques and skills (15% of marks)
- There is evidence that students perform better in written examinations when they have had more direct experience of practical work
- Ideally, students would carry out all the embedded practicals, either individually, or in pairs, or in small groups
- If this is not possible, then less good alternatives would be teacher demonstrations, or watching suitable video clips

Practicals in the specification

Embedded Practicals (Topics 1 and 2):

- **Investigate solubilities of solids at a specific temperature (C)**
- Investigate paper chromatography using inks/food colourings
- Determine formula of metal oxide by combustion or reduction
- **Investigate electrolysis of aqueous solutions (C)**
- Determine approximate % by volume of oxygen in air
- Investigate reactions between metals and acids
- Prepare pure dry hydrated copper(II) sulfate from copper(II) oxide
- **Prepare pure dry lead(II) sulfate (C)**

Practicals in the specification

Embedded Practicals (Topics 3 and 4):

- Investigate temperature changes during reactions
- Investigate effect of SA & concentration on rate of reaction
- Investigate catalytic decomposition of hydrogen peroxide
- **Prepare a sample of an ester (C)**

This means a total of 12 practicals (8 for Double Award)

Practicals in the specification

Experimental skills (page 28)

Examples of what may be tested:

- devise and plan investigations, using scientific knowledge and understanding when selecting appropriate techniques
- identify independent, dependent and control variables

The complete list is reproduced in your pack (Activity 2 Task)

ACTIVITY 2

This Activity is about how to teach your students an assessment statement in the specification that covers an embedded practical.

You will need:

- Activity 2 Task
- Activity 2 Question
- Activity 2 Practical method

from your pack

Practicals in the specification

Appendix 6 - Suggested practical investigations

This is reproduced in your pack

Unlike the embedded practicals, full practical details of how these investigations should be carried out will not be tested in question papers - **unless** there is a relevant assessment statement in the specification

However, they might be tested if sufficient information is provided in the question

Developing practical skills

Students should be familiar with a range of laboratory apparatus and its use, including the reading of scales.

1

Students should be able to plan an experiment and control variables, to collect and record data in a table, and to plot appropriate graphs with lines of best fit.

2

Students should be able to process and analyse data, to identify and account for anomalies, to evaluate data and methods, and to justify a conclusion.

3

The specification includes guidance on the use of terminology within practical and experimental work.

4

Practical skills in examinations

Students may be tested on their ability to:

Describe and plan experiments

Draw conclusions which are consistent with the evidence, using scientific knowledge and understanding

Describe safe and appropriate practical techniques

Communicate findings from experimental activities using appropriate vocabulary, calculations and graphs

Analyse and interpret data from experimental activities

Evaluate data and methods

Any questions about practical skills?



INTERNATIONAL GCSE CHEMISTRY 2017

Mathematical skills



Mathematical skills

- The development and use of relevant mathematical skills is important for progression in science subjects
- A list of mathematical skills that should be developed appears in **Appendix 4** of the specification (these are the same skills as for the reformed UK GCSEs)
- These skills will be tested in question papers within the context of the particular science
- Marks awarded for mathematical skills will be approximately 10% in Biology, 20% in Chemistry, 30% in Physics

Mathematical skills – categories

There are 5 categories of mathematical skills:

- 1 Arithmetical and numerical computation
- 2 Handling data
- 3 Algebra
- 4 Graphs
- 5 Geometry and trigonometry (does not apply to chemistry)

Categories 1-4 are reproduced in your pack

Any questions about maths skills?



INTERNATIONAL GCSE CHEMISTRY 2017

Command words



Command words

- All our qualifications in science now use command words with a common meaning
- The list of command words used in external assessments appears in **Appendix 5** of the specification
- Students should expect to see many different command words in questions – they will reflect the range of demand in the exam paper
- The full list is reproduced in your pack

Command words – describe or explain?

These two command words are often used in questions, but sometimes students are not clear about the differences between them – look at what appears in Appendix 5

Note that dual commands are no longer used in questions – so 'Explain' may sometimes have the same meaning as 'State and explain'

Command words – explain a statement that is given

Question

Explain why the use of a catalyst has no effect on the position of equilibrium in a reversible reaction. (2 marks)

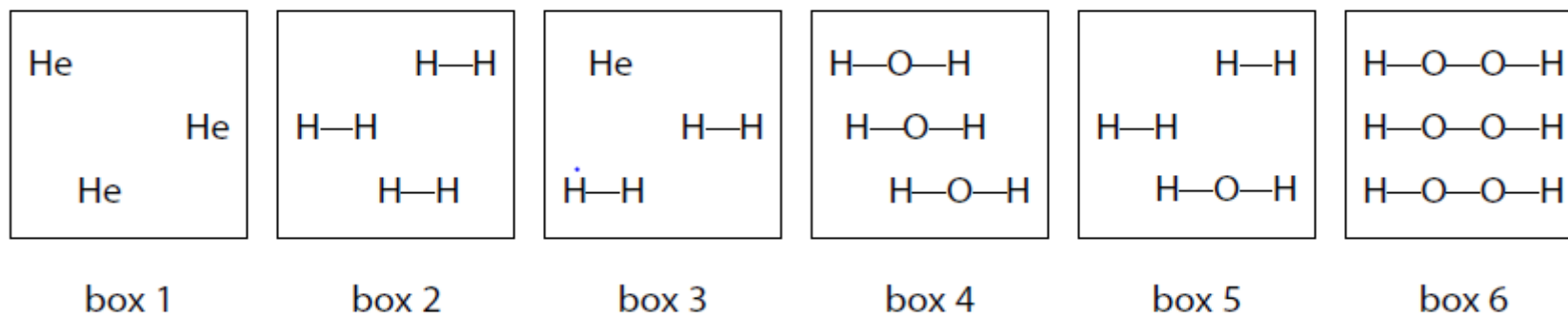
Comment

Note that the students are told that the catalyst has no effect, so the 2 marks are for explaining why it has no effect

Command words – explain something that must be stated

Question

- (a) Each of the boxes in the diagram represents either an element, a compound or a mixture.



- (i) Explain which **two** boxes represent an element.

(2)

Comment

The first mark is for identifying the two boxes, and the second mark is for giving the reason.

Any questions about command words?



INTERNATIONAL GCSE CHEMISTRY 2017

Assessment



Summary of assessment

FAMILIAR ...

100% external assessment – with no coursework

Linear assessment – all exams taken in the same exam session

Variety of question types – all marked with 'points-based' mark schemes

Single tier of entry – no foundation or higher

... AND NEW

Questions using maths skills:
10% in Bio
20% in Chem
30% in Phys

Each paper will have some longer questions (4 – 6 marks)

Assessment objectives

A01

Knowledge and understanding of biology / chemistry / physics

~40%
of total marks

A02

Application of knowledge and understanding, analysis and evaluation of biology / chemistry / physics

~40%
of total marks

A03

Experimental skills, analysis and evaluation of data and methods in biology / chemistry / physics

~20%
of total marks

Assessment summary

Paper 1

Two hours; 110 marks (reduced from 120)

Paper 2

1 hour 15 mins; 70 marks
(15 mins longer, 10 more marks)

Both papers will contain
a mixture of AO1,
AO2 and AO3

The AO3 questions
are likely to be in a practical
context

Assessment summary

There will be two examination papers:

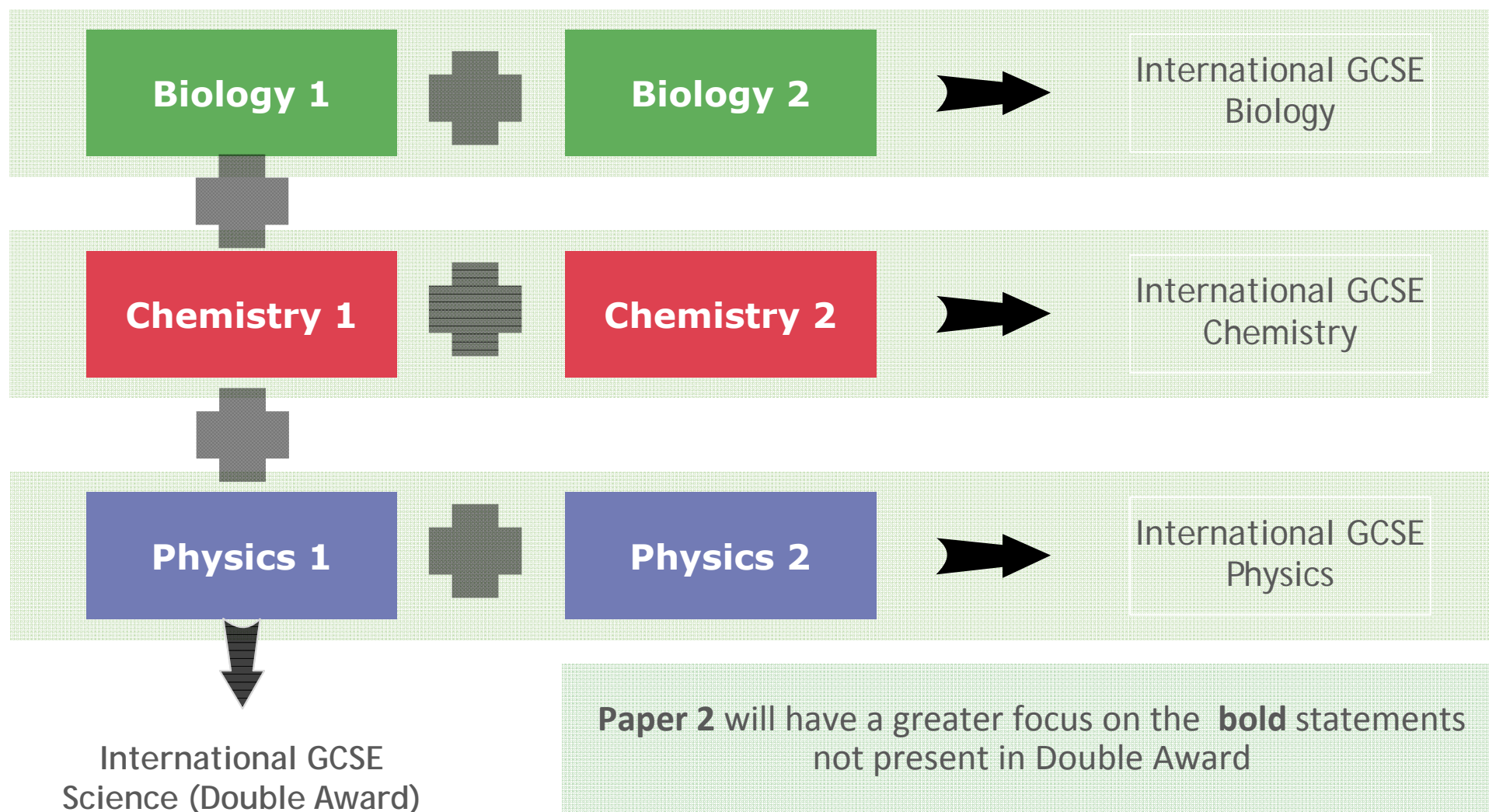
Paper 1

will **NOT** include the specification statements printed in **BOLD**

Paper 2

includes **ALL** the specification statements, including those printed in **BOLD** –more bold statements now

Both papers have similar question types



INTERNATIONAL GCSE CHEMISTRY 2017

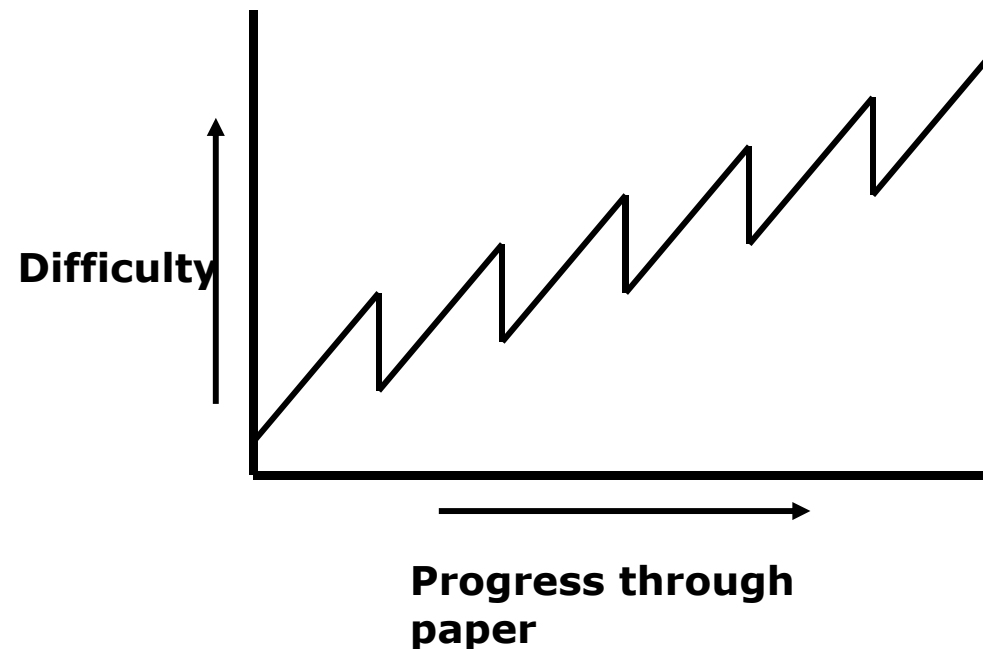
Examination papers and grading



An ideal incline of difficulty

Where possible:

- Increase in difficulty within each question
- Increase in difficulty from first question to last question



Exam question styles

The question style is similar to that of the existing International GCSE:

A small number of multiple choice questions

Short answer responses, usually worth 1 – 3 marks

Longer answer questions, up to 6 marks

All questions are **compulsory** and may cover **practical** situations as well as **areas** of theory

The new 9-1 grading scale

- Broadly the same proportion of students will achieve a grade 4 and above as currently achieve a grade C and above
- Broadly the same proportion of students will achieve a grade 7 and above as currently achieve a grade A and A*
- The bottom of grade 1 will be aligned with the bottom of grade G

New grading structure	Current grading structure
9	A*
8	
7	
6	B
5	
4	C
3	D
2	E
1	F
U	G
	U

GOOD PASS (DfE)
5 and above = top of C and above

AWARDING
4 and above = bottom of C and above

Source:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/465873/your_qualification_our_regulation.pdf

Grade 9

- Originally intended to be “the top 20% of those scoring Grade 7”
- However, this way of finding Grade 9 has been changed, as this method is not fair on students in subjects with skewed distributions
- New method of working out Grade 9 will be:

Proportion of Grade 7 students who will be awarded Grade 9

$$= (\% \text{ of students who achieved Grade 7} \div 2) + 7\%$$

Grade 9 – an example

- An exam is sat by 12 000 students
- The grade boundaries are set – and 6000 students are awarded a Grade 7

How many students get a Grade 9?

- 50% of the students have achieved a Grade 7
- So, $(50 \div 2) + 7 = 32\%$ **of the Grade 7 students** will get a Grade 9
- 32% of 6000 students = 1920 students

Any questions about the new grading scale?



LUNCH BREAK!

Please be back in 1 hour

INTERNATIONAL GCSE CHEMISTRY 2017

A closer look at the SAMs (Sample Assessment Materials)



INTERNATIONAL GCSE CHEMISTRY SAMs

- You can all access the SAMs (including mark schemes) through the Pearson website
- New sample assessment material planned for May 2018
- But none of us know how these questions will perform in a real examination
- However, some students have volunteered to answer some of the questions in the SAMs
- Their answers are very useful in informing us of any problems with the questions, or issues to do with their understanding of the topics being tested

INTERNATIONAL GCSE CHEMISTRY SAMs

- Specimen paper appears as actual paper will using a barcode and borders
- All answers must be within borders and written with black ink/biro as answers are scanned for online marking
- Each answer is a single clip and rest of the page is not visible to the examiner
- Errors should be crossed out and replaced within answer space if possible
- If additional sheet used this should be referred to in original answer space so examiner is aware
- Mark scheme presented is an initial scheme and does not have the alterations that a final scheme would have

ACTIVITY 3

This Activity is about how students are able to answer questions on the CH1 specification

You will need:

- Activity 3 Task
- Activity 3 Sample answers (1 - 5)
- Activity 3 Mark scheme

from your pack

Activity 4

This Activity is to look at potential practical activities and relate them to a sample exam question

You will need:

- Activity 4 task
- Neutralisation- curing acidity experiment sheet
- Heat energy from alcohols experiment sheet
- SAM question 10 and mark scheme

from your pack

Activity 4

related section of scheme of work

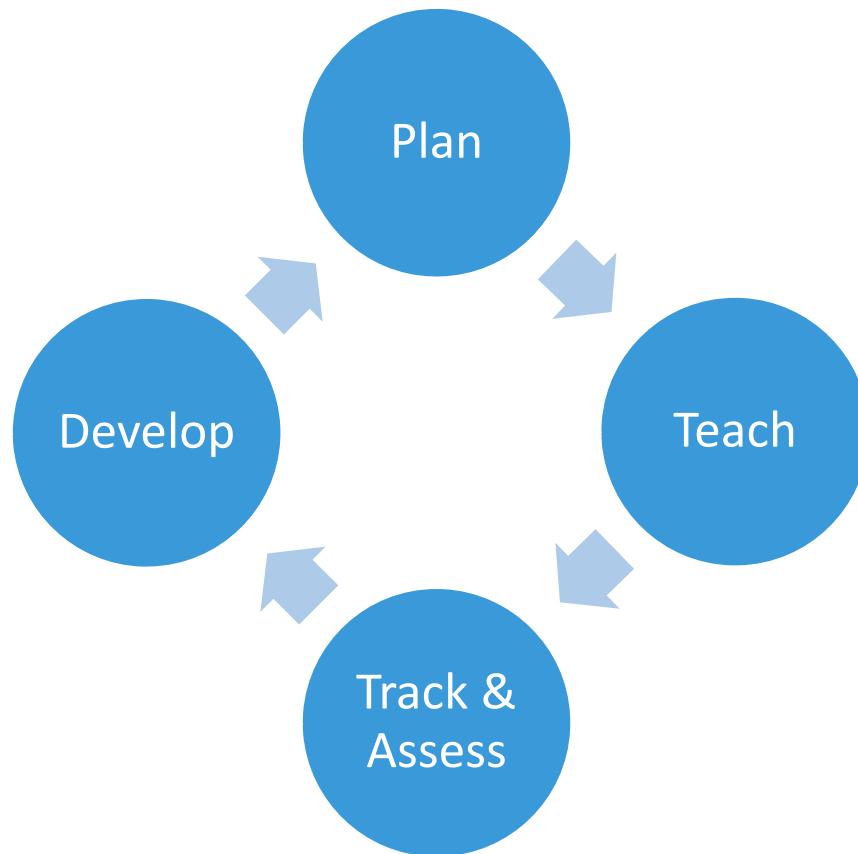
Week	Content coverage	Learning outcomes	Exemplar activities	Exemplar resources	Which transferable skills are explicitly assessed through examination	Which transferable skills could also be acquired through teaching and delivery
37	Section 3: Physical chemistry (a) Energetics	<p>Students will be assessed on their ability to:</p> <p>3.1 know that chemical reactions in which heat energy is given out are described as exothermic, and those in which heat energy is taken in are described as endothermic</p> <p>3.2 describe simple calorimetry experiments for reactions such as combustion, displacement, dissolving and neutralisation</p> <p>3.3 calculate the heat energy change from a measured temperature change using the expression $Q = mc\Delta T$</p> <p>3.4 calculate the molar enthalpy change (ΔH) from the heat energy change, Q.</p>	<p>Activity:</p> <ul style="list-style-type: none"> Complete exercises, identifying whether a reaction is exo- or endothermic given ΔH. <p>Class practicals:</p> <ul style="list-style-type: none"> Exothermic or endothermic? (RSC 22). Heats of reaction (RSC 84). Thermometric titration (RSC 45). Calculating ΔH from practical results. 	<p>Edexcel International GCSE Chemistry Student Book: Pages 120-122, 204-207</p> <p>RSC Classic Chemistry Experiments: Pages 54, 114 and 215</p>	Analysis	Analysis Reasoning

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Support and published resources



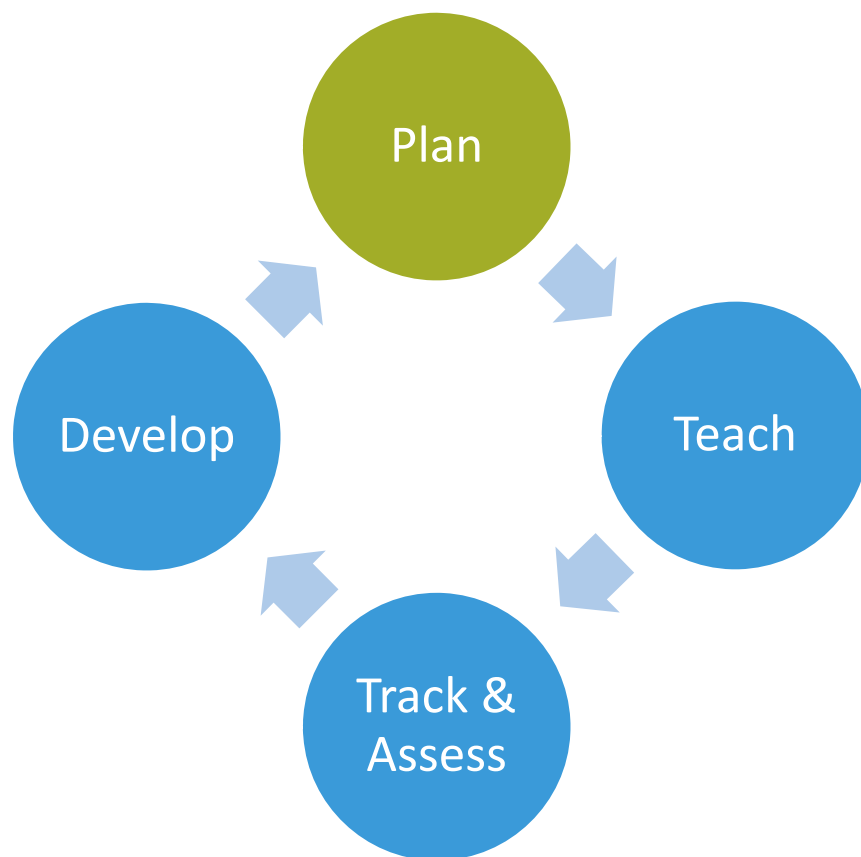
Supporting great science teaching



- We will provide a range of support to help you plan, teach, track and assess, and develop the new course.
- This includes free qualification support to download from our website as well as published resources*

* You do not have to purchase any resources to deliver our qualifications

Supporting great science teaching

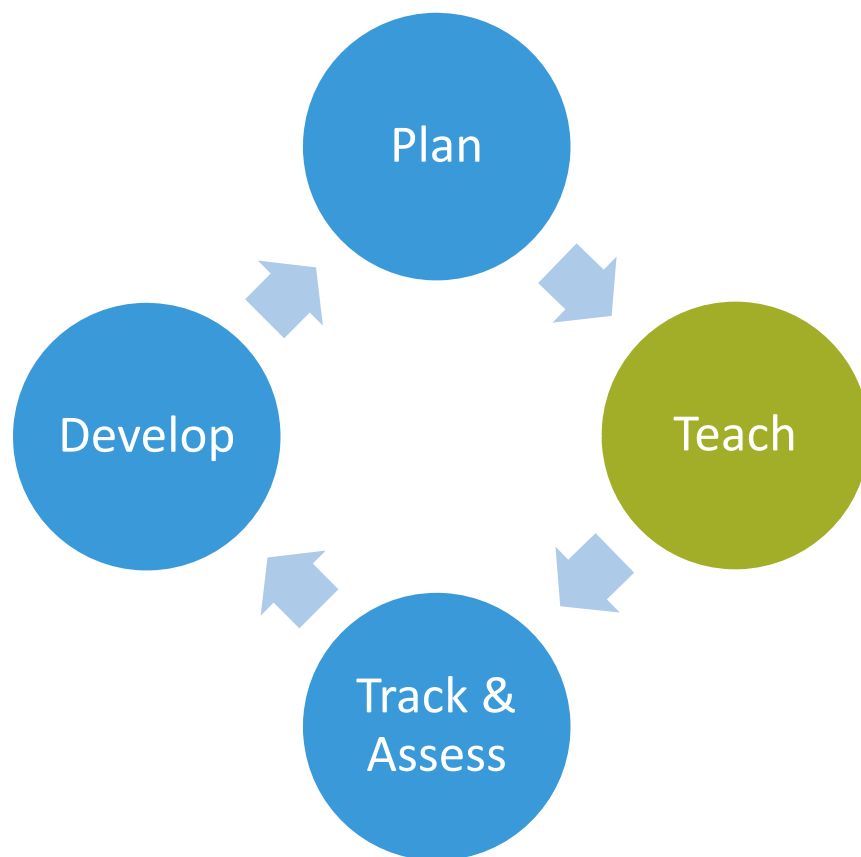


To help you plan the new course we are providing:

Free support for the qualification-

- Getting Started Guide
- Course planners / scheme of work (published October 2017)
- Mapping documents (referenced to 2011 qualification)

Supporting great science teaching



There will be teaching and learning support to help you deliver the new qualification:

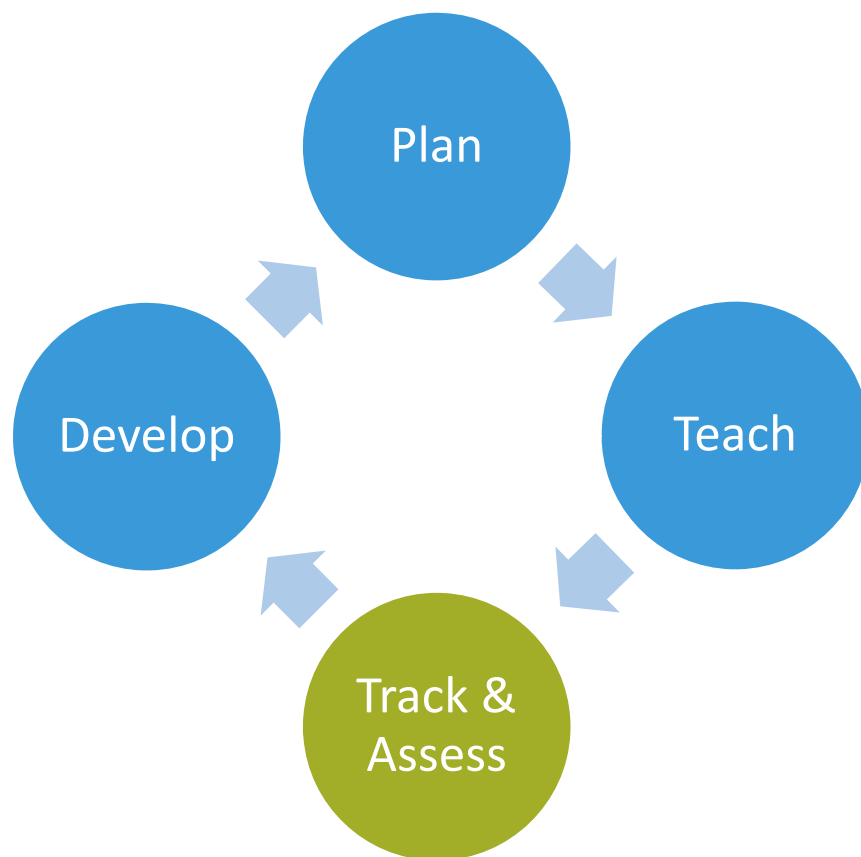
Free support for the qualification:

- Support for practical activities (core practical guide)
- Mathematics guide

Published resources from Pearson:

- Student book and ActiveBook

Supporting great science teaching



To help you prepare your students for the assessments:

Free support for the qualification:

- Specimen papers to support formative assessment and mock exams
- ResultsPlus and ExamWizard

Published resources from Pearson:

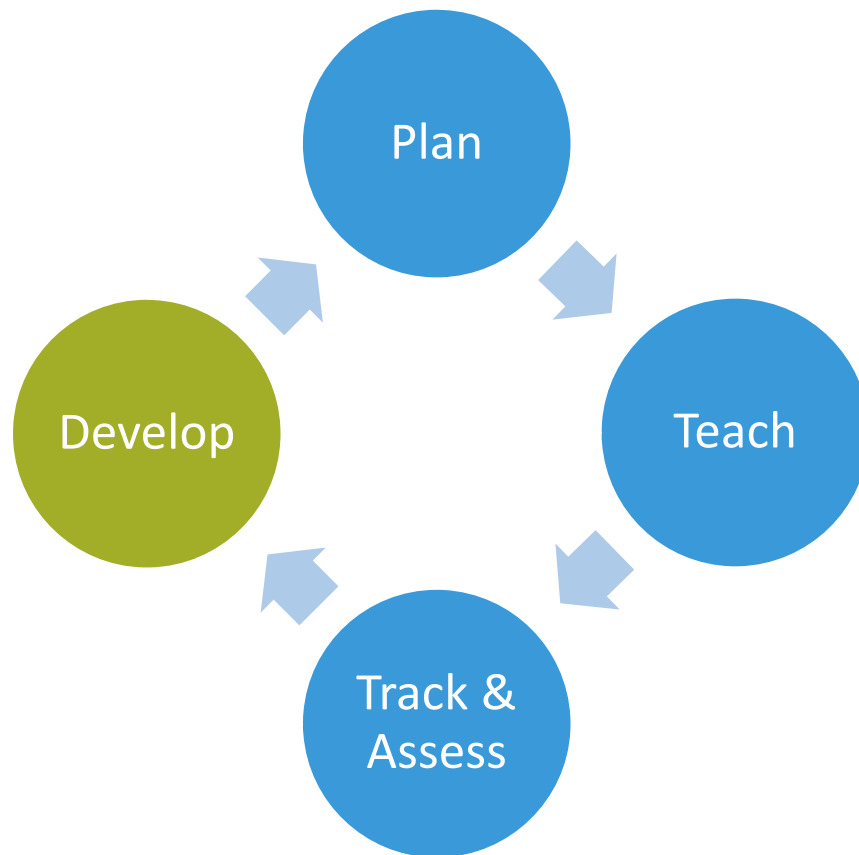
- Consideration is being given to a Revision Guide and Workbook

* You do not have to purchase any resources to deliver our qualification

ResultsPlus and ExamWizard

- **ResultsPlus** provides the most detailed analysis available of your students' exam performance. This free online service helps you identify topics and skills where students could benefit from further learning, helping them gain a deeper understanding
- **ExamWizard** is a free exam preparation tool containing a bank of past Edexcel exam questions, mark schemes and examiners' reports, so you can create mock papers, homework or practice tests in minutes

Supporting great science teaching



Our training programme includes:

- Launch events
- Getting Ready to Teach training events

Our subject advisor team, led by **Stephen Nugus**, will guide you through all the changes and are on hand to answer any questions you might have.

TeachingScience@pearson.com



Published resources for sale 1

We are committed to helping teachers deliver our Edexcel qualifications and helping students to achieve their full potential

To do this, we aim for our qualifications to be supported by a wide range of high-quality resources, produced by a range of publishers

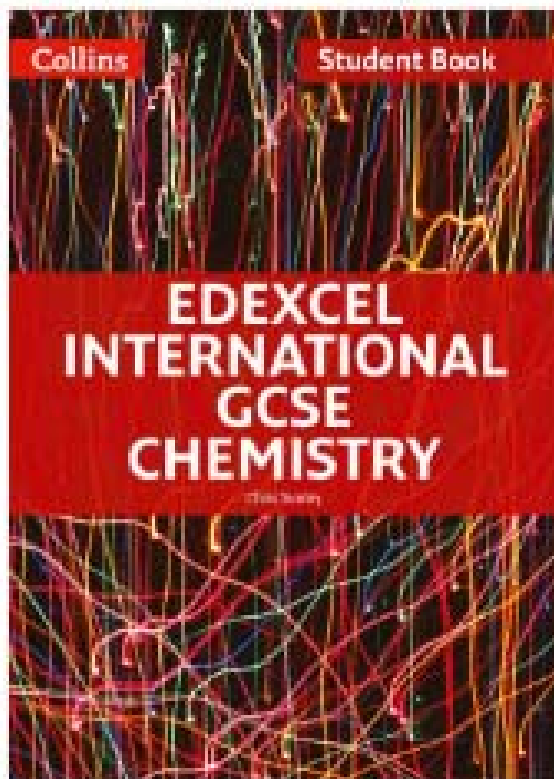
However, it is not necessary to purchase endorsed resources to deliver our qualifications

Published resources for sale 2

- Three UK publishers have prepared resources, including Student Books, for the new International GCSE qualifications
- These are **Collins**, **Hodder** and **Pearson**
- All resources are now available
- The Student Books will be endorsed by Pearson/Edexcel – which means that they will have been checked for specification coverage

Published resources –Collins

<http://collins.co.uk/product/9780008236212/Edexcel+International+GCSE+-+Edexcel+International+GCSE+Chemistry+Student+Book>



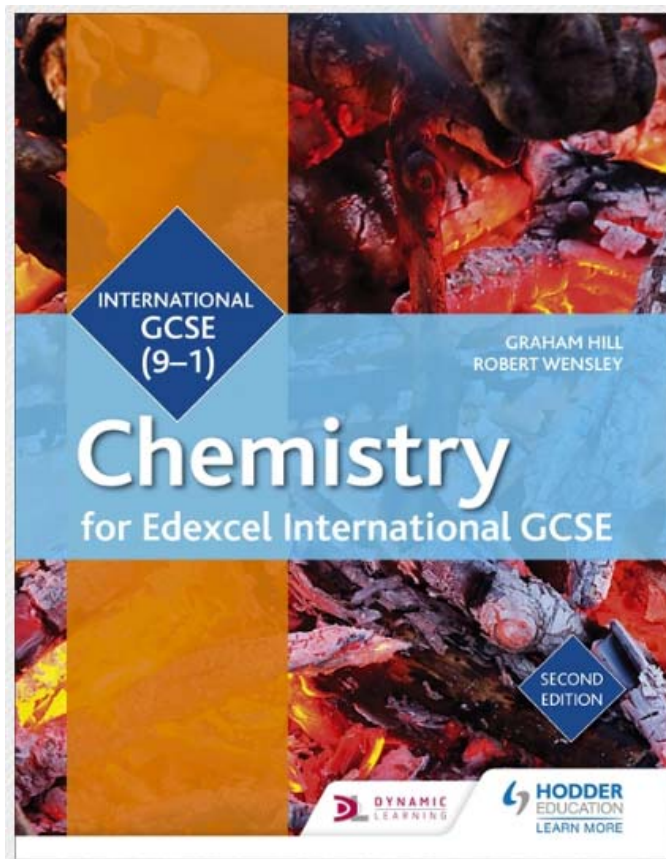
- **Student Book – from June 2017**
- **Teacher Pack – from June 2017**

The Collins Student Book allows you to co-teach Edexcel International GCSE Chemistry and Double Award Science

It is packed full of engaging content, practical skills features and questions, and is rigorously updated for the new specifications.

Published resources – Hodder

www.hoddereducation.co.uk/edexceligcse



- **Student Book – from May 2017, and as an eBook from June 2017**

Provide your students with complete coverage of the Edexcel International GCSE Chemistry specification with these affordable student books written by expert authors and teachers; testing knowledge and building practical skills throughout.

- **Workbook – from July 2017**

Maximise every student's performance with exam-style questions, sample answers and examiner comments, written to support and enhance the content of the Edexcel International GCSE Chemistry book.

Published resources – Pearson

<http://www.pearsonglobalschools.com>



- **Student Book – from May 2017**

This new resource, which includes access to an eBook, has been developed for the new Edexcel International GCSE specification with progression, international relevance and support at their core, and is designed to supply students with the best preparation possible for the examination.

- **Teacher Pack– from August 2017**

This new resource, available online, will include videos, worksheets, lesson plans and other support to help you deliver the International GCSE in Chemistry.

Free resources from the website: Specification

These are the sections:

- About this specification
- Chemistry content
- Assessment information
- Administration and general information
- Appendices

Free resources from the website: Sample assessment material (SAM)

This includes:

- General marking guidance
- Paper 1C and mark scheme
- Paper 2C and mark scheme
- New material planned for publication May 2018

Free resources from the website: Getting started guide

This includes:

- Some information from the specification
- A list of the new assessment statements
- An outline course planner, assuming topics will be taught in the same order as the specification

Free resources from the website: Mapping document

This includes:

- All the assessment statements in the specification in the first column
- In the second column, a comment on whether the statement has been transferred from 4CH0, or modified, or combined with another statement, or is new, eg

(e) Chemical formulae, equations and calculations	
1.25 write word equations and balanced chemical equations (including state symbols): <ul style="list-style-type: none">• for reactions studied in this specification• <u>for</u> unfamiliar reactions where suitable information is provided.	1.21 & 1.22: combined and slightly re-worded

Free resources from the website: Scheme of work

This is much more detailed than the outline course planner.

It suggests one example of a logical order of teaching topics, not in the order in the specification.

It includes for each week:

- the assessment statements in the specification
- exemplar activities, including teacher demonstrations, class practicals and resources

Scheme of work

Week	Content coverage	Learning outcomes	Exemplar activities	Exemplar resources	Which transferable skills are explicitly assessed through examination	Which transferable skills could also be acquired through teaching and delivery
37	Section 3: Physical chemistry (a) Energetics	<p>Students will be assessed on their ability to:</p> <p>3.1 know that chemical reactions in which heat energy is given out are described as exothermic, and those in which heat energy is taken in are described as endothermic</p> <p>3.2 describe simple calorimetry experiments for reactions such as combustion, displacement, dissolving and neutralisation</p> <p>3.3 calculate the heat energy change from a measured temperature change using the expression $Q = mc\Delta T$</p> <p>3.4 calculate the molar enthalpy change (ΔH) from the heat energy change, Q.</p>	<p>Activity:</p> <ul style="list-style-type: none"> Complete exercises, identifying whether a reaction is exo- or endothermic given ΔH. <p>Class practicals:</p> <ul style="list-style-type: none"> Exothermic or endothermic? (RSC 22). Heats of reaction (RSC 84). Thermometric titration (RSC 45). Calculating ΔH from practical results. 	<p>Edexcel International GCSE Chemistry Student Book: Pages 120-122, 204-207</p> <p>RSC Classic Chemistry Experiments: Pages 54, 114 and 215</p>	Analysis	Analysis Reasoning

Free resources from the website:

Topic guides

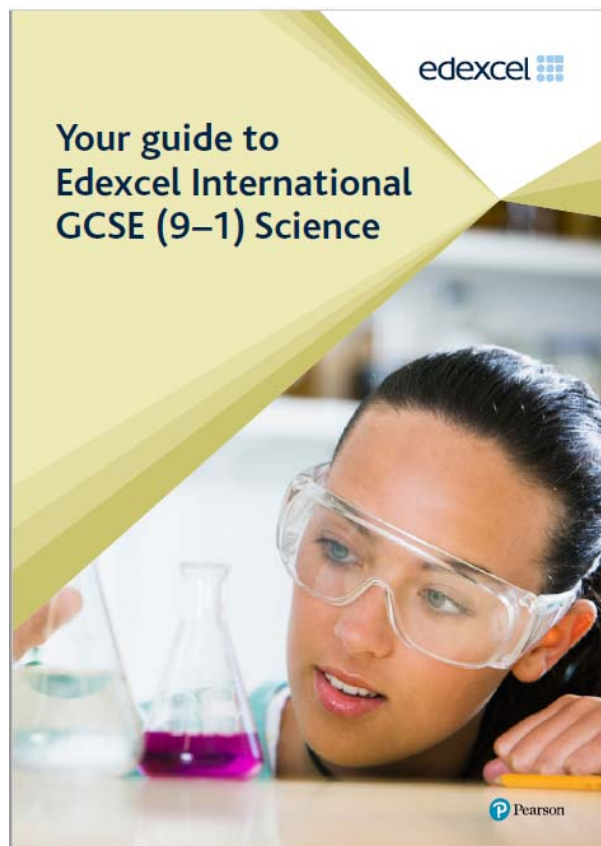
There are two topic guides:

- Strategies for teaching chemical bonding
- Strategies for teaching chemical equilibrium

Each offers advice on approaches to teaching two of the most difficult topics in the specification

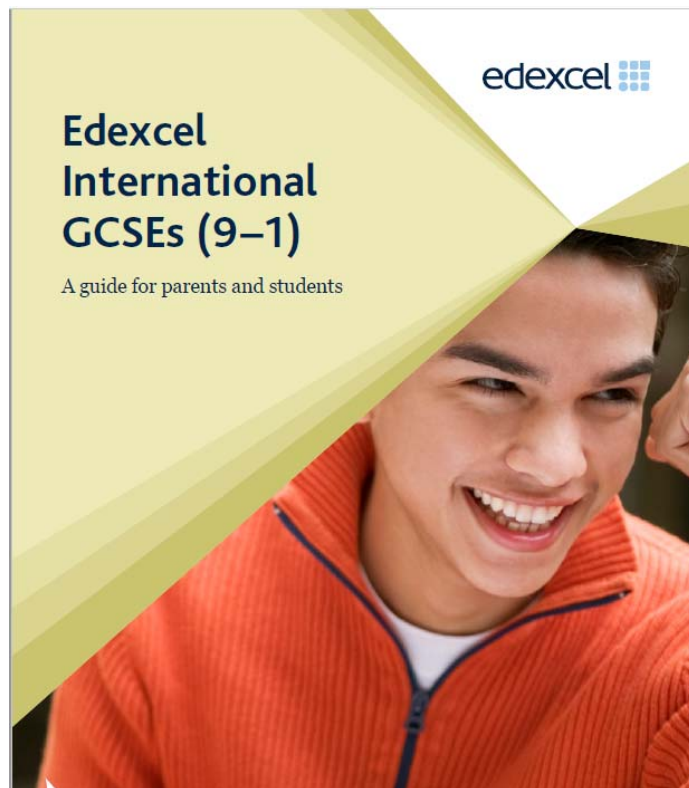
Free resources from the website:

Your guide to Edexcel International GCSE (9-1) Science



- This is a glossy brochure that refers to all the new science specifications, including Human Biology and the new Single Award qualification
- It gives full details of all the planned Pearson published resources, including planned publication dates and ISBNs

Free resources from the website: Edexcel International GCSEs (9-1) – a guide for parents and students

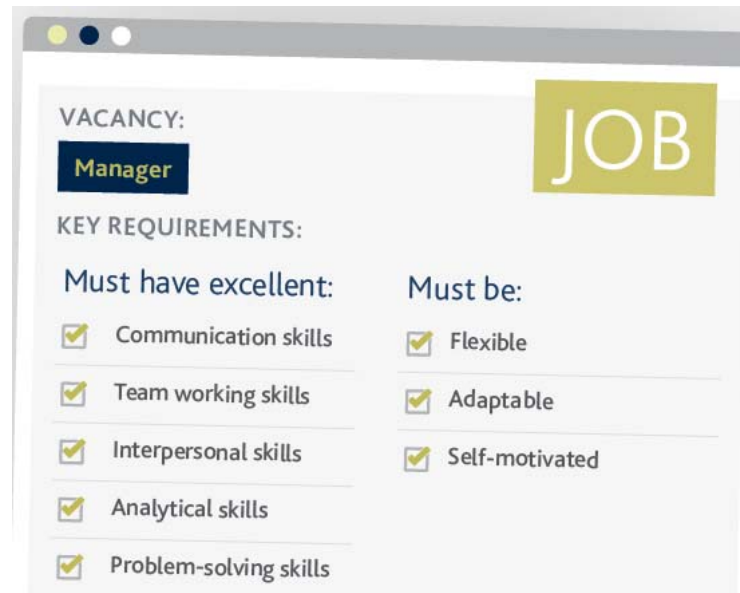


- This is a glossy brochure that gives general information about all the 9-1 GCSEs
- It gives full details of the 9-1 grading scale

Free resources from the website: Edexcel International GCSEs (9-1) - transferable skills

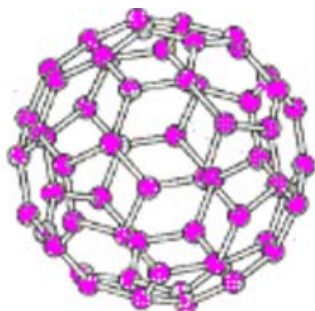


This is a glossy brochure that gives information about transferable skills in the context of the 9-1 GCSEs



Other internet resources 1

- There are many websites on the internet that provide free and useful information and support to chemistry teachers
- Very few of them are designed to cover a particular specification, but are still worth looking at
- Some of them are mentioned in the Scheme of Work – one is www.docbrown.info
- Here is one example of how this might help students understand the structure of C₆₀ fullerene (spec 1.50):



One of the simplest
'buckyballs' C₆₀

Other internet resources 2

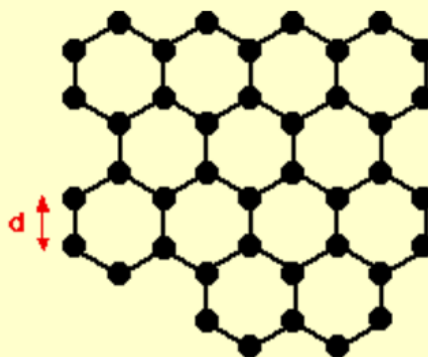
Another useful UK site is www.chemguide.co.uk - here is one small extract that also supports spec 1.50

explain how the structures of diamond, graphite and C₆₀ fullerene influence their physical properties, including electrical conductivity and hardness

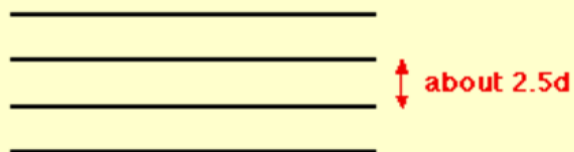
The giant covalent structure of graphite

Graphite has a **layer structure** which is quite difficult to draw convincingly in three dimensions. The diagram below shows the arrangement of the atoms in each layer, and the way the layers are spaced.

atoms in one layer:



a stack of layers:



RSC resources 3.1

- One of the best UK sites is the Royal Society of Chemistry
- Go to www.rsc.org then choose Resources and tools
- You can now click on either Learn Chemistry or ChemSpider
- Many resources can be downloaded free of charge

RSC resources 3.2

Learn Chemistry has a huge number of resources, and they can be searched by:

Select audience ▼	Select resource type ▼	Select age group ▼	Select subject ▼
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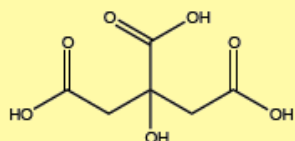
- Audience means Student or Teacher
- Resource type - a long list, e.g. video, experiment, handout
- Age group from Primary to Postgraduate – including 14-16
- Subject – includes Patterns, Organic chemistry and others

RSC resources 3.3

Here is one example of an infographic from Learn Chemistry

THE CHEMISTRY OF A LEMON

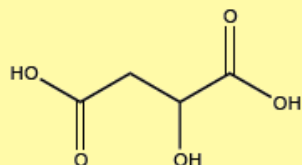
ACIDIC COMPOUNDS IN LEMONS



CITRIC ACID

The sour taste of lemons is caused by the presence of organic acids. The major acid in lemons is citric acid, which constitutes around 5 to 6% of the lemon's juice.

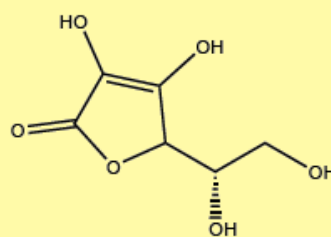
Other acids are also present, although in much lower concentrations than citric acid. Malic acid is one of these, present at around 5% of the concentration of citric acid.



MALIC ACID



VITAMIN C, LEMONS & SCURVY



VITAMIN C (ASCORBIC ACID)

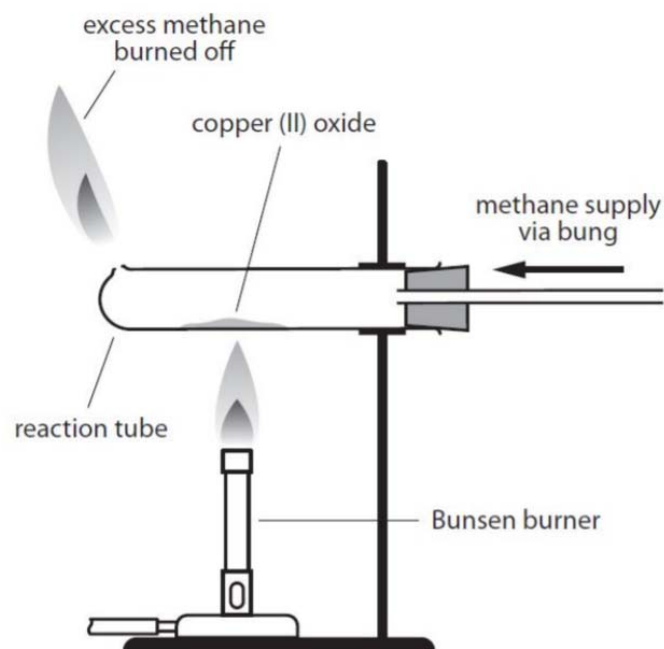
Lemons contain high levels of vitamin C, also known as ascorbic acid. The levels in lemons are around 50mg per 100g, on a par with oranges and around double the amount of limes.

Vitamin C deficiency can lead to scurvy, a disease that causes loss of teeth, jaundice, and eventually death. In the 1700s, all British ships were required to provide a lemon juice ration to seamen to guard against this disease.

RSC resources 3.4

Here is one example of a practical resource from Learn Chemistry

Finding the formula of copper(II) oxide



The resource includes:

- Practical details
- Safety precautions
- Sample calculation
- Video of the experiment

**The presentation is over –
any final questions?**



Finally – thank you for coming

**Please complete your evaluation form
and hand in before you leave**

Thank you!

Have a safe journey home