# PEARSON EDEXCEL INTERNATIONAL GCSE (9–1)

## Chemistry: Welcome to Pearson (Module 1)

Event code: 4CH1-20IO1

First teaching in 2017, first assessment in 2019

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# Aims and objectives

- To understand how the qualification is devised
- To review the content of the qualification
- To understand the assessment of the qualification
- To explore how to plan the course
- To identify the support available from Pearson

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# Agenda

| Item |
| --- |
| Introductions |
| Welcome to Pearson Edexcel |
| How the qualification is devised |
| Content of the qualification |
| Assessment of the qualification |
| Planning the course |
| **BREAK** |
| Support to help you deliver the content & to prepare your students |
| Other support available |

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# Welcome to Pearson Edexcel

# Welcome to Pearson Edexcel

Welcome to Pearson Edexcel,
the world's leading learning company and the UK's largest awarding body.

We set the standard for worldwide recognised qualifications, built on the UK educational system and accepted by universities worldwide.

We have a simple mission:
to help make a measurable impact on improving people's lives through learning.

*"We judge ourselves – and invite others to judge us – not by the products that we make but by the impact on learners."*

**John Fallon**,
Chief Executive Officer,
Pearson

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# About Pearson Edexcel

As the UK's largest awarding organisation, we are best placed to provide qualifications that are most closely aligned to the British educational system.

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# About Pearson Edexcel

We are the most reliable awarding organisation in the UK, recognised and trusted by educators, learners and employers to provide high quality qualifications.

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# About Pearson Edexcel

By helping you to realise student potential, you can prepare and empower all your students to progress to further education, university and employment.

# About Pearson Edexcel

Our technology capability allows us to provide you with more advanced support services, tools and resources to make life easier for school leaders, teachers and students.

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# About Pearson Edexcel

Pearson Edexcel are leading the way, challenging thinking and creating new ideas so you can be confident our qualifications will always be world-class.

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# HOW THE QUALIFICATION IS DEVISED

# Structure of the qualification

- The qualification consists of two external assessed examination papers.
- The total number of marks for this qualification is 180.
- This total is obtained by adding the mark for Paper 1C (out of 110 marks) to the mark for Paper 2C (out of 70 marks).
- The marks for the papers are not scaled.
- Based on the overall mark, students will be awarded a grade.
- The grades available range from 9 to 1, where 9 is the highest grade.

# CONTENT OF THE QUALIFICATION

# Overview of the specification

| Principles of chemistry | Inorganic chemistry | Physical chemistry | Organic chemistry |
|---|---|---|---|
| (a) States of matter<br>(b) Elements, compounds and mixtures<br>(c) Atomic structure<br>(d) The Periodic Table<br>(e) Chemical formulae, equations and calculations<br>(f) Ionic bonding<br>(g) Covalent bonding<br>(h) Metallic bonding<br>(i) Electrolysis | (a) Group 1 (alkali metals) – lithium, sodium and potassium<br>(b) Group 7 (halogens) – chlorine, bromine and iodine<br>(c) Gases in the atmosphere<br>(d) Reactivity series<br>(e) Extraction and uses of metals<br>(f) Acids, alkalis and titrations<br>(g) Acids, bases and salt preparations<br>(h) Chemical tests | (a) Energetics<br>(b) Rates of reaction<br>(c) Reversible reactions and equilibria | (a) Introduction<br>(b) Crude oil<br>(c) Alkanes<br>(d) Alkenes<br>(e) Alcohols<br>(f) Carboxylic acids<br>(g) Esters<br>(h) Synthetic polymers |

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# ASSESSMENT OF THE QUALIFICATION

# Paper-by-paper breakdown

| Paper 1 | Paper 2 |
|---|---|
| Externally assessed<br>• Availability: January and June<br><br>**Content summary**<br>Assesses core content that is **not** in bold and does not have a 'C' reference. Questions may come from any topic area across the specification.<br>1 Principles of chemistry<br>2 Inorganic chemistry<br>3 Physical chemistry<br>4 Organic chemistry | Externally assessed<br>• Availability: January and June<br><br>**Content summary**<br>Assesses **all the content**, including content that is in bold and has a 'C' reference.<br>Questions may come from any topic area across the specification.<br>Bold statements cover some sub-topics in greater depth.<br>1 Principles of chemistry<br>2 Inorganic chemistry<br>3 Physical chemistry<br>4 Organic chemistry |

# Paper-by-paper breakdown

| Paper 1 | Paper 2 |
| --- | --- |
| **Assessment**<br>• The paper is assessed through a 2-hour written examination paper set and marked by Pearson.<br>• The total number of marks is 110.<br>• A mixture of different question styles, including multiple-choice questions, short-answer questions, calculations and extended open-response questions.<br>• A calculator may be used in the examinations.<br><br>• 61.1% of the total International GCSE | **Assessment**<br>• The paper is assessed through a 1-hour and 15-minute written examination paper set and marked by Pearson.<br>• The total number of marks is 70.<br>• A mixture of different question styles, including multiple-choice questions, short-answer questions, calculations and extended open-response questions.<br>• A calculator may be used in the examinations.<br><br>• 38.9% of the total International GCSE |

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# 9–1 Grading scale

**Awarding**

- The grading system has changed from the legacy specification, but our commitment to awarding grades that accurately reflect learner exam performance remains the same.
- We set new grade boundaries (minimum number of marks needed to achieve each grade) for each assessment of each qualification.

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# 9–1 Grading scale

**Benefits**

- Greater differentiation across levels of attainment, e.g. 2 grades where the previous C grade is
- Rewards truly outstanding achievement with the grade 9
- Provides more information about student attainment to help progression to GCE A Level and IAL
- Same scale for Pearson Edexcel GCSE and International GCSE allows for clear comparison with UK standards

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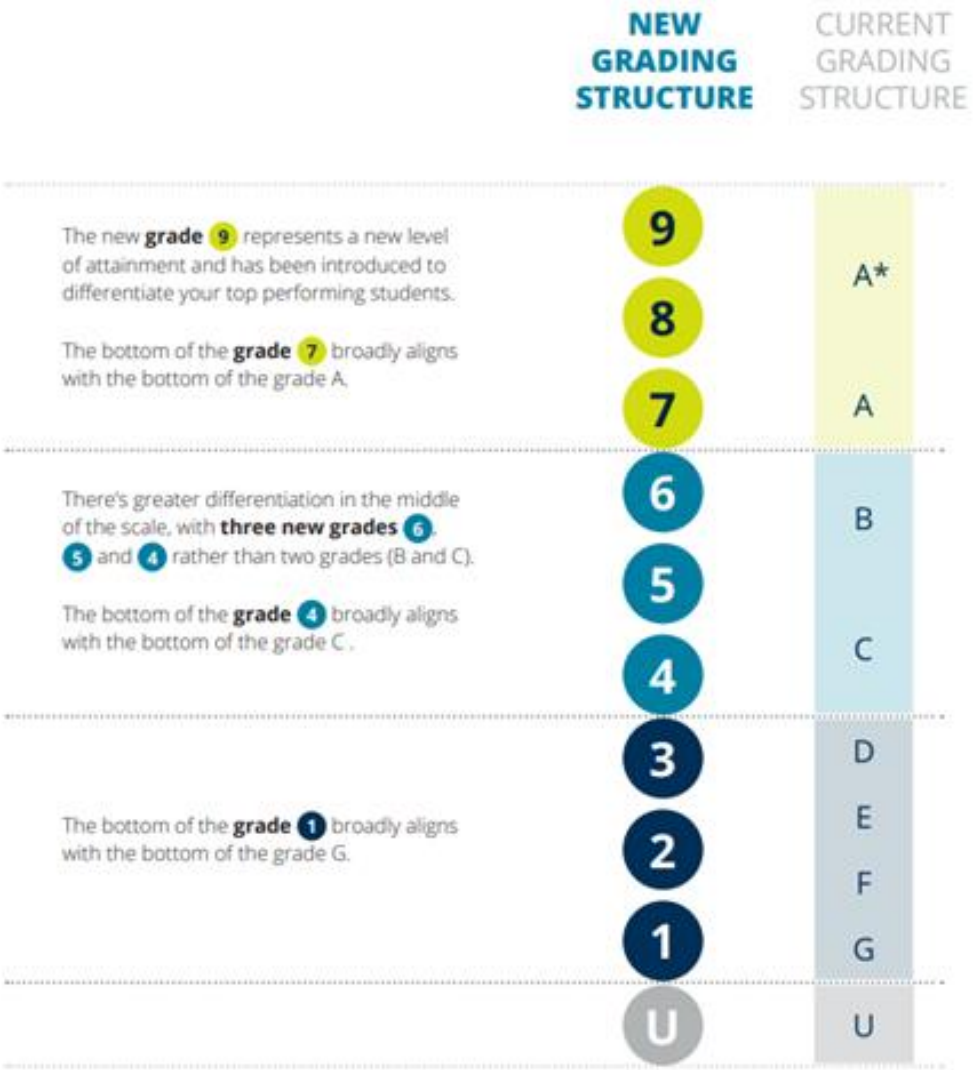
# 9–1 Grading scale



# Features of our question papers

- Our question papers are clear and accessible for students of all ability ranges, with straightforward mark schemes
- We use a series of well-defined command words
- Papers assess relevant mathematical skills – 20% of marks cover maths skills
- Question papers contain a mixture of question types, including MCQ questions

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# ACTIVITY 1

**Which specification point is the following question assessing?**

Malachite is an ore of copper containing copper(II) carbonate and several other compounds that are insoluble in water.

You are supplied with several pieces of malachite, these chemicals and items of apparatus.

Chemicals: dilute sulfuric acid magnesium powder

Apparatus: beakers filter funnel and paper pestle and mortar

Describe how you would use the chemicals and the apparatus to obtain a sample of copper from the malachite.

(6)

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# ACTIVITY 2

**Which specification points are the following questions assessing?**

**7** Dinitrogen tetraoxide, $N_2O_4$, is a colourless gas.

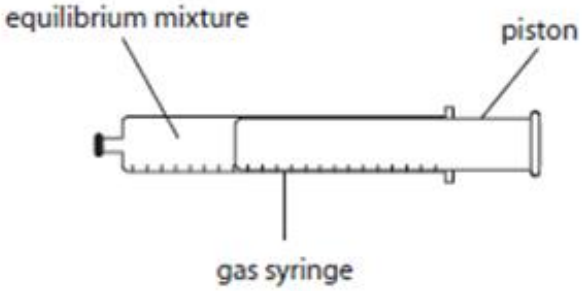
Nitrogen dioxide, $NO_2$, is a brown gas.

The two gases can exist together in dynamic equilibrium according to the equation

$$N_2O_4(g) \rightleftharpoons 2NO_2(g)$$

(a) Explain what is meant by the term **dynamic equilibrium**.

(b) Some $N_2O_4$ and some $NO_2$ are put into a sealed gas syringe and allowed to form an equilibrium mixture.




This equilibrium mixture is brown.

The pressure of the gas in the syringe is increased by pushing in the piston. The mixture is then allowed to reach a new equilibrium at the same temperature as before.

Explain why the new equilibrium mixture contains less $NO_2$ than the original equilibrium mixture.

# Some common errors seen in answers

- Referring to intermolecular forces of attraction when discussing the properties of substances with giant covalent structures, ionic compounds and metals
- Stating that covalent bonds are weak, and therefore require little energy to break, when explaining why simple molecular substances have low melting/boiling points
- Losing marks when writing chemical equations by getting the formulae incorrect (e.g. H instead of $H_2$, MgCl instead of $MgCl_2$)

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# Some common errors seen in answers

- Referring to changes in (kinetic) energy of the particles when explaining the effect of surface area of a solid or concentration of a solution of the rate of reaction
- Providing contradicting information when explaining the effects of the change of a variable on the position of equilibrium of a reversible reaction

  E.g. $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g) \quad \Delta H = -92$ kJ/mol
- A decrease in temperature will increase the yield of ammonia as the equilibrium shifts in the endothermic direction
- Note that Le Chatelier's principle is not on the specification
- Mark schemes never give credit for the idea that an equilibrium reaction "wants to resist a change" or "moves to oppose a change"

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# ACTIVITY 3

**What are the essential points to include when answering these two questions?**

$SiF_4$ and $SiCl_4$ have simple molecular structures.

$SiO_2$ has a giant covalent structure.

(i) Explain why the boiling point of $SiCl_4$ is greater than the boiling point of $SiF_4$

(2)

(ii) Explain why the boiling point of $SiO_2$ is very much greater than the boiling point of $SiCl_4$

(2)

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# ACTIVITY 3

| Simple molecular | Giant covalent |
|---|---|
| Compound exists as simple molecules | The structure is a giant lattice, not molecular |
| Weak forces between molecules | Strong covalent bonds between atoms |
| Forces easily overcome – so low boiling point | Lots of energy needed to break the bonds – high boiling point |
| Stronger intermolecular forces lead to higher boiling point | There are no molecules, so no intermolecular forces |

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# Assessment objectives

## Assessment objectives and weightings

| | | International GCSE |
|---|---|---|
| **AO1** | Knowledge and understanding of chemistry | 38–42% |
| **AO2** | Application of knowledge and understanding, analysis and evaluation of chemistry | 38 42% |
| **AO3** | Experimental skills, analysis and evaluation of data and methods in chemistry | 19–21% |
| | | 100% |

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# Assessment objectives

## Relationship of assessment objectives to units

| Unit number | Assessment objective | | |
|---|---|---|---|
| | AO1 | AO2 | AO3 |
| Chemistry Paper 1 | 23.2–25.7% | 23.2–25.7% | 11.6–12.8% |
| Chemistry Paper 2 | 14.8–16.3% | 14.8–16.3% | 7.4–8.2% |
| **Total for International GCSE** | 38–42% | 38–42% | 19–21% |

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# PLANNING THE COURSE

# Key documents

There are two key documents needed to deliver the course:

- The specification
- The SAMS

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# What is the specification?

- The specification is the main document you need to teach the course (see handout)
- It outlines the aims of the course, the content you **MUST** cover and all the information you need about assessing your students
- This document can be found on our website

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# What are the SAMS?

- SAMs is short for Sample Assessment Materials. This document is just as important as the specification (see handout).
- The SAMs are examples of the question papers and mark schemes and show the question types and how they will be marked by the examiners.
- We base all of our future papers and assessments on these Sample Assessment Materials.

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# How do I make sure I cover the content?

- Specification
- Schemes of work
- Lesson plans

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# Example Scheme of Work

## Edexcel International GCSE in Chemistry (2017)

| 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 |
|---|---|---|---|---|---|---|
| 1 | **Section 1: Principles of chemistry**<br>(a) States of matter | Students will be assessed on their ability to:<br><br>1.1 understand the three states of matter in terms of the arrangement, movement and energy of the particles<br><br>1.2 understand the interconversions between the three states of matter in terms of:<br>• the names of the interconversions<br>• how they are achieved<br>• the changes in arrangement, movement and energy of the particles<br><br>1.3 understand how the results of experiments involving the dilution of coloured solutions and diffusion of gases can be explained. | **Activity:**<br>• Model particle behaviour in the three states using trays of marbles; draw diagrams of the results.<br><br>**Demonstrations:**<br>• Diffusion of gases – ammonia and hydrogen chloride (RSC 65).<br>• Bromine diffusing into a gas jar of air.<br><br>**Class practicals:**<br>• Diffusion in liquids (RSC 27).<br>• Recording a heating curve for water, from ice to boiling point. | Edexcel International GCSE Chemistry Student Book: Pages 1–4<br><br>RSC Classic Chemistry Experiments Page 68<br><br>RSC Classic Chemistry Demonstrations Page 162 | Analysis | Analysis<br>Problem solving |

# Possible components of a lesson plan

**While there are many formats for a lesson plan, most lesson plans contain some or all of these elements, typically in this order:**

- Title of the lesson
- Time required to complete the lesson
- List of required materials
- List of objectives (what the student is expected to know by the end of the lesson)

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# Possible components of a lesson plan

- The ‘lead-in’ to the lesson that focuses students on the lesson’s  skills or concepts – this could include showing pictures or models, asking leading questions, or reviewing previous lessons.
- An instructional component that describes the sequence of events that make up the lesson, including the teacher's instructional input and, where appropriate, guided practice by students to consolidate new skills and ideas.
- Independent practice that allows students to extend skills or knowledge on their own.

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# Possible components of a lesson plan

- A summary, where the teacher wraps up the discussion and answers questions.
- A risk assessment where the lesson's risks and the steps taken to minimise them are documented.
- An analysis component the teacher uses to reflect on the lesson itself, such as what worked and what needs improving.

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# Practicals in the specification

- The specification lists 12 core practicals
- These are listed in italics as specification points

  E.g. 1.7C *practical: investigate the solubility of a solid in water at a specific temperature*

  2.43C *practical: prepare a sample of pure, dry lead(II) sulfate*

- It is strongly recommended that students complete these core practicals in order to develop skills

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# Practicals in the specification

- Other suggested practicals appear in the specification (see handout)
- The suggested practicals are optional
- You may add – or substitute – your own practicals too!

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# Experimental skills

- The best way to develop experimental skills is to embed practical investigations in teaching or theory.

- The development of knowledge and experimental skills can then happen together, leading to secure acquisition of both knowledge and skills.

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# Experimental skills

**In the assessment of experimental skills, students may be tested on their ability to:**

- solve problems set in a practical context
- apply scientific knowledge and understanding in questions with a practical context
- devise and plan investigations, using scientific knowledge and understanding when selecting appropriate techniques
- demonstrate or describe appropriate experimental and investigative methods, including safe and skilful practical techniques.

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# Experimental skills

**In the assessment of experimental skills, students may be tested on their ability to:**

- make observations and measurements with appropriate precision, record these methodically and present them in appropriate ways
- identify independent, dependent and control variables
- use scientific knowledge and understanding to analyse and interpret data to draw conclusions from experimental activities that are consistent with the evidence.

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# Experimental skills

**In the assessment of experimental skills, students may be tested on their ability to:**

- communicate the findings from experimental activities, using appropriate technical language, relevant calculations and graphs
- assess the reliability of an experimental activity
- evaluate data and methods taking into account factors that affect accuracy and validity.

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# BREAK TIME!

# PLEASE BE BACK IN 5 MINS

# SUPPORT

# Types of support available

**Online support:**

- Teaching and Learning Materials
- Past Papers, Mark Schemes & Examiner's Reports
- Teacher Resource Pack

**Published resources:**

- Student Books

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# Teaching and Learning Materials

| | | |
|---|---|---|
| Guidance on using Practical Terminology | Exemplar Material | Past Training Content |
| Getting Started Guide | Guide: Core Practicals | Guide: Maths for Scientists |
| Scheme of Work | Topic Guide: Chemical Bonding | Topic Guide: Chemical Equilibrium |

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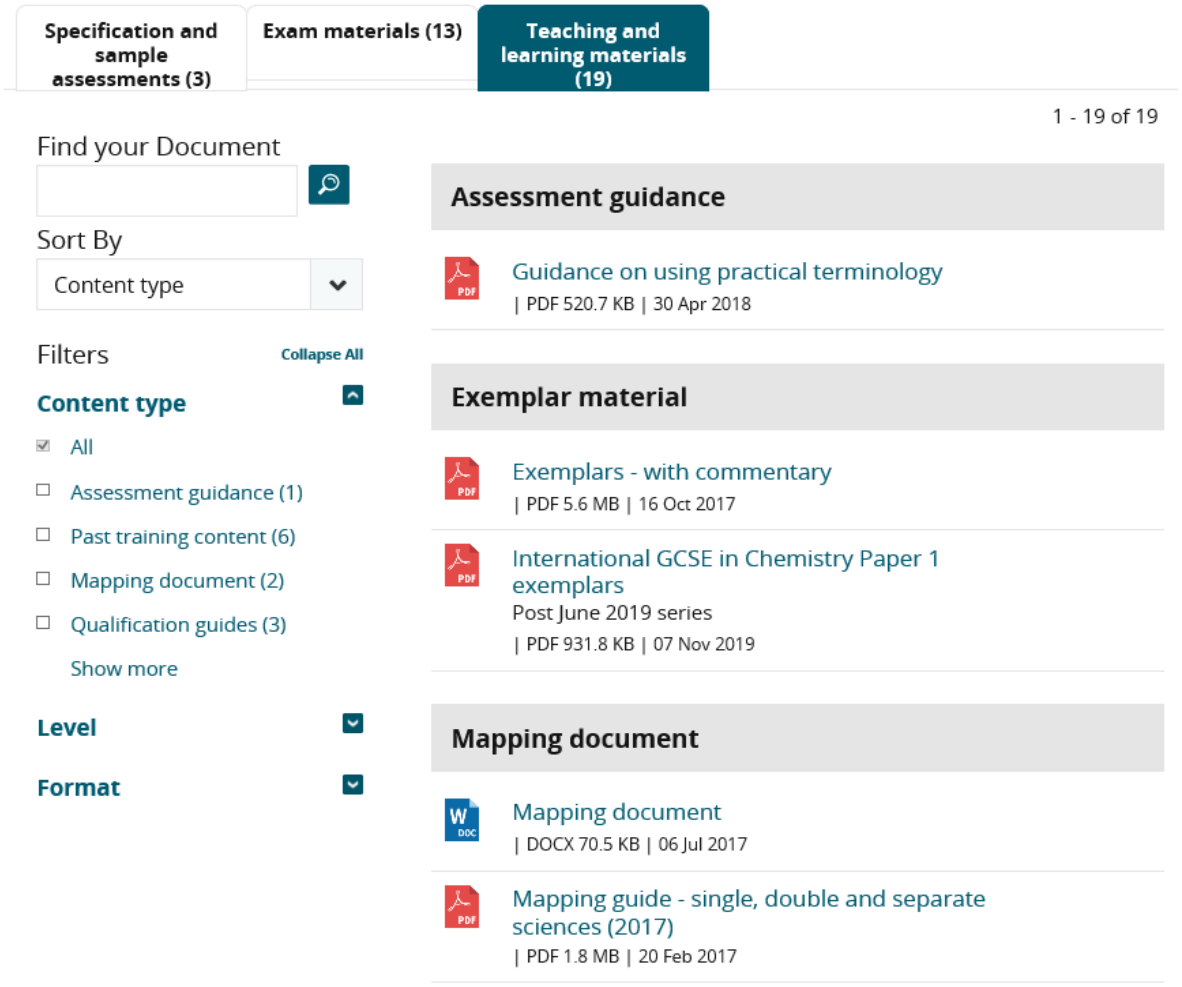
# Teaching and Learning Materials

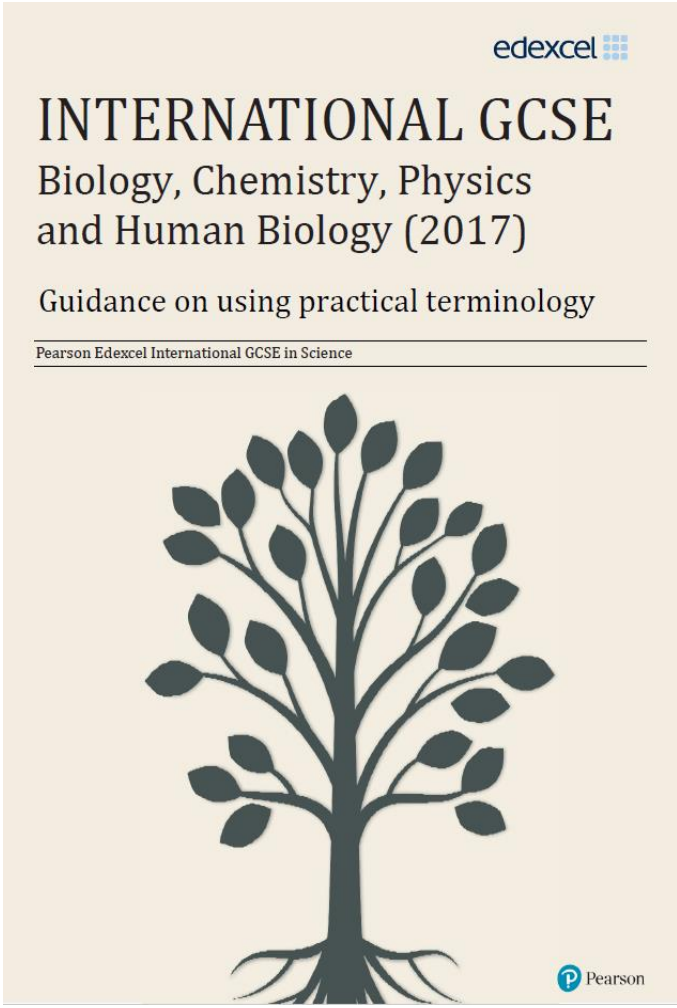


# Guidance on using practical terminology

The Guide illustrates the terminology by using it within the context of experimental and investigative work. Using terminology within the context of practical scenarios will, it is hoped, give students and teachers a better ‘feel’ for the terms used.

The Guide considers four different aspects of practical science:

- Planning investigations
- Using apparatus
- Making measurements
- Presenting and analysing data

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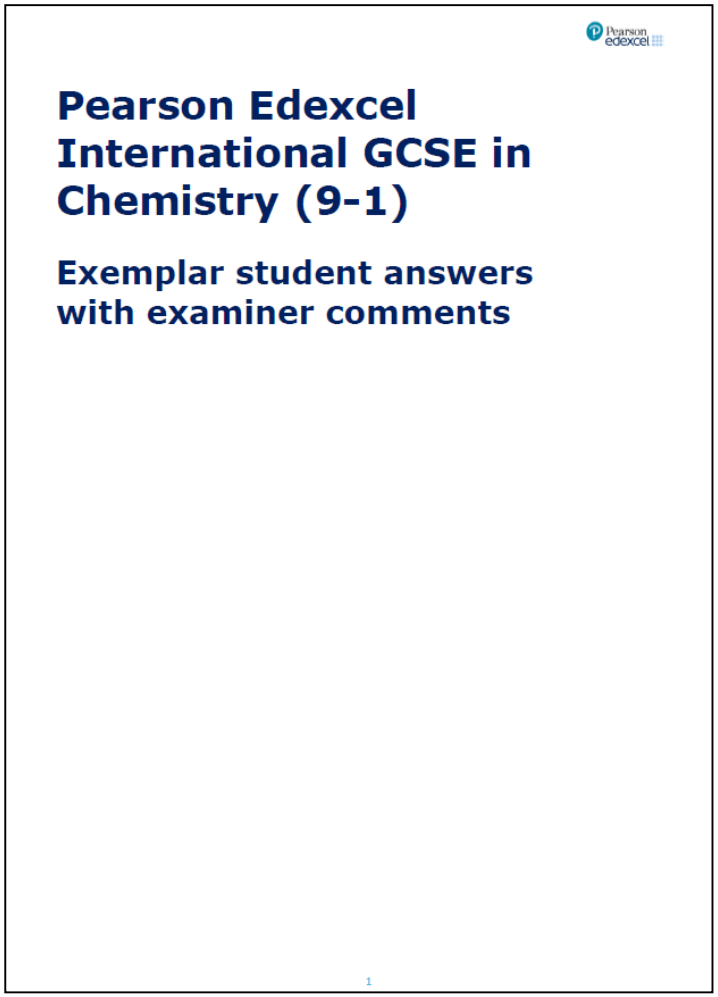
# Exemplar material

Marked exemplars with examiner commentaries



# Past training content

Training events such as:

- Getting Ready to Teach, and
- Effective Delivery and Assessment

are available in PDF format.

You need a username and password to access them.

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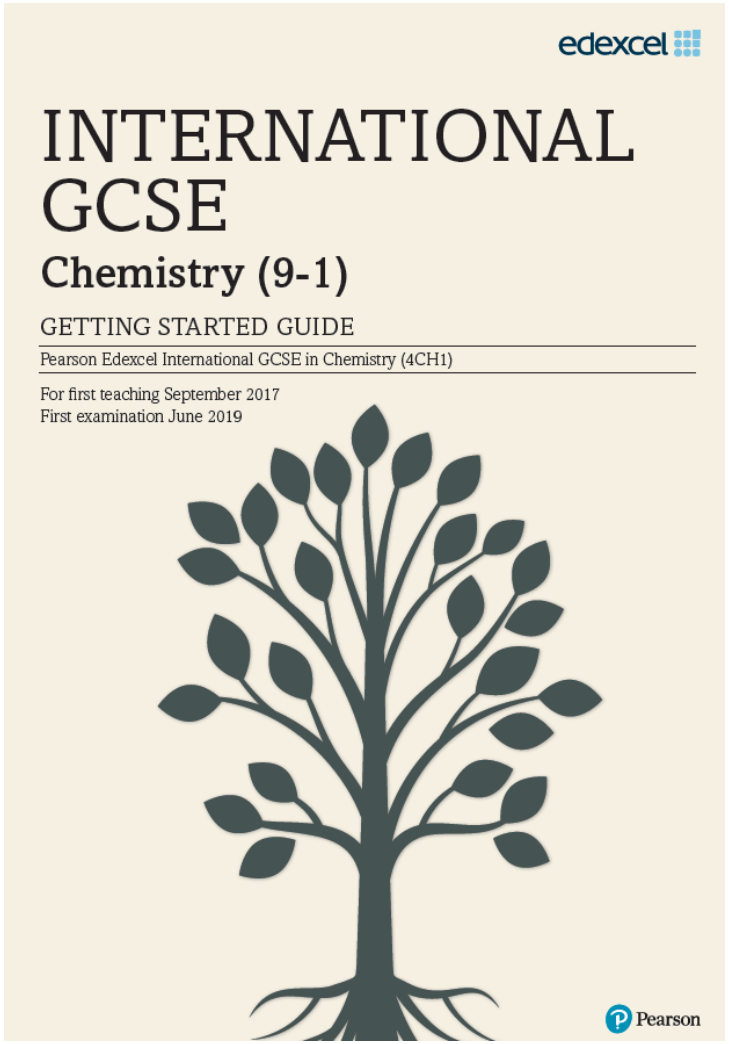
# Getting Started guide

The Getting Started guide provides an overview of the new International GCSE Chemistry qualification, to help you get to grips with the changes to content and assessment, and to help you understand what these mean for you and your students.

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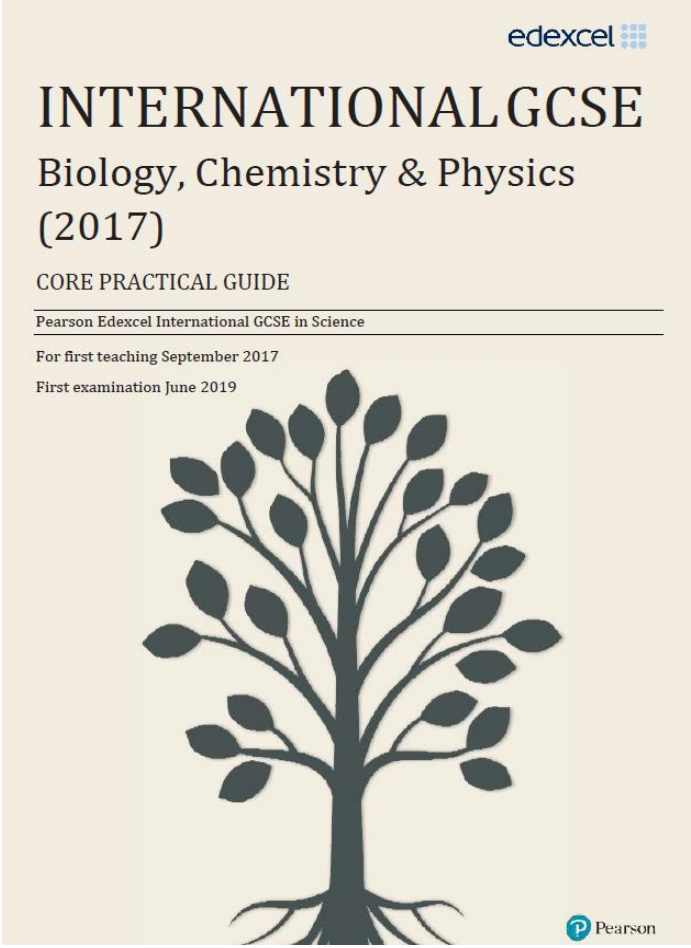
# Guide: Core practicals

This guide is designed to support you in delivering the core practicals.

- It gives you links to the specification content and highlight key areas to further your students' understanding.
- It contains key questions you can ask to focus your students and get them thinking about why they are carrying out a particular practical in a certain way.

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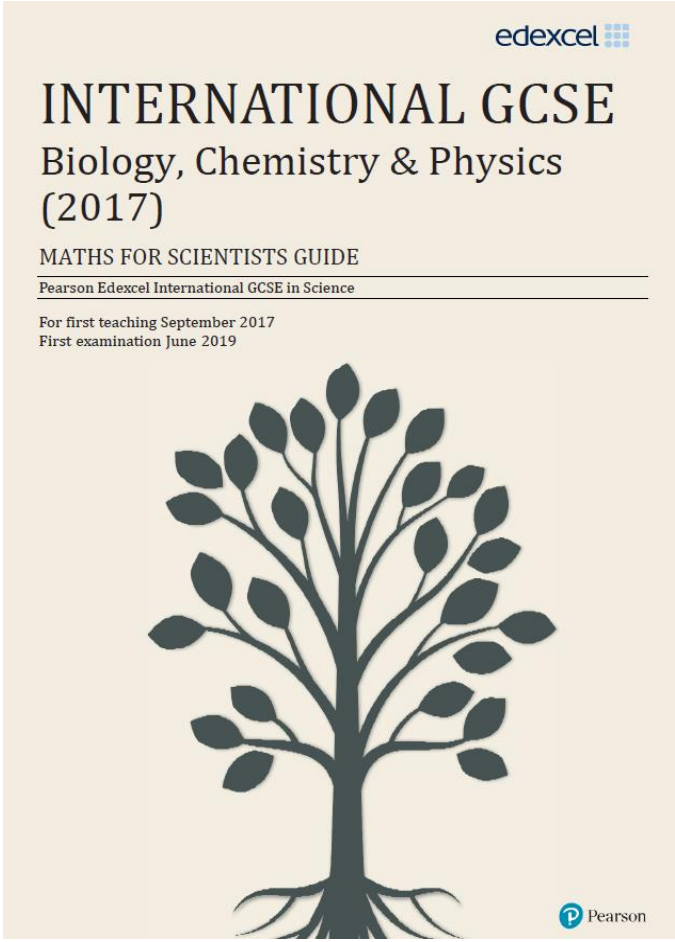
# Guide: Maths for scientists

This guide to maths for scientists outlines the content that students will have covered in their maths lessons throughout KS3 and KS4.

You can use this guide to help you understand how different areas are approached in maths, and therefore support your teaching of mathematical content in science lessons.

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# Scheme of Work

**How to use the scheme of work**

The Scheme of Work (SoW) has been made available on a word document rather than PDF, allowing you to edit the document in a way that suits your teaching style and student needs.

Guidance provided are suggested approaches that can be adapted by centres to suit their particular context.

This SoW is based on 2 hours of teaching time per week over 60 weeks and reflects how centres could use time for practical activities; you should edit this planner to suit your teaching approach.

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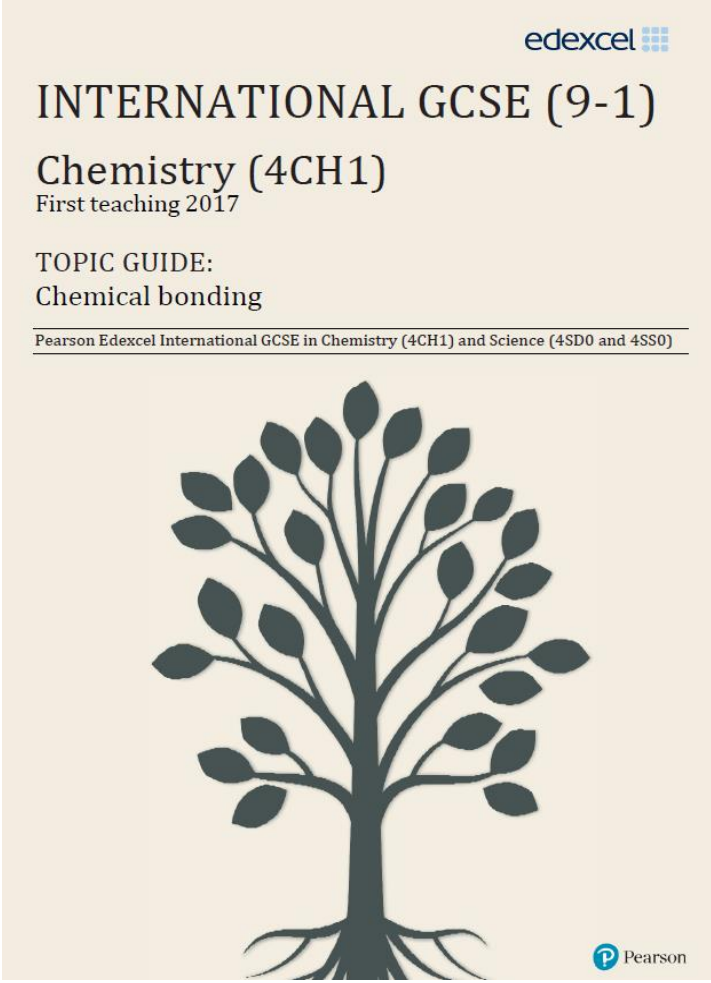
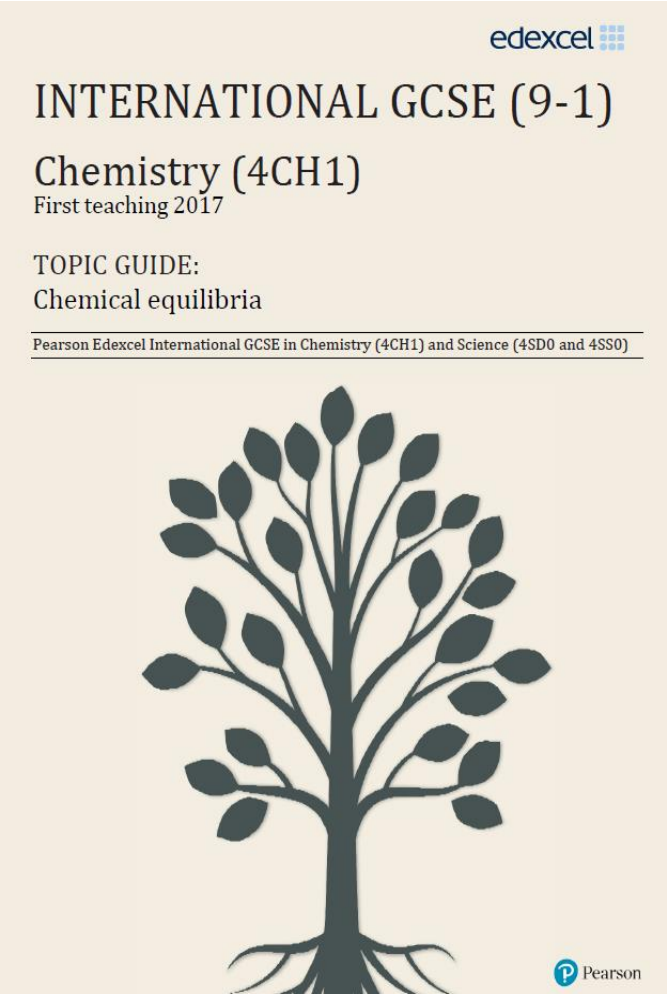
# Topic Guide: Chemical Bonding

This guide adopts a teaching approach to chemical bonding that does not involve the use of the so-called ‘Octet Rule’.



# Topic Guide: Chemical Equilibrium

This guide adopts a teaching approach to chemical equilibrium that does not involve the use of Le Châtelier's Principle

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# Past Papers, Mark Schemes and Examiner's Reports

These can be accessed from the Pearson website using the following link:

https://qualifications.pearson.com/en/support/support-topics/exams/past-papers.html

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# Published resources

- 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 are endorsed by Edexcel – which means that they have been checked for specification coverage.

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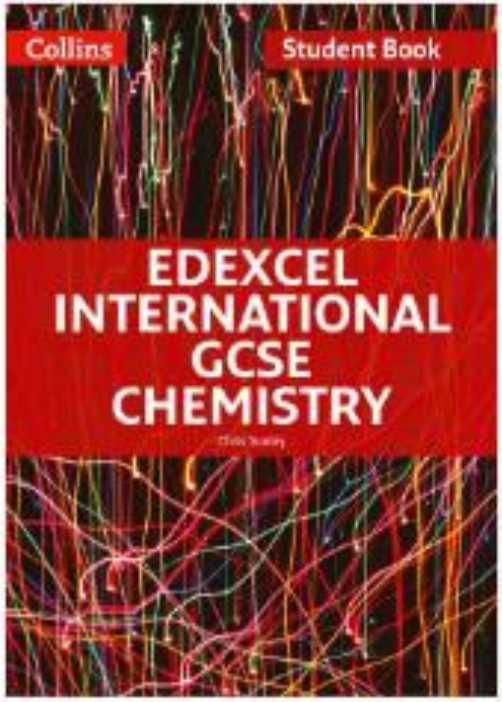
# Published resources – Collins

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



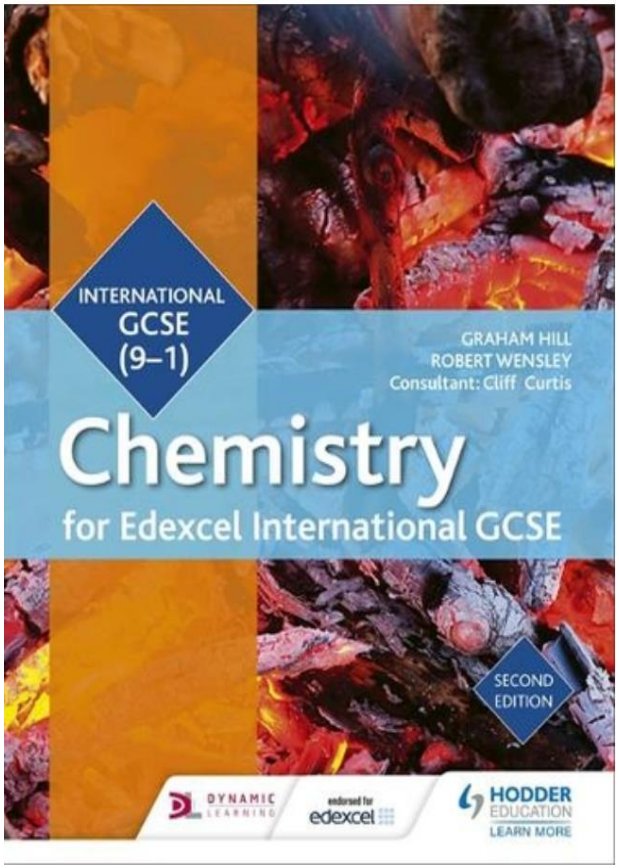

## Student Book

**Teacher Pack**

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/edexceligcs




**Student Book**
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**
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.

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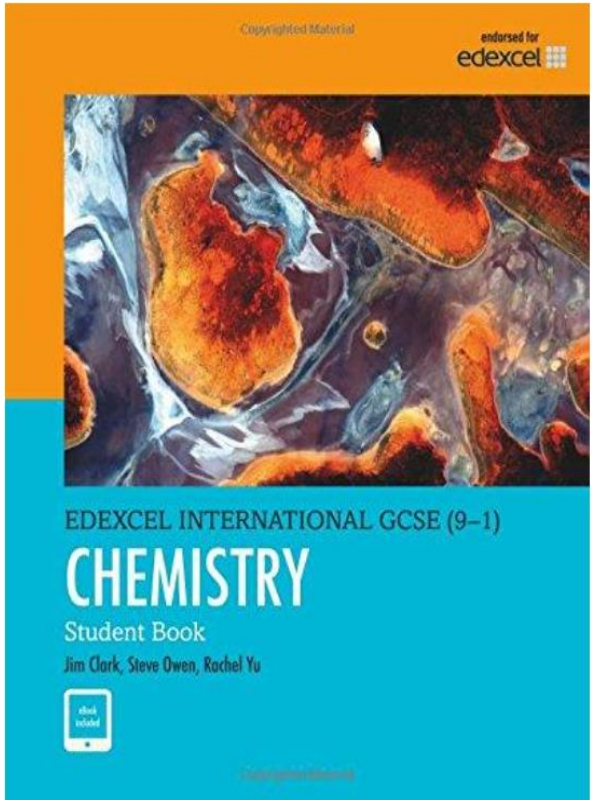
# Published resources – Pearson

http://www.pearsonglobalschools.com




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

**Teacher Pack**
This is available online, and includes videos, worksheets, lesson plans and other support to help you deliver the International GCSE in Chemistry.

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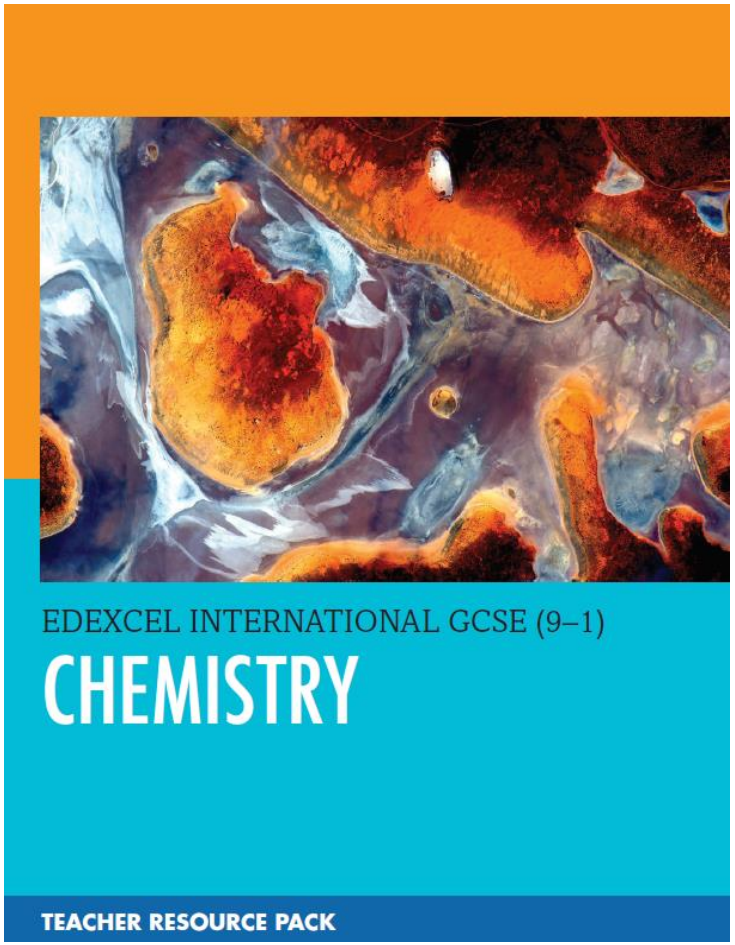
# Teacher resource pack

The pack contains lesson plans, worksheets, multiple choice questions with answers, exemplar student answers with commentaries.



# Other support available

| | | |
|---|---|---|
| ResultsPlus | examWizard | Post-results Service |
| Access to Scripts | Subject Advisor | Pearson International Schools Community |

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# Thank you

Find out more about us at:
**http://qualifications.pearson.com**

ALWAYS LEARNING