

# PEARSON EDEXCEL INTERNATIONAL GCSE (9-1)

**Understanding Assessment  
and Improving delivery in  
International GCSE  
Chemistry**

**ONLINE Module 2**



Event code:

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First teaching in 2017, first assessment in 2019.

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# Getting to know you

- ❖ Who are you, and at which school do you teach?
- ❖ Are you new to Pearson Edexcel International GCSE; or have you been teaching the existing specification?
- ❖ Do you also teach the Single Award or Double Award specifications?

# Aims and objectives

- ❖ investigate different assessment objectives, focusing on AO3 in this module, considering how questions have been answered by looking at feedback from the previous exam series
- ❖ discuss strategies for teaching to help students access questions targeting different assessment objectives
- ❖ review the support Pearson offers for the qualification
- ❖ network, discuss best practice and share ideas with other teachers

# Assessment objectives

## AO1

Knowledge  
and  
understanding  
in  
chemistry

## AO2

Application of  
knowledge  
and  
understanding,  
analysis  
and evaluation  
in  
chemistry

## AO3

Experimental  
skills, analysis  
and  
evaluation  
of data  
and methods  
in  
chemistry

# Assessment objectives

## AO1

Questions requiring students to recall and use information that you have taught them

## AO2

Questions requiring students to apply what you have taught them, or to use skills, or to analyse and make judgements

## AO3

Questions on practical work and associated practical skills, such as planning, drawing graphs, analysing data, evaluating methods

# AO<sub>3</sub> QUESTIONS

# What is AO3?

AO3 assesses the practical skills and understanding gained by students as they undertake practical work.

AO3 questions may require RECALL of practical techniques and understanding or APPLICATION of these to new situations.

AO3 may also involve the use of experimental data, and the evaluation of experimental methods or results.

# AO3: Recall of a Practical Technique

(e) Describe how the student could obtain a pure, dry sample of hydrated copper(II) sulfate crystals from the filtrate in stage 6.

(5)

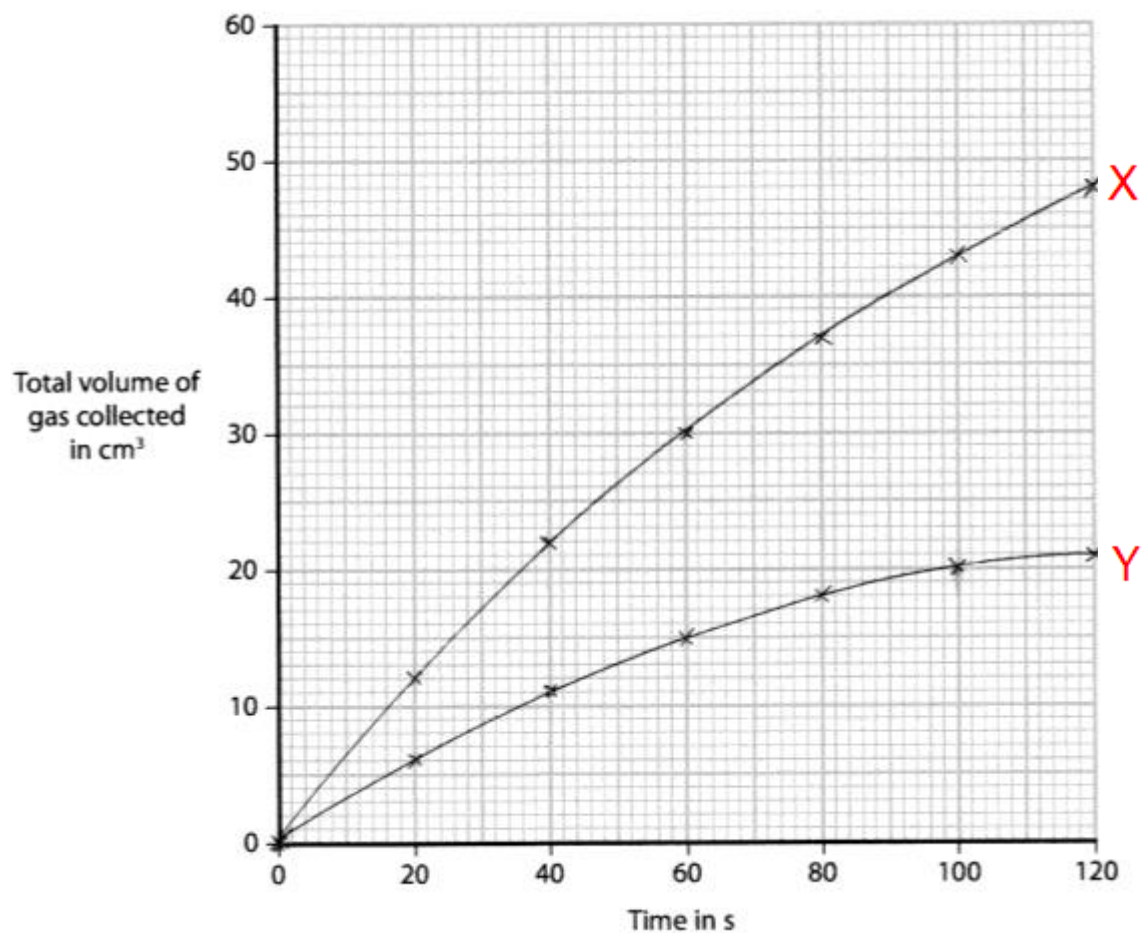


## AO3: Analysis of results – graph

The graph on the next slide shows the results of reacting two different acids, X and Y, with the same mass of magnesium ribbon and at the same temperature.

Explain how the curves show which acid has the greater concentration.

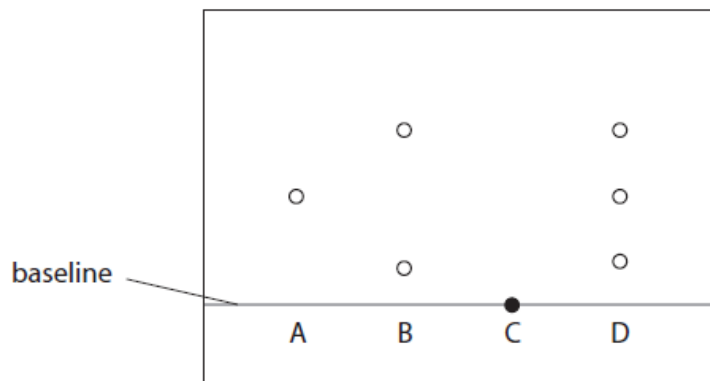
# AO3: Analysis of results - graph



# AO3: Analysis of results – diagram

(b) Another student does the experiment but does not make any mistakes.

The diagram shows her results.



(i) State how many colours ink D contains.

(1)

(ii) State which of the inks tested could be mixed together to make ink D.

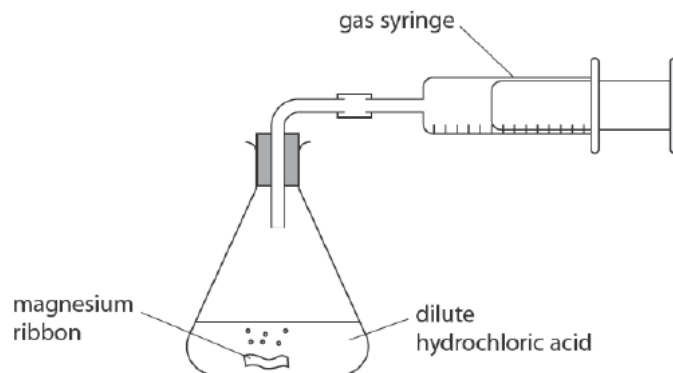
(1)

(iii) Explain which of the inks tested is insoluble in water.

(2)

# AO3: Evaluation of methods

- 13 A student uses this apparatus to investigate the rate of reaction between magnesium and an **excess** of dilute hydrochloric acid.



She uses this method.

- use a graduated beaker to pour  $50\text{ cm}^3$  of dilute hydrochloric acid of concentration  $2.00\text{ mol/dm}^3$  into the conical flask
- add a piece of magnesium ribbon of mass  $0.086\text{ g}$  to the acid and put the bung into the neck of the flask
- measure the total volume of gas collected every ten seconds until the reaction stops

- (c) The expected volume of gas produced in the first experiment is  $86\text{ cm}^3$ .

Suggest why the volume collected is less than the expected volume.

(1)

- (d) The student uses a graduated beaker to measure the volume of dilute hydrochloric acid.

Explain why it is **not** necessary to use a measuring cylinder in this experiment.

(2)

# AO3: Evaluation of methods

## Examiner's Report

### **Question 13 (c)**

This question was poorly answered by the majority of candidates. Many said that gas escapes or is lost, but very few of these went on to say why it escapes, so this was insufficient to be awarded the mark. Mention of the magnesium being impure was rarely seen. Some said that the magnesium did not fully react, which was not creditworthy because as the acid is in excess there is no reason why the magnesium would stop reacting.

### **Question 13 (d)**

This question was not particularly well answered. Many talked about an accurate measurement not being required but failed to mention that this was because the acid was in excess. As the second marking point was dependent on the first, answers such as these could not be awarded any marks.

# AO3: Use of data

(c) The table shows the results of experiments done by four students, A, B, C and D.

Alcohol	Formula of alcohol	Time taken for liquid to evaporate in s				
		Student A	Student B	Student C	Student D	Mean time in s
methanol	CH <sub>3</sub> OH	20	24	22	26	23
ethanol	C <sub>2</sub> H <sub>5</sub> OH	32	34	35	30	33
propanol	C <sub>3</sub> H <sub>7</sub> OH	45	47	50	48	48
butanol	C <sub>4</sub> H <sub>9</sub> OH	64	63	90	60	

(ii) Explain how the results show which alcohol evaporates most easily.

(2)

# AO3: Use of data

## Examiner's Report

### *Question 3 (c) (ii)*

Most candidates identified that methanol was the alcohol that evaporates most easily and gained the first mark.

The question asked for an explanation for this from the results, and as the results in the table were values of times, the required explanation needed to refer to methanol taking the shortest time.

# Teaching AO3 - Terminology

validity

anomaly

precision

accuracy

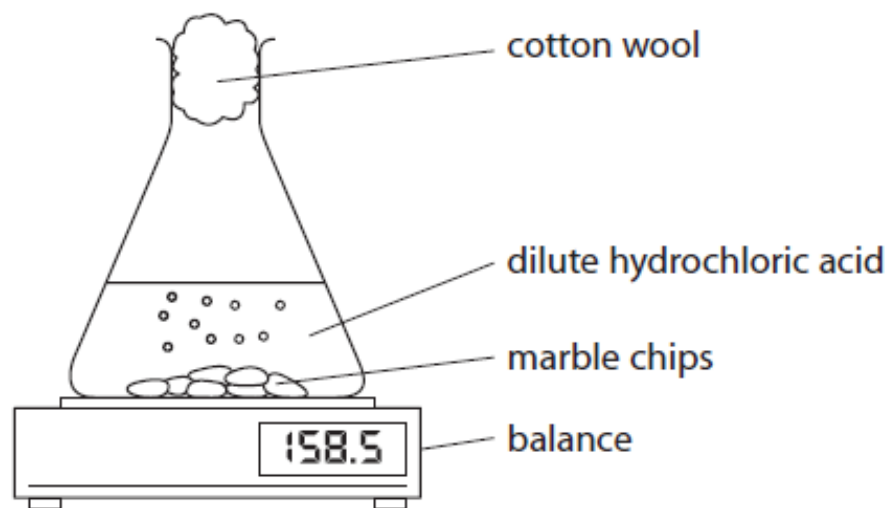
reliability





# Terminology – Accuracy

- 5 A student uses this apparatus to investigate the rate of reaction between marble chips and dilute hydrochloric acid.

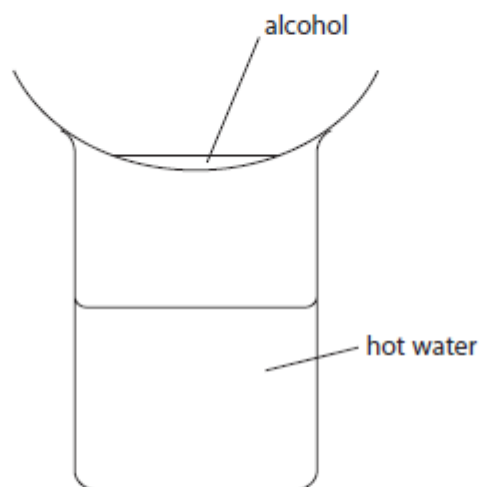


- (a) During the reaction, the reading on the balance decreases because mass is lost from the flask.
- (i) Explain how using the cotton wool increases the accuracy of this investigation. (2)

# Terminology – Validity

- 3 Methanol, ethanol, propanol and butanol are alcohols. They are all liquids that evaporate easily when warmed.

A student uses this apparatus to compare the time taken for the four liquids to evaporate.



She uses this method.

- pour some methanol into an evaporating basin
- place the evaporating basin on top of a beaker containing hot water
- measure the time taken for the methanol to evaporate completely
- repeat the experiment with each of the other alcohols, using the same apparatus

(a) State two variables the student should control to make sure her results are valid.

(2)

## ACTIVITY 5 – AO3 in exams

Your pack contains three questions from May/June 2019 Papers 1C and 2C, with mark schemes and student answers.

- ❖ Mark the questions using the scheme provided.
- ❖ Are students showing understanding of what they did in practical lessons?

# ACTIVITY 5 – AO3 in exams

Paper 1C, Q4(a)

Student 1

- 1 The starting level of the four different ink dots is below the water meaning the ink will not rise. To be done correctly they should be 1-2 cm above the waterline
- 2 The student has drawn the baseline in ink meaning that it will mix with and contaminate the inks that they want to use (A, B, C, D). This line should be drawn in pencil.

# ACTIVITY 5 – AO3 in exams

## Student 2

- 1 The student uses ink as the baseline. This is wrong as the ink could smear the ~~chromatography~~ chromatography paper which could make the test invalid.
- 2 The student submerges the ~~four~~ inks into the water. This will ruin the test as the inks will not travel up the paper properly. The student should have put the baseline and inks just above the water line.

# ACTIVITY 5 – $\text{AO}_3$ in exams

## Student 3

1 The baseline should not be drawn in ink it should be drawn in pencil as it will interfere with the results.

2 There should be a cover on top of the apparatus.

# ACTIVITY 5 – AO<sub>3</sub> in exams

Paper 2C, Q3(c)

Student 1 (c)(i)

(c) The table shows the results of experiments done by four students, A, B, C and D.

Alcohol	Formula of alcohol	Time taken for liquid to evaporate in s				
		Student A	Student B	Student C	Student D	Mean time in s
methanol	CH <sub>3</sub> OH	20	24	22	26	23
ethanol	C <sub>2</sub> H <sub>5</sub> OH	32	34	35	30	33
propanol	C <sub>3</sub> H <sub>7</sub> OH	45	47	50	48	48
butanol	C <sub>4</sub> H <sub>9</sub> OH	64	63	90	60	

(i) Calculate the mean (average) time for butanol to evaporate.

$$\frac{64 + 63 + 90 + 60}{4} = 69.25$$

$$\frac{63 + 64 + 60}{3} = 62.3$$

(2) Without anomaly

mean time = 69.25 s

# ACTIVITY 5 – $\text{AO}_3$ in exams

## Student 2 (c)(i)

(c) The table shows the results of experiments done by four students, A, B, C and D.

Alcohol	Formula of alcohol	Time taken for liquid to evaporate in s				
		Student A	Student B	Student C	Student D	Mean time in s
methanol	$\text{CH}_3\text{OH}$	20	24	22	26	23
ethanol	$\text{C}_2\text{H}_5\text{OH}$	32	34	35	30	33
propanol	$\text{C}_3\text{H}_7\text{OH}$	45	47	50	48	48
butanol	$\text{C}_4\text{H}_9\text{OH}$	64	63	90	60	

(i) Calculate the mean (average) time for butanol to evaporate.

(2)

mean time = 62 s



# ACTIVITY 5 – AO<sub>3</sub> in exams

## Student 3 (c)(i)

(c) The table shows the results of experiments done by four students, A, B, C and D.

Alcohol	Formula of alcohol	Time taken for liquid to evaporate in s				
		Student A	Student B	Student C	Student D	Mean time in s
methanol	CH <sub>3</sub> OH	20	24	22	26	23
ethanol	C <sub>2</sub> H <sub>5</sub> OH	32	34	35	30	33
propanol	C <sub>3</sub> H <sub>7</sub> OH	45	47	50	48	48
butanol	C <sub>4</sub> H <sub>9</sub> OH	64	63	90	60	

(i) Calculate the mean (average) time for butanol to evaporate.

(2)

$$\begin{array}{l}
 64 + 63 + 90 + 60 \\
 \hline
 = 69.25
 \end{array}$$

4. Remove the

$$\begin{array}{l}
 64 + 63 + 60 \\
 \hline
 3
 \end{array}
 = 62.3 \text{ approx.}$$

mean time =  $\frac{62.3}{1} = 62.3$  s

# ACTIVITY 5 – AO3 in exams

Paper 2C, Q3(c)

Student 1 (c)(ii)

methanol evaporates most easily because it's mean  
time taken to evaporate is the ~~smallest~~ lowest out of all  
the alcohols.

# ACTIVITY 5 – $\text{AO}_3$ in exams

## Student 2 (c)(ii)

The results show that methanol evaporates  
most easily

# ACTIVITY 5 – $\text{AO}_3$ in exams

## Student 3 (c)(ii)

The results show that Methane evaporates the easiest because it takes less time on average to evaporate compared to Butanol which takes the longest.

# ACTIVITY 5 – $\text{AO}_3$ in exams

Paper 2C, Q3(c) (iii)

Student 1

The fewer carbon atoms, the quicker the reaction. More carbon atoms makes evaporation slower.

# ACTIVITY 5 – $\text{AO}_3$ in exams

## Student 2 (c)(iii)

The more carbon atoms in a molecule, the longer it takes for the alcohol to evaporate. ~~A small~~  
A less number of carbon atoms, the ~~alco~~ alcohol evaporates more easily.

# ACTIVITY 5 – AO3 in exams

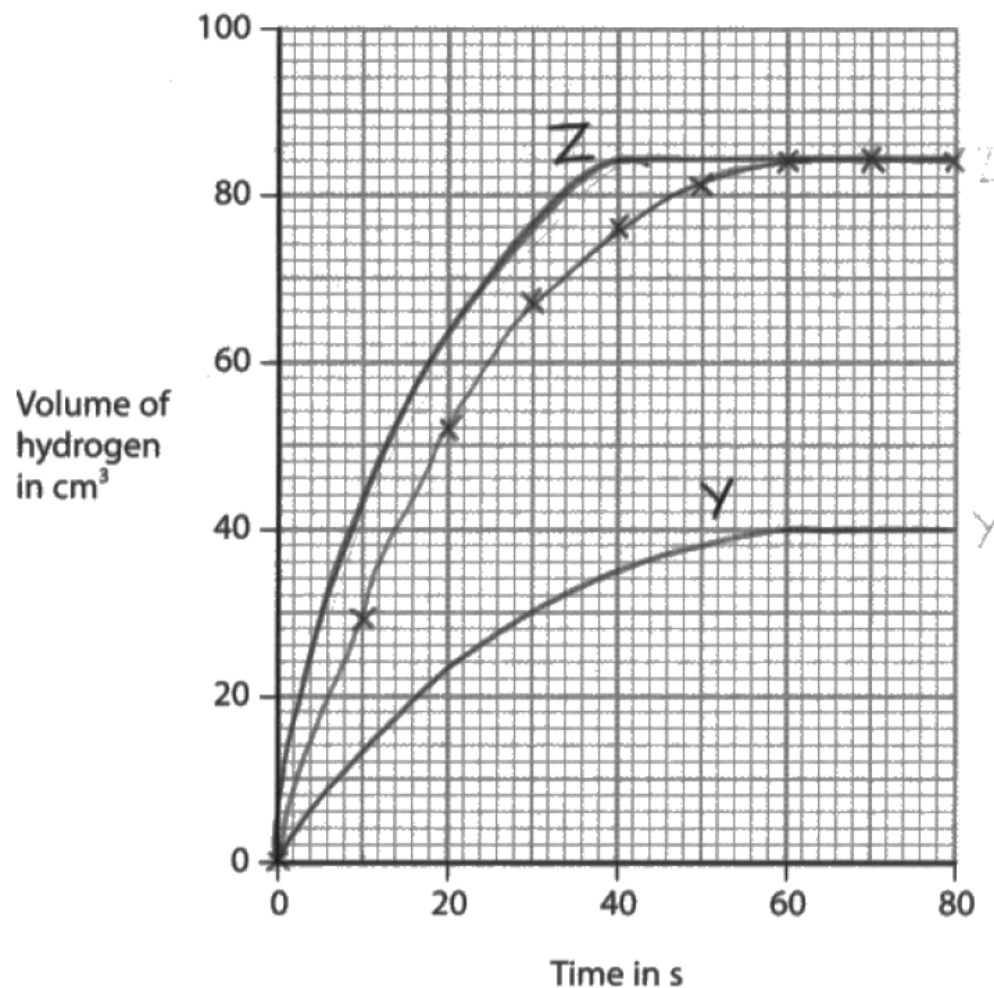
Student 3 (c)(iii)

The greater the number of carbon atoms in the molecule, the longer the alcohol takes to ~~evaporate~~ evaporate and so the less easily it evaporates. For example, methanol (which only has one carbon atom) takes an average of 23 seconds to evaporate compared (Total for Question 3 = 9 marks) to propanol (which has three carbon atoms) which takes an average of 48 seconds to completely evaporate.

# ACTIVITY 5 – $\text{AO}_3$ in exams

Paper 1C, Q13(a) & (b)

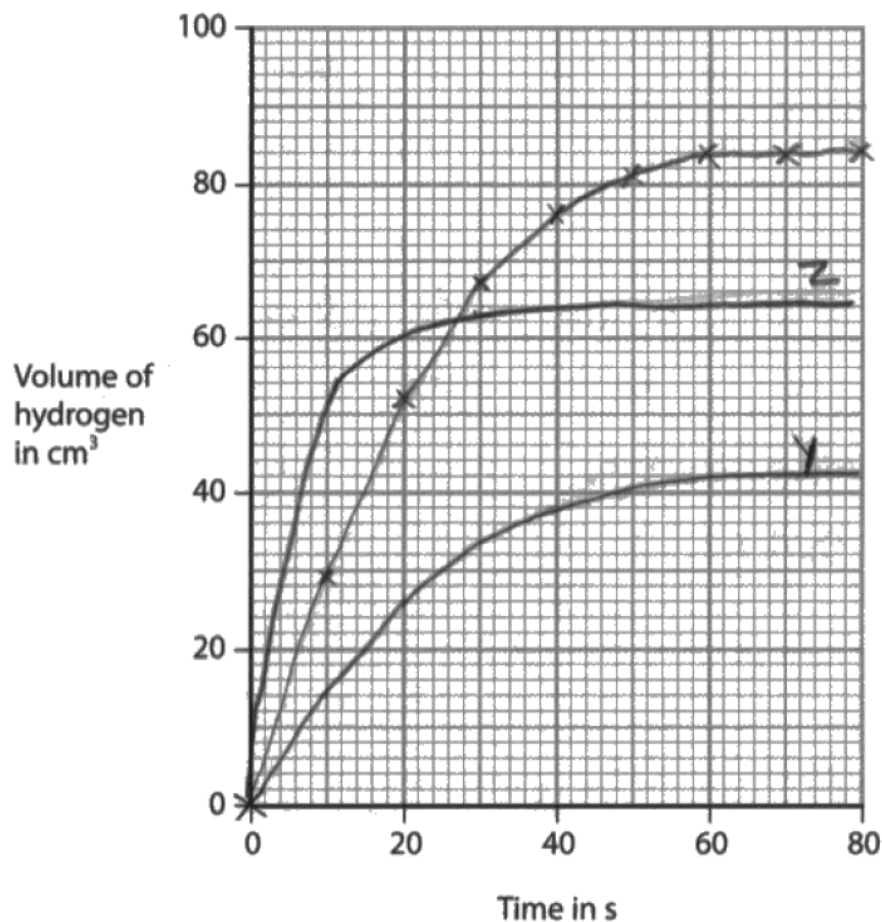
Student 1





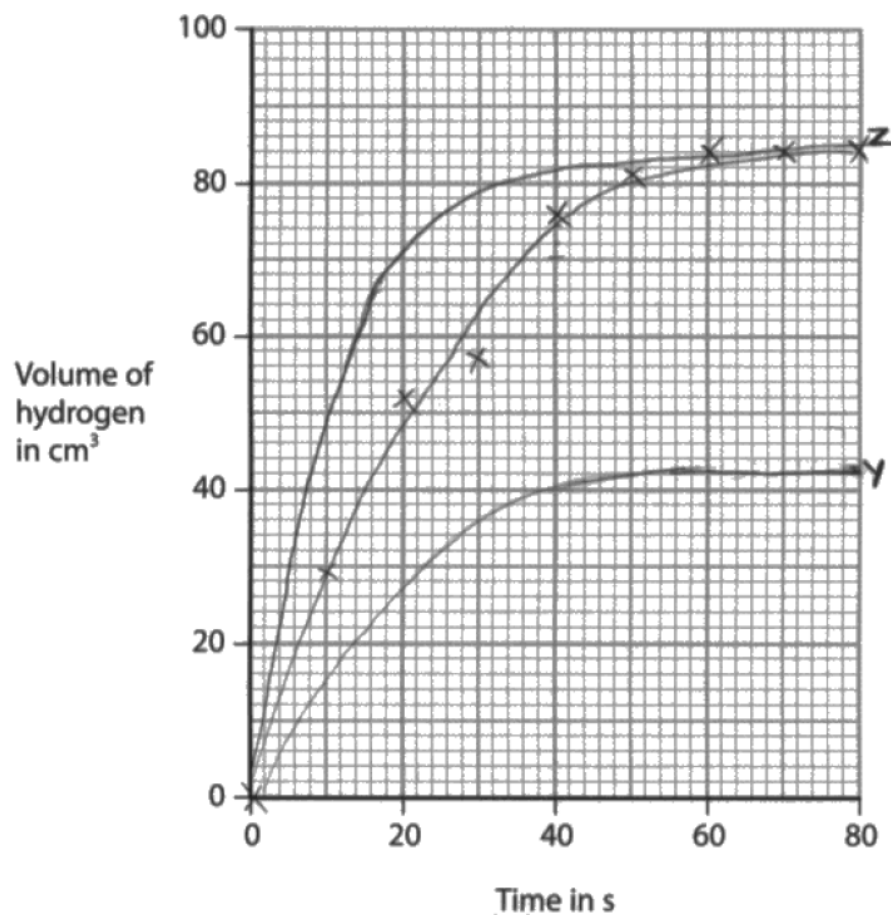
# ACTIVITY 5 – $\text{AO}_3$ in exams

## Student 2



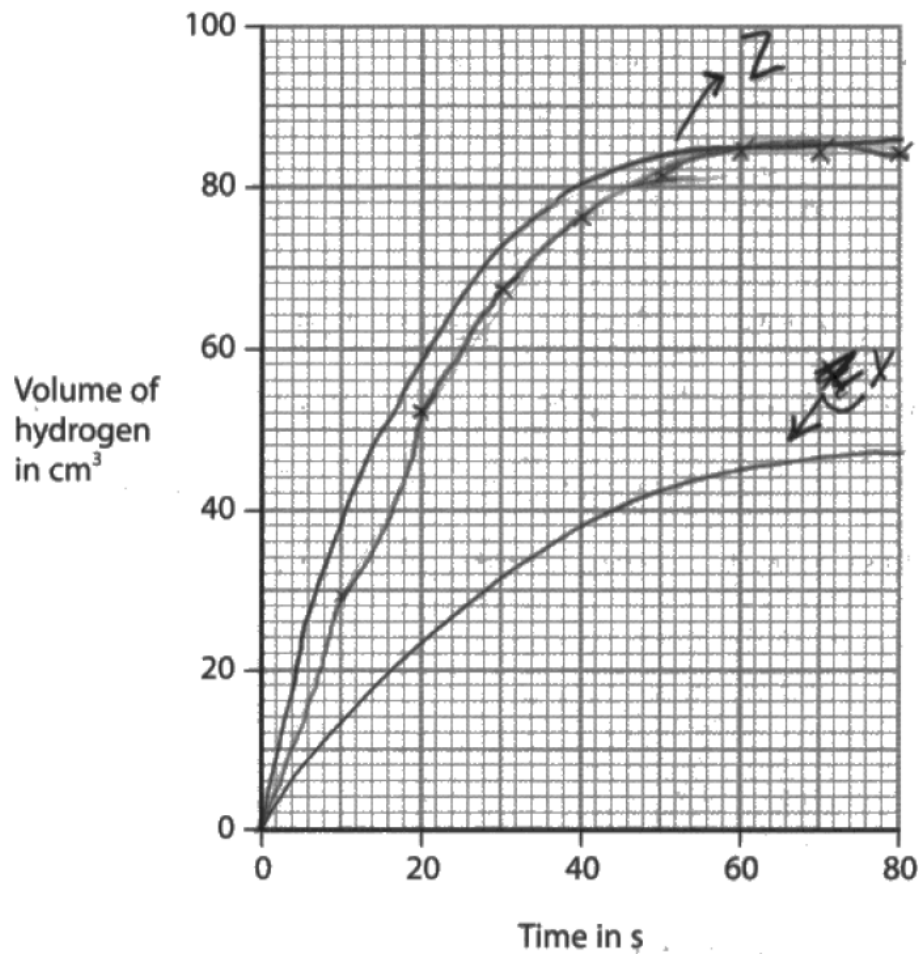
# ACTIVITY 5 – $\text{AO}_3$ in exams

## Student 3



# ACTIVITY 5 – $\text{AO}_3$ in exams

## Student 4



# Teaching AO3 – doing practical work

- ❖ The specifications for International GCSE Chemistry contain a number of practical activities that form part of the subject content.
- ❖ Exam questions expect students to be familiar with methods for these practicals.
- ❖ Questions also expect students to apply their knowledge of practical methodology to unfamiliar scenarios.

# Teaching AO3 – doing practical work

- ❖ Why should students do practical work?
- ❖ Are students getting knowledge or skills from practical activities?
- ❖ When do you do practical activities: before or after teaching the theory of a topic?

# Preparing students for AO3

## Teaching approaches: fact .v. investigative

Why does copper turn black when heated in air using a Bunsen burner?

**Fact:** Copper reacts with oxygen to form copper(II) oxide

**Investigative:** What may have caused the black substance to appear?

Answer – the Bunsen flame or the air

How can we find out which?

Answer – heat the copper in a vacuum (not practical)

OR

heat the copper in a test tube so it is not in contact with the Bunsen flame

# Preparing students for AO3

## Teaching approaches: fact .v. investigative

**Investigative:** The copper stills turns black so it must be something in the air

How can we find out which gas in the air is responsible?

Answer – heat copper in each gas separately (not practical)

- heat copper in a sample of air and find out the percentage of gas used up
- $\approx 20\%$  used up, so copper has combined with oxygen

# Preparing students for $\text{AO}_3$

## Good, I'm glad it's gone wrong!

- ❖ Add 1 cm depth of  $1 \text{ mol/dm}^3$  hydrochloric acid to each of three boiling tubes
- ❖ Leave one tube at room temperature
- ❖ Place the second in a water bath at  $\approx 40^\circ\text{C}$
- ❖ Place the third in a water bath at  $\approx 60^\circ\text{C}$
- ❖ You are going to add a 1 cm strip of clean magnesium ribbon to each tube and measure how long it takes for the magnesium ribbon to completely disappear
- ❖ Predict the order of disappearance and then do the experiment



# Preparing students for AO3

**Prediction** – magnesium disappears first at 50°C and last at room temperature

**Outcome** – magnesium usually disappears first at room temperature and last at 60°C

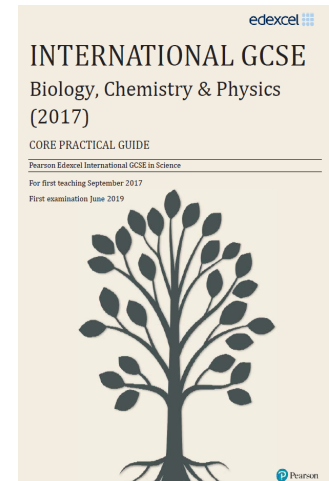
**Explanation** – gas given off so violently at 60°C that magnesium continuously lifts off the acid and falls back down  
– at room temperature the magnesium sinks

# ACTIVITY 6 – Questions for practicals

Your pack has a list of Core Practical.

- ❖ Select one Core Practical from the list: it should ideally be one that your students actually do.
- ❖ What questions would you ask your students as they do this practical?
- ❖ What homework would you set?

# Core practical guide



- ❖ An introduction to each practical activity.
- ❖ Description of the practical, with some useful hints and tips.
- ❖ Questions to use with students to test their understanding as they do the experiment in the lab.
- ❖ A past paper question, where relevant, to use as a homework activity.

# SUPPORT

# What's on the website?

## Chemistry (2017)


[Specification](#)
[Course materials](#)
[Published resources](#)
[News](#)

### Specification


[DOWNLOAD](#)

PDF | 1.5 MB

First teaching: **2017**  
First external assessment: **2019**

Our Pearson Edexcel International GCSE (9-1) Chemistry specification and support materials have been developed with the help of teachers, higher education representatives and subject expert groups.

The qualification supports progression to further study, with up-to-date content reflecting the latest thinking in the subject. It is comparable to

### Register your interest

Find out more about Pearson Edexcel International qualifications and sign up to receive the latest news.

[➤ Let us know](#)

### Course materials

- [Specification and sample assessments \(3\)](#)
- [Exam materials \(13\)](#)
- [Teaching and learning materials \(18\)](#)



### Teacher support and training

- [Training sessions](#)
- [Results support](#)
- [New 9-1 grading scale explained](#)



# Teaching and learning materials

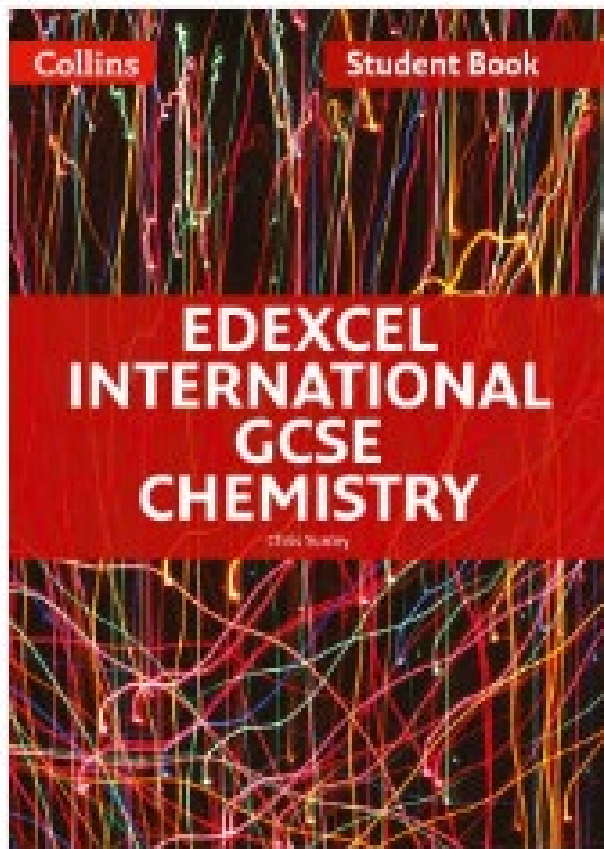
- Guidance on using practical terminology
- Exemplars with commentary
- Mapping documents
- Past training materials
- Guide for Core Practicals and Mathematics
- Scheme of work
- Topic Guides – Chemical bonding and chemical equilibrium

# 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

# Published resources – Collins

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



## Student Book Teacher Pack

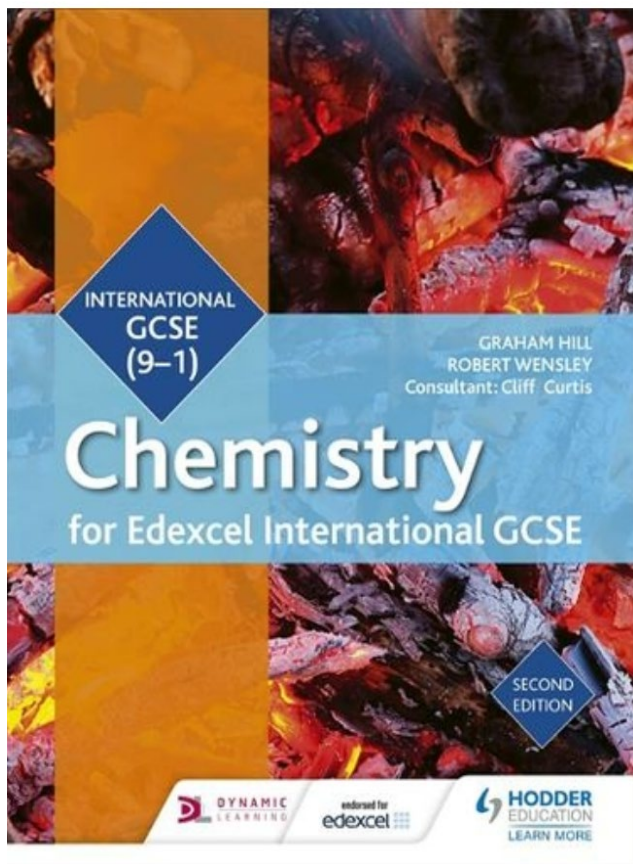
The Collins Student Book allows you to co-teach Edexcel International GCSE Chemistry and Double Award Science.

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/edexceligcse](http://www.hoddereducation.co.uk/edexceligcse)



- **Student Book**

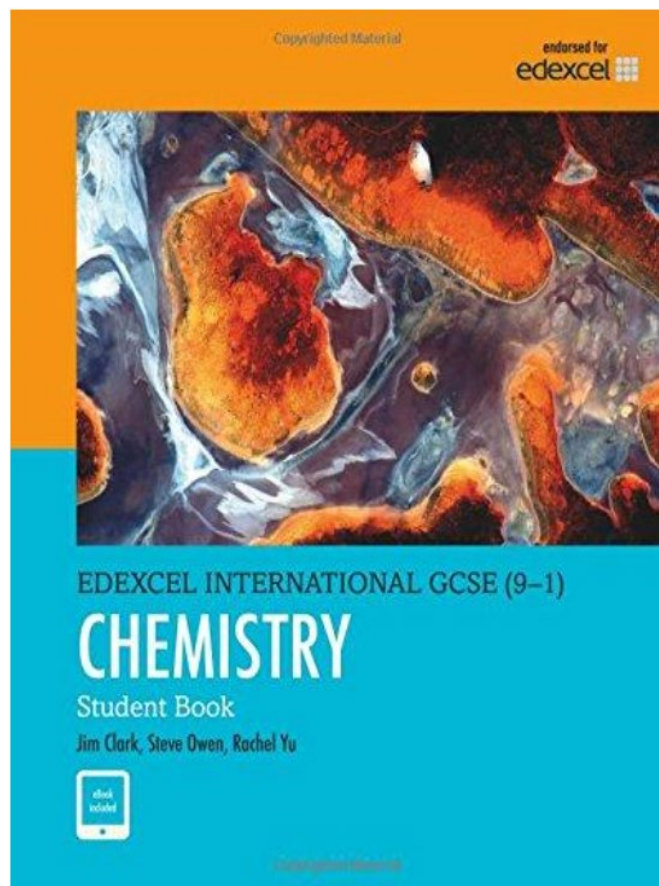
Provide your students with complete coverage of the Edexcel International GCSE Chemistry specification with these affordable student books written by expert authors and teachers; testing knowledge and building practical skills throughout.

- **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.

# 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.



**ResultsPlus is the free online results analysis tool for teachers - it provides analysis features that other similar solutions don't**

- Provides a detailed breakdown of student performance in Edexcel exams.
- Helps identify topics where the student can benefit from further learning and allows this knowledge to inform teaching strategies and approaches.
- Provides a comparison of student performance at regional level.
- Allows you to view your school's performance against other Pearson Edexcel schools in your country. You can also find student results analysis from their previous Pearson Edexcel school.
- Mock exams results can also be fed into the system to produce an analysis.
- [ResultsPlus Direct](#) gives your students access to their final grades and performance breakdown, wherever they are.
- Sign up for free ResultsPlus account in just a few quick and easy steps [here](#).
- Access additional video guides here:
  - [ResultPlus - Individual Student Analysis](#)
  - [ResultsPlus - Cohort Analysis](#)
  - [ResultsPlus - Mock Analysis](#)
  - [ResultsPlus - Global Analysis](#)



**examWizard is a free tool for teachers containing a bank of past paper questions to help create their own bespoke mock exams and tests to focus on particular topic areas as needed:**

- Use existing mark schemes for accurate marking
- Use existing examiner report for insight
- Use the results to understand where students need more support, informing teaching strategies.

**Unlike other similar question banks, ExamWizard is:**

- Available free to all Edexcel centres
- Updated with latest questions faster, following the exam series
- One stop shop for assessment material with access to whole past papers and examiner reports as well as the ability to construct bespoke ones easily with content tagged to specific attributes.

# New Access to Script (ATS) Online Portal

**Access to Scripts (ATS) is a free online portal which allows teachers to immediately access electronically marked exam papers**

Provides enhanced transparency and:

- Offers transparent approach to marking process
- Provides better understanding of marking before requests for enquiries about results are made
- Provides excellent aid for teaching and preparing other cohorts for examinations by helping you to evaluate a student's performance on particular questions in relation to what they have been taught.

Available instantly from results day for all our examination series, for a defined window, you can view and download scripts which have been marked online free of charge from our Self-Service Portal.

**For more information on ATS, and the post-results windows, visit our [post-results pages here](#).**



# Examination feedback

- ❖ Look out for our pre-recorded feedback sessions for International GCSE.
- ❖ These provide feedback directly from the Principal Examiner on the summer's exams.
- ❖ Examiner reports are also provided on each subject website, with question papers and mark schemes.

# Contact your Subject Advisor

Your Science Subject Advisor team can be contacted through our website:

<https://qualifications.pearson.com/en/contact-us/teachers.html>

Phone: **+44 (0)330 058 9493**

Twitter: [\*\*@PearsonSciences\*\*](#)

# Thank you

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