

PEARSON EDEXCEL INTERNATIONAL GCSE (9-1)

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

ONLINE Module 1



Event code:

First teaching in 2017, first assessment in 2019.

Getting to know you

Please enter into the onscreen polls:

- ❖ How long have you been using this Pearson Edexcel International GCSE?
- ❖ What is your current role in your school?

Aims and objectives

- ❖ introduce the idea of assessment objectives: what they are and why they are used when writing examination papers
- ❖ analyse recent question papers and learn which types of questions match the different assessment objectives
- ❖ investigate different assessment objectives, concentrating on AO2 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
- ❖ network, discuss best practice and share ideas with other teachers

Introduction to Assessment Objectives

Why do we have assessment objectives?

- ❖ Help make exams fairer year on year.
- ❖ Provide structure for question paper writers.
- ❖ Make sure that exams are about skills, not just about knowledge.
- ❖ Can provide students with some reassurance about the types of questions they will be asked.

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

Assessment objectives

AO1

≈40%
of total marks

AO2

≈ 40%
of total marks

AO3

≈ 20%
of total marks

- ❖ Note the proportions of AOs on International GCSE papers
- ❖ Paper 1 and Paper 2 both have the same balance of AO1 : AO2 : AO3
- ❖ Compared to our previous specification, this specification has less AO1 and more AO2

Typical AO1 questions

❖ Can be simple recall

OR

❖ Can be based on understanding, not just knowledge

Typical AO2 questions

- ❖ Can involve simple ideas being applied to unfamiliar scenarios

OR

- ❖ Can involve more complex scenarios involving data analysis or evaluation

Typical AO3 questions

- ❖ Questions based on practical experiences –
- ❖ not just Core Practicals, but any practical work!

3 Sodium chloride is a soluble salt.

(a) Name the acid and the alkali that can be used to make sodium chloride.

(2)

acid

alkali

(b) A teacher drops a bottle containing sodium chloride. The bottle breaks when it hits the floor. The teacher sweeps up the mixture of sodium chloride and glass.

Describe how the teacher can obtain a pure, dry sample of sodium chloride from the mixture.

(4)

ACTIVITY 1 – Assigning AOs

Your pack contains questions from May/ June 2019 Papers 1C and 2C.

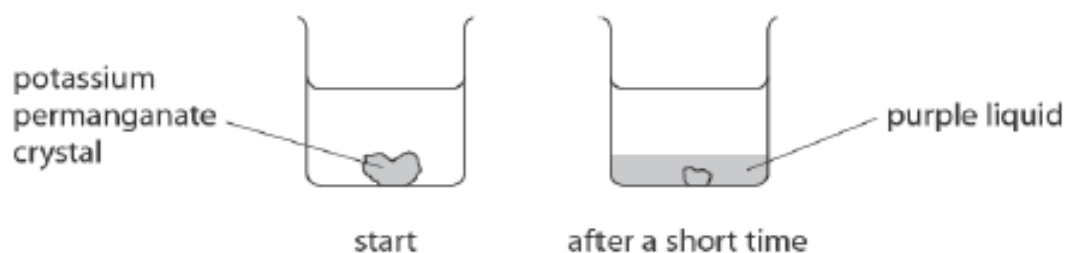
Read the questions and assign an AO to each question part.

ACTIVITY 1 – Assigning AOs

AOs in Multiple choice questions

- 1 Potassium permanganate is a purple solid that is soluble in water.

A crystal of potassium permanganate is placed in a beaker containing water.



- (a) After a short time, the crystal becomes smaller and the liquid at the bottom of the beaker becomes purple.

Which statement explains this observation?

(1)

- ☐ A the crystal condenses in the water
- ☐ B the crystal dissolves in the water
- ☐ C the crystal evaporates in the water
- ☐ D the crystal melts in the water

AO 1

ACTIVITY 1 – Assigning AOs

AOs in Multiple choice questions

(b) The beaker is left until there is no further change in the appearance of the liquid.

(i) Which statement describes the final appearance of the liquid?

(1)

- ☐ **A** all of the liquid is purple
- ☐ **B** none of the liquid is purple
- ☐ **C** only the bottom half of the liquid is purple
- ☐ **D** only the top half of the liquid is purple

(ii) Which process causes this change in appearance?

(1)

- ☐ **A** condensation
- ☐ **B** crystallisation
- ☐ **C** diffusion
- ☐ **D** evaporation

(b)(i) AO2

(b)(ii) AO1

ACTIVITY 1 – Assigning AOs

AOs in Multiple choice questions

- 6 The reactions of metals with water and with dilute sulfuric acid can be used to determine the order of reactivity of the metals.

The table shows the reactions of four metals, W, X, Y and Z, with water and with dilute sulfuric acid.

Metal	Reaction with water	Reaction with dilute sulfuric acid
W	no reaction	no reaction
X	very slow reaction	reacts quickly
Y	no reaction	reacts slowly
Z	reacts quickly	reacts violently

- (a) What is the order of reactivity of these metals?

(1)

	most reactive	→			least reactive
<input type="checkbox"/> A	W	X	Y		Z
<input type="checkbox"/> B	Z	X	Y		W
<input type="checkbox"/> C	W	Y	X		Z
<input type="checkbox"/> D	Z	Y	X		W

AO3

ACTIVITY 1 – Assigning AOs

AOs in Structured Questions

3 A student does these two tests on a solution made from a white solid.

- flame test
- add acidified silver nitrate solution

The table shows his results.

Test	Result
flame test	red flame
add acidified silver nitrate solution	cream precipitate

(a) Give the formula of the ion that produces the red flame.

(1)

(b) Name the cream precipitate.

(1)

(c) Identify the white solid.

(1)

(a) AO1 (b) AO1 (c) AO2

ACTIVITY 1 – Assigning AOs

AOs in Structured Questions

(d) The student uses a clean metal wire in the flame test.

(i) State why the wire should be clean when used in the flame test.

(1)

(ii) The table lists properties of some metals.

Add ticks (✓) to the table to show the two properties needed in a metal wire used in a flame test.

(2)

Property	
good conductor of electricity	
high density	
high melting point	
unreactive	

(d)(i) AO3

(d)(ii) AO3

ACTIVITY 1 – Assigning AOs

AOs in Structured Questions

- 2 The table gives some information about the halogens, chlorine, bromine and iodine.

Halogen	Physical state at room temperature	Colour
chlorine	gas	pale green
bromine		red-brown
iodine	solid	

- (a) Complete the table.

(2)

- (b) Chlorine has two isotopes of mass numbers 35 and 37

The relative percentage of each isotope in a sample of chlorine is

chlorine-35 77.78% chlorine-37 22.22%

Calculate the relative atomic mass of this sample of chlorine.

Give your answer to one decimal place.

(3)

relative atomic mass =

- (c) A student is given an aqueous solution of chlorine and an aqueous solution of potassium bromide.

Explain how he can use these two solutions to compare the reactivity of chlorine with the reactivity of bromine.

(4)

(a) AO1 (b) AO2 (c) AO3

Command words

- ❖ Questions in our exam papers are designed to use a specific command word to guide students.
- ❖ The command words represent a range of skills:
 - simple recall (Give....., Name.....)
 - using knowledge (Describe...)
 - giving reasons (Explain...)
 - provide more detailed analysis (Evaluate, Justify)
 - show particular skills (Calculate....., Plot.....)
- ❖ Is there a link between command words and AOs?

ACTIVITY 2 – Assigning Command Words to AOs

Your pack contains a list of command words used in International GCSE Chemistry question papers

- ❖ Draw a table with 3 columns: one for each AO.
- ❖ Place the command words into the columns, to show which command words can commonly be used to assess that AO.

ACTIVITY 2 – Assigning Command Words to AOs

AO1

Add/Label
Describe
Give/State/Name
Give a reason

AO2

Calculate
Identify
Deduce
Determine
Explain
Predict
Suggest
Write (an equation)

AO3

Deduce
Design
Draw
Estimate
Evaluate
Explain
Plot

AO₂ QUESTIONS

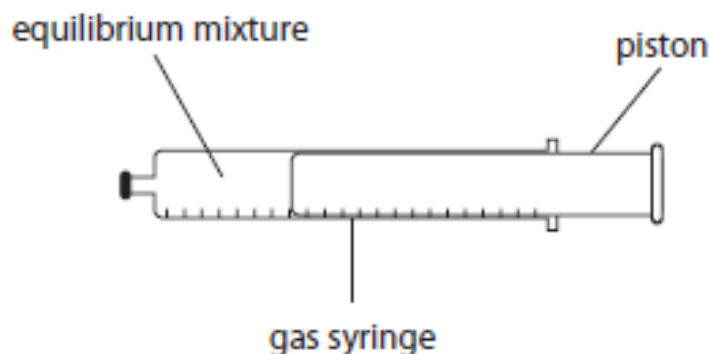
Why not look at AO1?

- ❖ AO1 is all about knowledge – and basic understanding
- ❖ This is not one that teachers can influence much...
- ❖ ... students either go away and learn what you teach them or they do not!
- ❖ **BUT...** remember that students should still recognise AO1 questions and not spend time going beyond AO1.

What is AO2?

❖ Application of knowledge to unfamiliar situations

- (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.

- (i) 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.

(2)

What is AO2?

❖ Calculations

9 Halon 1301 is a compound used in some fire extinguishers.

Halon 1301 has the percentage composition by mass of

C 8.05% Br 53.69% F 38.26%

(a) Show, by calculation, that the empirical formula of this compound is CBrF_3

(2)

What is AO2?

❖ Equations

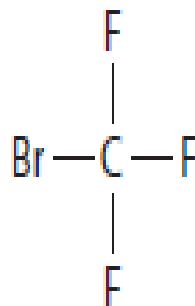
(ii) Write a chemical equation for the complete combustion of ethanol in air.

(2)

What is AO2?

❖ Unfamiliar dot and cross diagrams

(b) The diagram shows the displayed formula of a molecule of Halon 1301.



Draw a dot-and-cross diagram to show all the outer electrons in this molecule.

(2)

ACTIVITY 3 – AO2 in exams

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

Mark the questions using the scheme provided.

We will discuss the student answers to each question one by one, but don't let that stop you working on the next question if you are waiting for others to finish.

ACTIVITY 3 – AO2 in exams

Paper 2C, Q2(b)

Student 1

(b) Chlorine has two isotopes of mass numbers 35 and 37

The relative percentage of each isotope in a sample of chlorine is

chlorine-35 77.78% chlorine-37 22.22%

Calculate the relative atomic mass of this sample of chlorine.

Give your answer to one decimal place.

$$\begin{aligned} & (35 \times 77.78) + (37 \times 22.22) & (3) \\ & = 3544.44 \end{aligned}$$

relative atomic mass = 3544.4

ACTIVITY 3 – AO2 in exams

Student 2

(b) Chlorine has two isotopes of mass numbers 35 and 37

The relative percentage of each isotope in a sample of chlorine is

chlorine-35 77.78% chlorine-37 22.22%

Calculate the relative atomic mass of this sample of chlorine.

Give your answer to one decimal place.

$$\left(\frac{77.78}{100} \times 35 \right) + \left(\frac{22.22}{100} \times 37 \right) = 35.4444^{(3)}$$

relative atomic mass = 35

ACTIVITY 3 – AO2 in exams

Student 3

(b) Chlorine has two isotopes of mass numbers 35 and 37

The relative percentage of each isotope in a sample of chlorine is

chlorine-35 77.78% chlorine-37 22.22%

Calculate the relative atomic mass of this sample of chlorine.

Give your answer to one decimal place.

$$\begin{aligned}
 & (77.78 \times 35) + (22.22 \times 37) & (3) \\
 & = 3546 \\
 & \div 100 = 35.4689 & \text{relative atomic mass} = \underline{35.5}
 \end{aligned}$$

ACTIVITY 3 – AO2 in exams

Paper 2C, Q4c(ii)

Student 1

(ii) Explain why magnesium is harder than aluminium.

(3)

In Magnesium the structure is less uniform as magnesium atoms disarrange the uniformity of the aluminium atoms. This means the atoms can slide over each other less easily, this means the metal is harder and less soft/malleable.

ACTIVITY 3 – AO2 in exams

Student 2

(ij) Explain why magnalium is harder than aluminium.

(3)

Magnalium contains the different sized atoms of Mg and Al, therefore this distorts the layers. This means the layers are unable to slide over each other meaning that ~~they~~ Magnalium is harder and not malleable. Aluminium has the same sized atoms so layers can slide over each other, ^{making} ~~was~~ it softer, and malleable.

(Total for Question 4 = 7 marks)

ACTIVITY 3 – AO2 in exams

Student 3

(ii) Explain why magnesium is harder than aluminium.

(3)

Magnesium is harder than aluminium as its ~~is~~ atoms have different shapes which break up the ~~perfect~~ perfect lattice and make it harder for the layers to slide over each other as they are not uniform in shape making them harder.

ACTIVITY 3 – AO_2 in exams

Paper 2C, Q7b(i)

Student 1

The backwards reaction increases as the pressure in the gas syringe increases. This is because the backwards reaction produces fewer moles of gas which take up less space. So, less ~~moles~~ of NO_2 ^{is} are produced as a result but more N_2O_4 is and the position of equilibrium moves to the left.

ACTIVITY 3 – A02 in exams

Student 2

Increasing the pressure, favours the reaction ^{that produces} the least amount of moles. 2NO_2 has more moles than N_2O_4 , therefore more N_2O_4 is produced and less NO_2 is produced.

ACTIVITY 3 – AO2 in exams

Student 3

When the pressure increases, it favours the gas with less moles, so the equilibrium shifts to the left and creates more of the reactants - N_2O_4 - and less of the products - 2NO_2 .

ACTIVITY 3 – AO_2 in exams

Student 4

NO_2 has more moles ^{on its side or} in the reaction. The equilibrium will shift to the left as the reaction is trying to lower the pressure so there will be less NO_2 and more N_2O_4 . N_2O_4 has less moles and therefore less pressure.

ACTIVITY 3 – AO2 in exams

Paper 2C, Q8(b)

Student 1

- (b) (i) Calculate the amount, in moles, of chlorine gas produced.
Assume one mole of chlorine gas occupies $24\,000\text{ cm}^3$.

$$\text{moles} = \frac{\text{volume}}{24}$$

$$\frac{24000}{60} = 400 \quad (2)$$

$$1\text{ mol} = 24\text{ dm}^3 \text{ or } 24000\text{ cm}^3 \quad \times 0.4$$

$$\text{vol} = 60\text{ cm}^3$$

$$\frac{60}{24000} = \frac{1}{400}$$

$$\text{amount of chlorine} = \frac{1}{400} \text{ mol}$$

- (ii) Determine the amount, in moles, of NaClO in 4.00 cm^3 of bleach.

$$\frac{4.00}{24000}$$

$$\frac{1}{400} \quad (1)$$

$$\text{amount of NaClO} = \frac{1}{400} \text{ mol}$$

- (iii) Calculate the concentration, in mol/dm^3 , of the bleach solution.

$$\text{concentration} = \frac{\text{moles}}{\text{volume}}$$

$$\frac{0.4}{4 \div 1000} = 100 \quad (2)$$

$$\frac{1 \div 400}{4 \div 1000} = 0.625$$

$$\text{concentration} = 0.625 \text{ mol/dm}^3$$

ACTIVITY 3 – AO2 in exams

Student 2

- (b) (i) Calculate the amount, in moles, of chlorine gas produced.
Assume one mole of chlorine gas occupies $24\,000\text{ cm}^3$.

$$\text{Volume} = \text{moles} \times 24000$$

(2)

$$\frac{60}{24000} = \underline{\underline{0.0025 \text{ moles}}}$$

$$\text{amount of chlorine} = \underline{\underline{0.0025}} \text{ mol}$$

- (ii) Determine the amount, in moles, of NaClO in 4.00 cm^3 of bleach.

$$23 + 35.5 + 16 = 74.5 \leftarrow \text{RFM}$$

(1)

$$\frac{4}{74.5} = \underline{\underline{0.05314 \dots \text{ moles}}}$$

$$\text{amount of NaClO} = \underline{\underline{0.05}} \text{ mol}$$

- (iii) Calculate the concentration, in mol/dm^3 , of the bleach solution.

(2)

$$4\text{ cm}^3 = 0.004\text{ dm}^3$$

$$\frac{0.05}{0.004} = \underline{\underline{12.5 \text{ mol/dm}^3}} \quad \text{concentration} = \underline{\underline{12.5}} \text{ mol/dm}^3$$

ACTIVITY 3 – AO2 in exams

Student 3

- (b) (i) Calculate the amount, in moles, of chlorine gas produced. $\text{moles} = \text{mass} \div \text{mr}$
 Assume one mole of chlorine gas occupies 24000 cm^3 . $\text{conc} = \text{moles} \div \text{vol}$
 $\hookrightarrow 24 \text{ dm}^3$ (2)

~~volume = moles \times 24 (at RTP)~~
~~moles = volume \div 24~~
 ~~$= 24000 \div 24$~~
 ~~$= 1000$~~
 $60.0 \text{ cm}^3 = 0.06 \text{ dm}^3$
 $\text{mol} = \text{vol} \div 24$
 $= 60 \div 24$
 $= 2.5$
 amount of chlorine = ~~1000~~ 2.5 mol

- (ii) Determine the amount, in moles, of NaClO in 4.00 cm^3 of bleach. (1)
 $4 \div 24 = 0.16666$

amount of NaClO = 0.17 mol

- (iii) Calculate the concentration, in mol/dm^3 , of the bleach solution. (2)

$\text{conc} = \text{mol} \div \text{volume}$
 $= 0.17 \div \frac{4}{1000}$
 $= 42.5$

concentration = 42.5 mol/dm^3

Preparing Students for AO2

What teaching strategies do you think will be, or have you found to be, effective?

(enter suggestions into the chatbox)

Preparing students for AO2

Teaching approaches: Is it better to present facts or to teach principles? Why?

Questioning styles: Is it better to ask closed or open questions? Why?

Assessment activities: Is it better to set summative or formative assessments? Why?

Exam preparation: What else could you do to prepare your students to answer the AO2 exam questions?

Issues to think about after this session: question styles

Think about one of the topics that you teach which often has AO2 questions in exams.

What sorts of questions do you ask in class when teaching this topic?

How do these questions help students to prepare for AO2 questions?

Issues to think about after this session: homework activities

- ❖ Why do you set homework?
- ❖ What sort of questions/problems do you set?
- ❖ What do you expect students to gain from the questions that you set?

ACTIVITY 4 – AO2 Exam preparation

Your pack contains two questions from June 2019 International GCSE Chemistry Paper 2C.

- ❖ How are these two questions different?
- ❖ What advice would you give to your students when trying to answer each question?

Enter your thoughts into the chatboxes on screen

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>