Zig Zag Education

Chemistry AS and A Level | OCR A | H032 & H432

Learning Grids for OCR AS and A Level Year 1 Chemistry A

Module 2: Foundations in Chemistry

Update v1.2, January 2022

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Contents

Teacher's Introduction

These learning grids are a tool designed to help you deliver **AS and A Level Year 1 OCR Chemistry A Module 2: Foundations in Chemistry** (for first teaching in September 2015). The concept is that your students are assigned a set of pages to read from their notes or a textbook, possibly for homework, and then asked to complete the relevant learning grids. These activities may be particularly useful for your weaker learners, who may benefit from both the requirement to read all the notes to find the information and the act of writing the answers down.

The grids are designed to ask questions in sufficient detail that your students are able to study the relevant sections and find the correct answers. Completed grids are provided so that your students' answers can be marked or checked. It may also be useful to hand them out to students during their revision to assist them with answers they cannot find.

This edition supports students using and is cross-referenced to:

- *A Level Chemistry A for OCR Year 1 and AS Student Book; Ritchie and Gent; Oxford University Press, 2015; ISBN 978-0198351962*
- *OCR AS/A Level Year 1 Chemistry A; Holyman, Scott and Stutt; Pearson Education Limited, 2015; ISBN 978 1447990789*

Advantages of using these learning grids are:

- Some students will find this method of studying of great value, particularly if they find it difficult to absorb information in class.
- Resulting grids contain a bullet-point summary that may be useful for revision.
- They are an easy-to-set yet valuable homework.
- They are a useful catch-up tool to help students who have missed a lesson.
- They can be used as a basis for cover lessons that require minimal preparation and no interaction from the cover teacher.
- They are an independent learning resource.

You may want to photocopy the sheets onto A3 paper, particularly for students with reading or writing difficulties.

Some questions will require use of a calculator.

Remember!

Always check the exam board website for new information, including changes to the specification and sample assessment material.

Word + PDF

Note that there is the option to pay an additional 30% to get this resource in PDF format or an additional 50% to get this resource in Word format. The latter allows you to edit the resource to adapt it for your students, and also to put it on your intranet or VLE so students can fill in the grids electronically.

For all formats the licence terms are that the purchasing institution can make unlimited copies on a single site, for students and teachers officially registered at that site.

We hope you find these grids useful during your teaching.

Update v1.1, January 2020

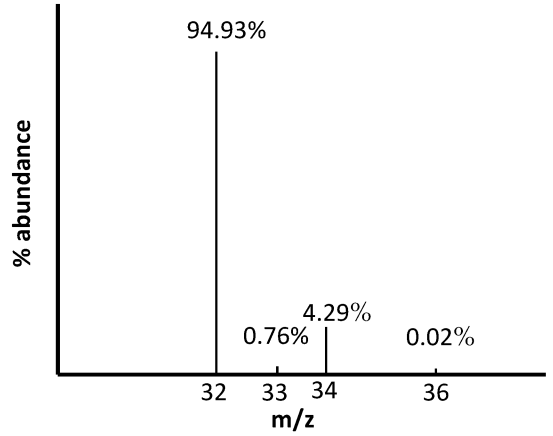
- The molar volume in answer calculations for questions on pages 7 and 9 has been corrected from '22.4' to '24.0' and the final answers updated accordingly.
- In the question 'Calculate the mass of MgO produced in this reaction.' on page 8, the word 'amount' has been corrected to 'mass'.

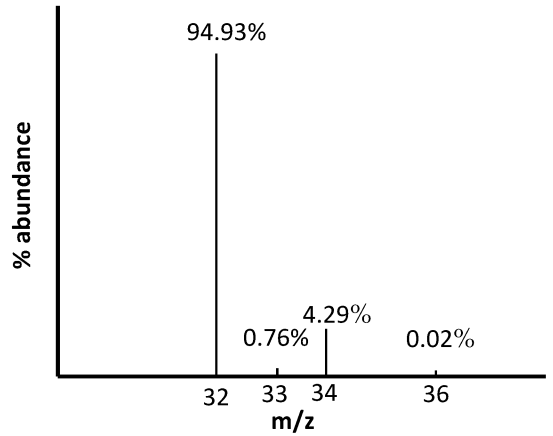
Update v1.2, January 2022

- The relative molecular mass in the answer calculation for question 2 on page 7 has been corrected from '110.1' to '74.6' and the final answer updated accordingly.

Selected Question and Answer Pages

For demonstration only, the sample answer pages immediately
follow their corresponding question pages

	Question	Answer
Relative Mass (Oxford: 12–14, Pearson 36–37)	**Define 'relative isotopic mass'.**	
	What is meant by 'relative atomic mass'?	
	What equipment can be used to determine relative atomic mass?	
	What information can be gained from a mass spectrum?	
	Using the % abundance and the mass-to-charge ratio (position of peak on m/z axis) calculate the relative atomic mass of sulfur. Give your answer to two decimal places.  	
	When is the term 'relative formula mass' used?	
	Calculate the relative molecular mass of calcium hydroxide, $Ca(OH)_2$.	

	Question	Answer
Relative Mass (Oxford: 12–14, Pearson 36–37)	**Define 'relative isotopic mass'.**	*The mass of a particular isotope compared with 1/12th the mass of Carbon-12*
	What is meant by 'relative atomic mass'?	*The weighted mean mass of an atom of an element compared to 1/12th the mass of an atom of Carbon-12*
	What equipment can be used to determine relative atomic mass?	*A mass spectrometer*
	What information can be gained from a mass spectrum?	*The number of isotopes, the relative percentage abundance of each isotope, the mass-to-charge ratio of each isotope and hence the relative atomic mass.*
	Using the % abundance and the mass-to-charge ratio (position of peak on m/z axis) calculate the relative atomic mass of sulfur. Give your answer to two decimal places.  	$\frac{(32 \times 94.93) + (33 \times 0.76) + (34 \times 4.29) + (36 \times 0.02)}{100}$ *= 32.09*
	Why would the term 'relative molecular mass' not be used for sodium chloride?	*Relative molecular mass only applies to simple molecular*
	Calculate the relative molecular mass of calcium hydroxide, $Ca(OH)_2$.	*40.1 + (2 × 16.0) + (2 × 1.0) = 74.1*

	Question	Answer
Continued	**Give the equation used to calculate atom economy.**	
	A reaction that produces a large amount of waste products will have a _____ atom economy.	
	Give two reasons why it is beneficial to have a high atom economy.	
	Calcium hydroxide is the desired product of the following reaction: $Ca + 2H_2O \rightarrow Ca(OH)_2 + H_2$. **What is the formula mass of the desired product?** **What is the sum of the formula masses of all products?**	
	Use your answers to the question above to calculate the atom economy for the reaction.	

	Question	Answer
Continued	**Give the equation used to calculate atom economy.**	$\%\ Atom\ Economy = \frac{Molar\ mass\ of\ the\ desired\ products}{Molar\ mass\ of\ all\ the\ products} \times 100$
	A reaction that produces a large amount of waste products will have a _____ atom economy.	*Low*
	Give two reasons why it is beneficial to have a high atom economy.	• *Reduced cost of disposal* • *If by-products can be sold, more profit can be made*
	Calcium hydroxide is the desired product of the following reaction: $Ca + 2H_2O \rightarrow Ca(OH)_2 + H_2$. **What is the formula mass of the desired product?** **What is the sum of the formula masses of all products?**	*(1 × Ca) + (2 × O) + (2 × H) = 40.1 + 32.0 + 2.0 = 74.1* *74.1 + (2 × H) = 76.1*
	Use your answers to the question above to calculate the atom economy for the reaction.	$Atom\ Economy = \frac{74.1}{76.1} \times 100 = 97.4\%$

Additional Selected Question Pages

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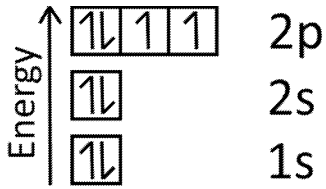
2.2.1 Electron Structure

Electrons and Bonding:
Electron Structure (Oxford: 54–58, Pearson: 76–81)

Question	Answer
What is meant by an 'electron shell'?	
What is an 'orbital'?	
Name the different types of orbitals.	
How many orbitals make up the p sub-shell?	
List the subshells in order of increasing energy for the third energy level.	
Why does the 4s subshell fill before the 3d subshell?	
When two electrons are present in the same orbital, they have different spin. How is the spin different?	
Give the full electronic configuration of sulfur.	
Give the electronic configuration (in order of orbital filling) for scandium.	

	Question	Answer
Continued	**The '*electrons in box*' representation of oxygen is as follows:**  **Construct a similar diagram showing the electronic configuration of phosphorus.**	
	Looking at the example above, why do the electrons occupy two of the 2p orbitals singly, rather than being paired in one orbital?	
	What is the shorthand way of writing the electronic configuration of scandium?	
	In which block of the Periodic Table would you find chlorine?	
	What is the electronic configuration of Cl^-?	
	When d-block metals lose electrons to form positive ions, the electrons are lost from which subshell first?	
	What shape is this orbital?	

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2.2.2 Bonding and Structure

	Question	Answer
Ionic Bonding and Structure (Oxford: 59–62, Pearson: 82–85)	What is meant by an 'ionic bond'?	
	Draw a dot and cross diagram to show the ionic bonding in sodium chloride. Show outer shells only.	
	Most ionic bonds form between metals and _____.	
	NaCl is a giant ionic lattice. What does this mean?	
	Why do ionic compounds have high melting points?	
	What happens when an ionic solid such as sodium chloride is dissolved in water?	
	Comment on the electrical conductivity of sodium chloride when solid and when molten (i.e. in its liquid form).	