Leventhorpe
a business and enterprise academy

Chemistry Accelerator Pack

Introduction

This pack is designed to give you a head start on you're A-Level chemistry course. It will provide you with the vital information you must know before you commence the course.

The Chemistry course

You will be studying the OCR A chemistry course.

Module 1 – Development of practical skills in chemistry

Skills of planning, implementing, analysis and evaluation

Module 2 – Foundations in chemistry

Includes:

- Atoms, compounds, molecules and equations
- Amount of substance
- Acid–base and redox reactions
- Electrons, bonding and structure.

Module 3 – Periodic table and energy

Includes:

- The Periodic table and periodicity
- Group 2 and the halogens
- Qualitative analysis
- Enthalpy changes
- Reaction rates and equilibrium (qualitative).

Module 4 – Core organic chemistry

Includes:

- Basic concepts
- Hydrocarbons
- Alcohols and haloalkanes
- Organic synthesis
- Analytical techniques (IR, MS).

Module 5 – Physical chemistry and transition elements

Includes:

- Reaction rates and equilibrium (quantitative)
- pH and buffers
- Enthalpy, entropy and free energy
- Redox and electrode potentials
- Transition elements.

Module 6 – Organic chemistry and analysis

Includes:

- Aromatic compounds
- Carbonyl compounds
- Carboxylic acids and esters
- Nitrogen compounds
- Polymers
- Organic synthesis
- Chromatography and spectroscopy (NMR).

Chemistry A is split into six modules: Modules 1 to 4 constitute the stand-alone AS Level qualification; Modules 1 to 6, combined with the Practical Endorsement, constitute the full A Level. The modules can be summarised as:

- **Module 1:** Development of practical skills – this module underpins the whole of the specification, and covers the practical skills that students should develop throughout the course. The practical skills in this module can be assessed within written examinations and (for A Level only) within the Practical Endorsement.
- **Module 2:** Foundations in chemistry covering concepts required throughout the remaining modules.
- **Modules 3 and 4:** AS topics.
- **Modules 5 and 6:** A Level topics.

At AS Level:

- Papers 1 and 2 can assess any content from Modules 1 to 4.

At A Level:

- Paper 1 assesses the content from Modules 1, 2, 3 and 5
- Paper 2 assesses the content from Modules 1, 2, 4 and 6
- Paper 3 assesses the content from Modules 1 to 6.

A Level Chemistry A (H432) – first exam June 2017

A Level Chemistry A (H432)					
ASSESSMENT OVERVIEW					
Paper			**Marks**	**Duration**	**Weighting**
Paper 1	**Periodic table, elements and physical chemistry**		**100**	2 hr 15 mins	37%
	Section A	Multiple choice	15		
	Section B	Structured questions covering theory and practical skills	85		
Paper 2	**Synthesis and analytical techniques**		**100**	2 hr 15 mins	37%
	Section A	Multiple choice	15		
	Section B	Structured questions covering theory and practical skills	85		
Paper 3	**Unified chemistry**		**70**	1 hr 30 mins	26%
	Structured questions and extended response questions covering theory and practical skills		**70**		
Non-exam assessment	**Practical Endorsement for chemistry**		**Pass/Fail**	Non-exam assessment	Reported separately
	See pages 27 and 28. Teacher-assessed component common to Chemistry A and Chemistry B (Salters). Candidates complete a minimum of 12 practical activities to demonstrate practical competence. Performance reported separately to the A Level grade. Moderation details still to be confirmed by Ofqual at the time of going to press		0		

In addition to the three externally assessed examinations, the A Level assessment includes the Practical Endorsement, which is internally assessed by the centre and externally moderated. The Practical Endorsement is reported separately from the overall grade issued for the A Level, which is determined by performance in the examinations.

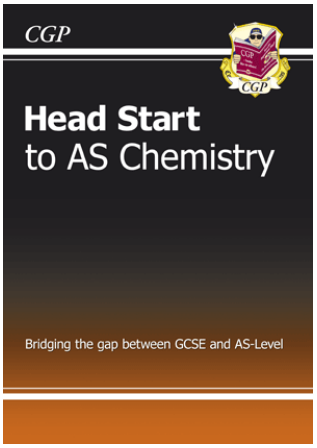
Teachers

Your teacher is the first point of call as they are the experts- we have 3 specialist Chemistry teachers who will always offer their time to help you in and out of lessons.
Mrs. H. Price – Teacher of Chemistry
Mrs. R Breame - Teacher of Chemistry
Miss M Evans - Teacher of Chemistry

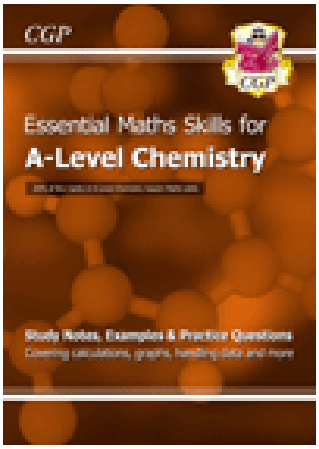
Getting ready for A-Level Chemistry

The following books need to be purchased **before the start of your course**.

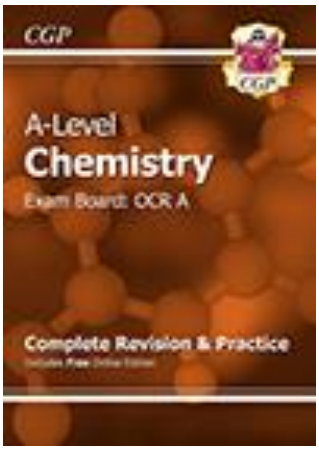
‘**Head Start to AS Chemistry’**
Buy on line at: https://www.cgpbooks.co.uk/
ISBN 978 1 84762 116 0



‘**Essential Maths Skills for A-Level Chemistry**
Buy on line at: https://www.cgpbooks.co.uk/
ISBN 978 1 78294 472 0



‘**OCR A Year 1 & 2 Complete Revision**
Buy on line at: https://www.cgpbooks.co.uk/
ISBN 978 1 78294 302 0



Practice Questions:

Below are a series of questions that we would like you to do over the summer holidays. Please bring these with you to the first lesson in September.

Make notes on the topics below, using your GCSE Revision Guide

- Atomic Structure
- Atomic Number, Atomic Mass & Isotopes
- Balancing Equations
- Chemical Calculations (inc. Mr, Empirical Formula, Molecular formulas, calculating reacting amounts)
- Ionic Bonding (inc. explaining the properties of giant ionic structures)
- Ionic Formula
- Covalent Bonding (inc. explaining the properties of simple molecules &giant covalent structures)
- Metallic bonding (inc. explaining the properties of giant metallic substances)
- Crude Oil
- Cracking
- Polymers

Now try the questions!

Atomic Number, Mass Number, Ions & Isotopes

Element or ion	Symbol	Z	A	Protons	Electrons	Neutrons
Sodium						
		6	12			
		12				12
Chlorine		17	35			
Chlorine		17	37			
Lithium ion	Li^+					
Chlorine ion	Cl^-		35.5			

1. Define an isotope.
2. There are 2 isotopes of Cl. ^{35}Cl and ^{37}Cl. What would you observe when they react?

Balance the following equations

1) $Mg + O_2 \rightarrow MgO$
2) $F_2 + KBr \rightarrow KF + Br_2$
3) $Al + O_2 \rightarrow Al_2O_3$
4) $Na + Cl_2 \rightarrow NaCl$
5) $CuCO_3 \rightarrow CuO + CO_2$
6) $K + O_2 \rightarrow K_2O$
7) $C_4H_8 + O_2 \rightarrow CO_2 + H_2O$
8) $Ba(OH)_2 + H_2SO_4 \rightarrow BaSO_4 + H_2O$
9) $FeCl_3 + NaOH \rightarrow Fe(OH)_3 + NaCl$
10) $HCl + Ba(OH)_2 \rightarrow BaCl_2 + H_2O$

Chemical Calculations

1) a) Calculate the M_r of: i) Br_2 ii) K_2CO_3 iii) $(NH_4)_2SO_4$ (3)

b) Calculate the percentage of oxygen in K_2CO_3. (1)

2) a) Define the terms *empirical formula* and *molecular formula*. (2)

b) A hydrocarbon was found to contain 82.8% by mass of carbon. It has an M_r of 58. Find the **empirical** and **molecular** formulas of this compound. (3)

c) 1 g of sulphur was burned forming 2.5 g of an oxide. Find the empirical formula of the oxide. (2)

3) What mass of calcium oxide is formed from the decomposition of 180 g of calcium carbonate?

$$CaCO_3(s) \rightarrow CaO(s) + CO_2(g) \quad (3)$$

Structure and Bonding

1) Explain each of the following about melting and boiling points:

a) Simple molecular substances have low melting and boiling points. (2)

b) Giant covalent substances have very high melting and boiling points. (2)

b) Ionic substances have high melting and boiling points. (2)

c) Metals have quite high melting and boiling points. (2)

2) Explain each of the following about electrical conductivity:

a) Simple molecular substances do not conduct at all. (1)

b) Giant covalent substances do not conduct, apart from graphite. (3)

c) Ionic substances conduct when melted or dissolved, but not when solid. (3)

d) Metals conduct as solids and when melted. (2)

What type of Structure is it?

	Melting point (°C)	Boiling point (°C)	Electrical conductivity as solid	Electrical conductivity as liquid	Electrical conductivity as aqueous solution	Type of Structure (simple or giant) & Bonding (covalent, ionic or metallic)
A	54	120	poor	poor	poor	
B	403	567	good	good	not soluble	
C	-210	-196	poor	poor	poor	
D	1610	2230	poor	poor	not soluble	
E	615	876	poor	good	good	
F	3727	4827	good		not soluble	
G	56	342	good	good	good	
H	934	1568	poor	good	insoluble	
I	-105	-45	poor	poor	good	

Ionic Formula – Work out the ionic formula of the following:

1. silver nitrate
2. iron (III) hydroxide
3. ammonium chloride
4. lithium oxide
5. copper carbonate
6. sodium sulphate
7. iron (II) sulphate
8. calcium hydroxide

Positive ions	Negative Ions
Silver, Ag^+	Nitrate, NO_3^-
Ammonium, NH_4^+	Hydroxide, OH^-
Lithium, Li^+	Chloride, Cl^-
Sodium, Na^+	Oxide, O^{2-}
Copper, Cu^{2+}	Carbonate, CO_3^{2-}
Calcium, Ca^{2+}	Sulphate, SO_4^{2-}
Iron (II), Fe^{2+}	
Iron (III), Fe^{3+}	

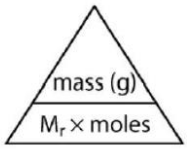
Moles

Element		A_r
aluminium	Al	27
bromine	Br	80
calcium	Ca	40
carbon	C	12
chlorine	Cl	35.5
copper	Cu	63.5
fluorine	F	19

Element		A_r
hydrogen	H	1
iodine	I	127
iron	Fe	56
magnesium	Mg	24
nitrogen	N	14
oxygen	O	16

Element		A_r
phosphorus	P	31
potassium	K	39
silver	Ag	108
sodium	Na	23
sulfur	S	32
zinc	Zn	65

$$\text{mass (g)} = M_r \times \text{moles}$$



1 Complete the blank parts of the following table.

Substance	Formula	M_r	Mass	Moles
carbon monoxide	CO		560 g	
propane	C_3H_8			0.2
unknown solid	unknown		0.104 g	0.0005
methane	CH_4		6 kg	
sodium carbonate	Na_2CO_3			2.5
unknown gas	unknown		0.1 g	0.0025

2 How many moles are there in each of the following?

a 72 g of Mg moles = $\frac{\text{mass}}{M_r} = \frac{72}{24}$ = 3 moles

b 39 g of $Al(OH)_3$ _____

c 1 tonne of NaCl _____

d 20 mg of $Cu(NO_3)_2$ _____

3 What is the mass of each of the following?

a 5 moles of Cl_2 mass = M_r × moles = 71 × 5 = 355 g

b 0.2 moles of Al_2O_3 _____

c 0.01 moles of Ag _____

d 0.002 moles of $(NH_4)_2SO_4$ _____

e 0.3 moles of $Na_2CO_3.10H_2O$ _____

4 An experiment was carried out to find the M_r of vitamin C (ascorbic acid). It was found that 1 g contains 0.00568 moles of vitamin C molecules. Calculate the M_r of vitamin C.

_____

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