

GCSE to A-level Transition Guide

AQA A-level Chemistry

WQE College

From GCSE to A-level Chemistry:

Studying Chemistry after GCSEs really develops your practical and mathematical skills. If you enjoy experimenting in a lab, you'll love it.

At first, the jump from GCSE to A-level may be a little daunting however if you follow the tips and advice in this guide, you will soon adapt.

Where does studying A-level Chemistry take you?

Chemistry students get to investigate a huge range of ideas therefore the career opportunities are endless. Some of the possible career opportunities are highlighted below:

- Analytical chemist
- Chemical engineer
- Clinical biologist
- Pharmacologist
- Doctor
- Research scientist
- Toxicologist
- Patent attorney
- Science writer
- Environmental consultant

Specification at a glance:

The A-level chemistry course is split up into three parts, physical chemistry, inorganic chemistry and organic chemistry. Below is the overview of the specification:

Year 1:

Physical	Inorganic	Organic
Atomic Structure	Periodicity	Introduction to organic chemistry
Amount of Substance	Group 2	Alkanes
Bonding	Group 7	Haloalkanes
Energetics		Alkenes
Kinetics		Alcohols
Equilibria		Organic Analysis
Redox		

Year 2:

Physical	Inorganic	Organic
Thermodynamic	Period 3	Optical isomerism
Rate Equations	Transition Metals	Aldehydes and Ketones
Equilibrium constants	Reactions of ions in aqueous solution	Carboxylic Acids
Electrode potentials		Aromatic Chemistry
Acid and Bases		Amines
Equilibria		Polymers
		Amino Acids
		Organic synthesis
		NMR
		Chromatography

Places to go for help throughout your course:

Websites:

Full Specification: <https://www.aqa.org.uk/subjects/science/as-and-a-level/chemistry-7404-7405/specification-at-a-glance>

<https://www.chemguide.co.uk/>

<https://www.physicsandmathstutor.com/>

<https://www.youtube.com/channel/UCPtWS4fCi25YHw5SPGdPz0g>

<https://www.youtube.com/channel/UCps4gUjfZsu6-b-7mwK41lg>

<http://www.a-levelchemistry.co.uk/>

<https://chemrevise.org/>

Activity 1: Important vocabulary for practical work

Match the correct word to the definition:

Accurate	A statement suggesting what might happen in the future
Data	An experiment that gives the same result when a different person carries it out, or a different technique or set of equipment is used
Precise	A measurement that is close to the true value
Prediction	An experiment that gives the same results when the same experimenter uses the same method and equipment
Range	Physical, chemical or biological quantities or characteristics
Repeatable	A variable that is kept constant during an experiment
Reproducible	A variable that is measured as the outcome of an experiment
Resolution	This is the smallest change in the quantity being measured (input) of a measuring instrument that gives a perceptible change in the reading
Uncertainty	The interval within the true value can be expected to lie
Variable	The spread of data, showing the maximum and minimum values of the data
Control variable	Measurements where repeated measurements show very little spread
Dependant variable	Information, in any form that has been collected.

Activity 2: The Periodic Table

The periodic table of elements is shown on the back page of this booklet. The A-level course will build on what you have learned in GCSEs

1. Draw a line showing the metals and non-metals
2. Colour the transition metals in blue
3. Colour the halogens in yellow
4. Colour the alkali metals in red
5. Colour the noble gases in green
6. Draw a blue arrow showing the direction of the periods
7. Draw a red arrow showing the direction of the groups.

Activity 3: Writing ionic formula

Below are some common ions and the charges they carry, you need to be able to write correct ionic formulae. Use the table to write the correct formula for the following ionic compounds.

Positive ions

Name	Formula
Hydrogen	H ⁺
Sodium	Na ⁺
Silver	Ag ⁺
Potassium	K ⁺
Lithium	Li ⁺
Ammonium	NH ₄ ⁺
Barium	Ba ²⁺
Calcium	Ca ²⁺
Copper(II)	Cu ²⁺
Magnesium	Mg ²⁺
Zinc	Zn ²⁺
Lead	Pb ²⁺
Iron(II)	Fe ²⁺
Iron(III)	Fe ³⁺
Aluminium	Al ³⁺

Negative ions

Name	Formula
Chloride	Cl ⁻
Bromide	Br ⁻
Fluoride	F ⁻
Iodide	I ⁻
Hydroxide	OH ⁻
Nitrate	NO ₃ ⁻
Oxide	O ²⁻
Sulfide	S ²⁻
Sulfate	SO ₄ ²⁻
Carbonate	CO ₃ ²⁻

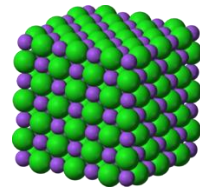
Copper oxide	Aluminium oxide	Magnesium oxide
Lead nitrate	Potassium nitrate	Copper carbonate
Sodium hydroxide	Lithium iodide	Zinc fluoride
Calcium carbonate	Barium oxide	Barium sulphate
Iron (II) oxide	Iron (III) oxide	Silver iodide

Activity 4: Bonding

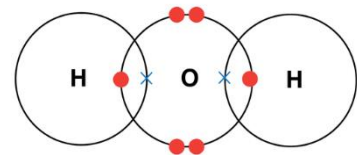
Write the key concepts regarding the following type of bonding:

Ionic Bonding:

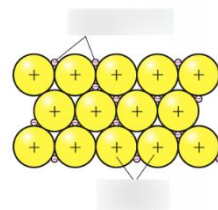
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Covalent Bonding:



Metallic Bonding:



Explain the differences in bonding between graphite and diamond?

Explain how and why sodium chloride can conduct electricity?

Describe the properties of aluminium?

Activity 5: Writing and balancing equations

Throughout your GCSEs you have come across common reactions between acids and metals complete the following chemical reactions by writing balanced symbol equations.

Magnesium + hydrochloric acid →

Sodium + sulphuric acid →

Hydrochloric acid + sodium hydroxide →

Potassium hydroxide + hydrochloric acid →

Sodium hydroxide + sulphuric acid →

Calcium carbonate + hydrochloric acid →

Potassium Carbonate + Hydrochloric Acid →

Calcium hydroxide + nitric acid →

Nitric acid + calcium →

Magnesium carbonate + Hydrochloric Acid →

Zinc + sulphuric acid →

Calcium + water →

Activity 6: Re-arranging formula

Rearrange this equation so that each of the following is the subject of the equation:

$$Pv=nRt$$

- A) V
- B) n
- C) T
- D) p

Make the bracketed symbol the subject of the equation:

A) $c=f\lambda$ (λ)

B) $c = \frac{n}{v}$ (v)

C) $Q= MC\Delta T$ (ΔT)

D) $n = \frac{V}{1000} \times c$ (V)

E) $n = \frac{V}{1000} \times c$ (c)

F) $E = hf$ (h)

G) $\Delta G = \Delta H - T\Delta S$ (ΔS)

Re arrange the following equation so that each of the following is the subject of the equation:

$$KE = \frac{1}{2}mv^2$$

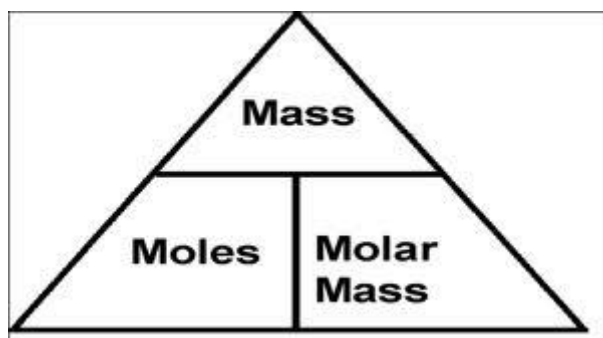
- a) m
- b) v

Activity 7: Calculating the number of moles of a solid

You can find the number of moles of a substance if you are given its **mass** and you know its **molar mass**:

$$\text{number of moles} = \text{mass/molar mass}$$

$$n = m/M_r$$



Mass MUST be measured in grams!

Molar mass has units of g mol^{-1}

1. Calculate the number of moles present in:	2. Calculate the mass of:	3. Calculate the molar mass of the following substances:
a) 2.3 g of Na	a) 0.05 moles of Cl_2	a) 0.015 moles, 0.42 g
b) 2.5 g of O_2	b) 0.125 moles of KBr	b) 0.0125 moles, 0.50 g
c) 240 kg of CO_2	c) 0.075 moles of Ca(OH)_2	c) 0.55 moles, 88 g
d) 12.5 g of Al(OH)_3	d) 250 moles of Fe_2O_3	d) 2.25 moles, 63 g
e) 5.2 g of PbO_2	e) 0.02 moles of $\text{Al}_2(\text{SO}_4)_3$	e) 0.00125 moles, 0.312 g

Activity 8: Equations and Molar Ratios

1. The equation: $S + O_2 \rightarrow SO_2$ tells us that 1 mole of sulphur reacts with 1 mole of oxygen to give 1 mole of Sulphur Dioxide.

How many moles of oxygen would react with

- a) 2 moles of sulphur
- b) 10 moles of sulphur
- c) 0.5 moles of sulphur

How many moles of SO_2 would be made by burning

- d) 2 moles of sulphur
- e) 10 moles of sulphur
- f) 0.5 moles of sulphur

2. The equation: $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$ tells us that 1 mole of methane reacts with 2 moles of oxygen to give 1 mole of carbon dioxide and 2 moles of water

How many moles of oxygen would react with

- a) 2 moles of methane
- b) 10 moles of methane
- c) 0.5 moles of methane

How many moles of CO_2 would be made by reacting

- d) 2 moles of methane
- e) 10 moles of methane
- f) 0.5 moles of methane

How many moles of CH_4 would react with

- g) 2 moles of O_2
- h) 4 moles of O_2
- i) 0.5 moles of O_2

Key

relative atomic mass
symbol
name
atomic (proton) number

1.0
H
hydrogen
1

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)																									
6.9 Li lithium 3	9.0 Be beryllium 4	11 Na sodium	12 Mg magnesium	19 K potassium	20 Ca calcium	21 Sc scandium	22 Ti titanium	23 V vanadium	24 Cr chromium	25 Mn manganese	26 Fe iron	27 Co cobalt	28 Ni nickel	29 Cu copper	30 Zn zinc	31 Ga gallium	32 Ge germanium	33 As arsenic	34 Se selenium	35 Br bromine	36 Kr krypton																					
37 Rb rubidium	38 Sr strontium	39 Y yttrium	40 Zr zirconium	41 Nb niobium	42 Mo molybdenum	43 Tc technetium	44 Ru ruthenium	45 Rh rhodium	46 Pd palladium	47 Ag silver	48 Cd cadmium	49 In indium	50 Sn tin	51 Sb antimony	52 Te tellurium	53 I iodine	54 Xe xenon	55 Cs caesium	56 Ba barium	57 La* lanthanum	58 Ce cerium	59 Pr praseodymium	60 Nd neodymium	61 Pm promethium	62 Sm samarium	63 Eu europium	64 Gd gadolinium	65 Tb terbium	66 Dy dysprosium	67 Ho holmium	68 Er erbium	69 Tm thulium	70 Yb ytterbium	71 Lu lutetium								
85.5 Rb rubidium	87.6 Sr strontium	88.9 Y yttrium	91.2 Zr zirconium	92.9 Nb niobium	96.0 Mo molybdenum	[98] Tc technetium	101.1 Ru ruthenium	102.9 Rh rhodium	106.4 Pd palladium	107.9 Ag silver	112.4 Cd cadmium	114.8 In indium	118.7 Sn tin	121.8 Sb antimony	127.6 Te tellurium	126.9 I iodine	131.3 Xe xenon	132.9 Cs caesium	137.3 Ba barium	138.9 La* lanthanum	[223] Fr francium	[226] Ra radium	[227] Ac † actinium	[227] Ac † actinium	[267] Rf rutherfordium	[268] Db dubnium	[271] Sg seaborgium	[272] Bh bohrium	[270] Hs hassium	[276] Mt meitnerium	[281] Ds darmstadtium	[280] Rg roentgenium	Elements with atomic numbers 112-116 have been reported but not fully authenticated									
87 Fr francium	88 Ra radium	89 Ac † actinium	104 Rf rutherfordium	105 Db dubnium	106 Sg seaborgium	107 Bh bohrium	108 Hs hassium	109 Mt meitnerium	110 Ds darmstadtium	111 Rg roentgenium	Elements with atomic numbers 112-116 have been reported but not fully authenticated																															

* 58 – 71 Lanthanides

† 90 – 103 Actinides

140.1 Ce cerium	140.9 Pr praseodymium	144.2 Nd neodymium	[145] Pm promethium	150.4 Sm samarium	152.0 Eu europium	157.3 Gd gadolinium	158.9 Tb terbium	162.5 Dy dysprosium	164.9 Ho holmium	167.3 Er erbium	168.9 Tm thulium	173.1 Yb ytterbium	175.0 Lu lutetium
232.0 Th thorium	231.0 Pa protactinium	238.0 U uranium	[237] Np neptunium	[244] Pu plutonium	[243] Am americium	[247] Cm curium	[247] Bk berkelium	[251] Cf californium	[252] Es einsteinium	[257] Fm fermium	[258] Md mendeleevium	[259] No nobelium	[262] Lr lawrencium

