



A-level Chemistry Summer Transition Work

OCR A A-level Chemistry

Chemistry is a fantastic subject in which we learn about the chemicals in the world around us and how they react and behave. We learn to see patterns and to predict outcomes of new reactions. We learn about it through both theory and practical work.

Here are the units that will be covered in your first year.

Foundations in chemistry

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

Periodic table and energy

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

Core organic chemistry

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

A character quality that will be crucial in order to achieve well in chemistry, is RESILIENCE. This means that you don't get put off easily if things get a bit difficult. You persevere. You look up. You find out. You make sure you don't let it beat you!

The ideas below should all have been covered and understood at GCSE. If for any reason, you didn't cover them or understand them, then **look them up in a text book or on the internet** and get yourself up to speed.

This first set of tasks will help us to identify any gaps in you may have in some important skills needed for A-level Chemistry. Do your best and don't be afraid to look up how to complete the tasks – this demonstrates good initiative and work ethic!

a) Explain how to work out the M_r (relative molecular mass) of a compound

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b) Explain how to rearrange an equation like $a = \frac{b}{c}$

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c) Draw a dot and cross diagram of the ionic bonding in NaCl

d) Draw a dot and cross diagram of the covalent bonding in water, H_2O

e) Explain why sodium chloride has the formula NaCl (1 x Na and 1 x Cl) whereas calcium chloride has the formula $CaCl_2$ (1 x Ca and 2 x Cl)

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f) Explain how to work out how many protons, electrons and neutrons there are in an isotope of an element. E.g. in ^{81}Br (atomic number = 35)

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Basic Maths Skills

1. If $n = \frac{m}{Ar}$ Rearrange for Ar?

2. If $a = b \times c$ Rearrange for c?

3. If $n = \frac{v}{1000} \times c$ Rearrange for c?

4. Write these numbers in **standard form**:

a. 0.00016

b. 3200

c. 6324000000

d. 0.065

And these as decimals

e. 1.22×10^{-3}

f. 3.44×10^4

g. 3.63×10^{-1}

h. 8.42×10^2

5. Give your answers to the calculations to the stated number of decimal places.

a. $6/9$ (3dp)

b. $37 - 8.4544$ (3dp)

c. $37 - 8.4544$ (2dp)

d. $37 - 8.4544$ (1dp)

6. Give the answers to the calculations to the stated number of significant figures.

a. $44/9$ (4sf)

b. $500/6$ (2sf)

c. $66/3.5$ (3sf)

d. $66/3.5$ (1sf)

7. What is the Mr of each of these compounds?

a. CO_2

b. $\text{C}_2\text{H}_5\text{OH}$

c. NaCl

8. How many moles in....?

a. 6g of ^{12}C

b. 4g of O

c. 1g of CO_2

d. 6g of H_2

9. Calculate the % of copper in each of the following chemicals (you will need to use the periodic table provided)

a. CuO

b. CuI_2

c. CuSO_4

d. $\text{Cu}(\text{NO}_3)_2$

10. Complete these unit conversions

a. 2.5 litres in cm^3

b. 0.165 litres in cm^3

c. 1.75kg in g

d. 0.00256kg in g

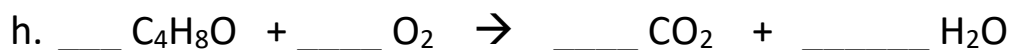
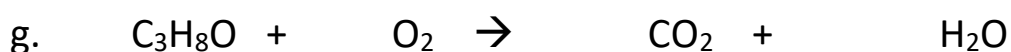
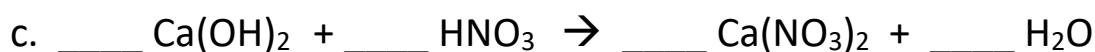
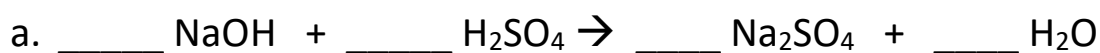
11. Calculate the **mean** value of the following data set, ignoring any anomalies.

Circle the anomalous reading.

22.55	20.30	22.50	22.75	22.70	22.65
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Mean:.....

12. Balance these equations:



12. Use the table of ions to write down a chemical formula for each of the compounds.

	+3	+2	+1		-1	-2	-3
	Al ³⁺	Ca ²⁺	Li ⁺		Cl ⁻	SO ₄ ²⁻	PO ₄ ³⁻
		Mg ²⁺	Na ⁺		Br ⁻	CO ₃ ²⁻	
		Cu ²⁺	K ⁺		OH ⁻	O ²⁻	
		Zn ²⁺	H ⁺		NO ₃ ⁻		
			NH ₄ ⁺				

1. Sodium hydroxide
2. Copper carbonate
3. Zinc sulphate
4. Lithium oxide
5. Potassium carbonate
6. Ammonium sulphate
7. Magnesium nitrate
8. Aluminium chloride
9. Potassium phosphate
10. Sodium hydrogen carbonate
11. Aluminium nitrate
12. Aluminium oxide

Further Reading Task

Show us that you are prepared to read ahead. Below are some websites you can access that you will become familiar with over the next two years!

www.chemguide.com

<https://www.physicsandmathstutor.com>

www.alevelchemistry.co.uk

- 1) Use these websites to find out what a **functional group** is.
- 2) Make a list of all the functional groups you will learn about in A level chemistry with diagrams to show their chemical structure. Use the remaining space on this page and the back page to complete this task.

The Periodic Table of the Elements

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(0)
1	2	3	4	5	6	7	8
1 H hydrogen 1.0	2 He helium 4.0	3 Li lithium 6.9	4 Be beryllium 9.0	5 B boron 10.8	6 C carbon 12.0	7 N nitrogen 14.0	8 O oxygen 16.0
11 Na sodium 23.0	12 Mg magnesium 24.3	13 Al aluminium 27.0	14 Si silicon 28.1	15 P phosphorus 31.0	16 S sulfur 32.1	17 Cl chlorine 35.5	18 Ar argon 39.9
19 K potassium 39.1	20 Ca calcium 40.1	21 Sc scandium 45.0	22 Ti titanium 47.9	23 V vanadium 50.9	24 Cr chromium 52.0	25 Mn manganese 54.9	26 Fe iron 55.8
37 Rb rubidium 85.5	38 Sr strontium 87.6	39 Y yttrium 88.9	40 Zr zirconium 91.2	41 Nb niobium 92.9	42 Mo molybdenum 95.9	43 Tc technetium 101.1	44 Ru ruthenium 101.1
55 Cs caesium 132.9	56 Ba barium 137.3	57-71 lanthanoids	72 Hf hafnium 178.5	73 Ta tantalum 180.9	74 W tungsten 183.8	75 Re rhenium 186.2	76 Os osmium 190.2
87 Fr francium	88 Ra radium	89-103 actinoids	104 Rf rutherfordium	105 Db dubnium	106 Sg seaborgium	107 Bh bohrium	108 Hs hassium
63 Eu europium 152.0	64 Gd gadolinium 157.2	65 Tb terbium 158.9	66 Dy dysprosium 162.5	67 Ho holmium 164.9	68 Er erbium 167.3	69 Tm thulium 168.9	70 Yb ytterbium 173.0
89 Ac actinium	90 Th thorium 232.0	91 Pa protactinium	92 U uranium 238.1	93 Np neptunium	94 Pu plutonium	95 Am americium	96 Cm curium
57 La lanthanum 138.9	58 Ce cerium 140.1	59 Pr praseodymium 140.9	60 Nd neodymium 144.2	61 Pm promethium 144.9	62 Sm samarium 150.4	63 Eu europium 152.0	64 Gd gadolinium 157.2
71 Lu lutetium 175.0	72 Hf hafnium 178.5	73 Ta tantalum 180.9	74 W tungsten 183.8	75 Re rhenium 186.2	76 Os osmium 190.2	77 Ir iridium 192.2	78 Pt platinum 195.1
85 At astatine	86 Rn radon	87 Fr francium	88 Ra radium	89 Ac actinium	90 Th thorium	91 Pa protactinium	92 U uranium
103 Lr lawrencium	104 No nobelium	105 Md mendelevium	106 Fm fermium	107 Es einsteinium	108 Cf californium	109 Bk berkelium	110 Cm curium
116 Lv livermorium	117 Ts tennessine	118 Og oganesson	119 Nh nihonium	120 Dl dubnium	121 Fl flerovium	122 Mc moscovium	123 Lv livermorium
131 I iodine 126.9	132 Xe xenon 131.3	133 At astatine	134 Rn radon	135 Fr francium	136 Ra radium	137 Ac actinium	138 Th thorium
152 Sm samarium 150.4	153 Eu europium 152.0	154 Gd gadolinium 157.2	155 Tb terbium 158.9	156 Dy dysprosium 162.5	157 Ho holmium 164.9	158 Er erbium 167.3	159 Tm thulium 168.9
173 Lu lutetium 175.0	174 Yb ytterbium 173.0	175 Lu lutetium 175.0	176 Hf hafnium 178.5	177 Ta tantalum 180.9	178 W tungsten 183.8	179 Re rhenium 186.2	180 Os osmium 190.2
197 Au gold 197.0	198 Hg mercury 200.6	199 Tl thallium 204.4	200 Pb lead 207.2	201 Bi bismuth 209.0	202 Po polonium	203 At astatine	204 Rn radon
209 Bi bismuth 209.0	210 Po polonium	211 At astatine	212 Rn radon	213 Fr francium	214 Ra radium	215 Ac actinium	216 Th thorium
223 Fr francium	224 Ra radium	225 Ac actinium	226 Th thorium	227 Pa protactinium	228 U uranium	229 Np neptunium	230 Pu plutonium
238 U uranium	239 Np neptunium	240 Pu plutonium	241 Am americium	242 Cm curium	243 Bk berkelium	244 Cf californium	245 Es einsteinium
254 Es einsteinium	255 Fm fermium	256 Md mendelevium	257 No nobelium	258 Lr lawrencium	259 Lu lutetium	260 Hf hafnium	261 Ta tantalum
262 Lu lutetium	263 Hf hafnium	264 Ta tantalum	265 W tungsten	266 Re rhenium	267 Os osmium	268 Ir iridium	269 Pt platinum
278 Ds darmstadtium	279 Ts tennessine	280 Og oganesson	281 Nh nihonium	282 Fl flerovium	283 Mc moscovium	284 Lv livermorium	285 Ts tennessine
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