

Chemistry Department

Bridging Work

The transition from studying GCSE Chemistry to A Level can be quite challenging. You need to continue to build on your GCSE knowledge, as that forms the basis of your understanding, so revisiting GCSE material is a good thing to do if you find that you are struggling.

To help you prepare for this, we ask that you complete the following tasks before your first timetabled lesson. This bridging work is designed to help you revise the core principles from GCSE, and will lead into the AS level chemistry topics that will be taught in the Autumn term.

Therefore, this work **MUST** be completed by the time you start the course and **must be with you for your first timetabled lesson.**

Please use resources such as the internet, library and your chemistry GCSE notes to help you complete this work. Enjoy!

The Chemistry Department



Task 2 – Bonding and Dot cross diagrams

You would have covered ionic and covalent bonding in your GCSE. Using your knowledge,

- **Draw** the dot cross diagrams for the following compounds, showing only **outer electrons**.
- State the **type of bonding** involved (ionic, covalent, metallic)

Oxygen gas	Sodium chloride
Magnesium oxide	Water
Carbon dioxide	Calcium chloride
Ethane	Nitrogen gas

Task 3 - Rearranging Formulae

When solving chemistry problems you will often be required to **rearrange** an equation to solve for an unknown. You would have seen this in Physics when trying to calculate speed.

$$\text{Speed (m/s)} = \text{distance (m)} / \text{time (s)}$$

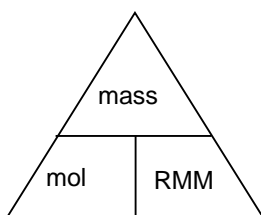
We can re-write this to show distance and time as follows:

$$\text{Distance (m)} = \text{speed (m/s)} \times \text{time (s)} \qquad \text{Time (s)} = \text{distance (m)} / \text{speed (m/s)}$$

You will encounter the following equations in the first topic.

Rearrange the following:

a)

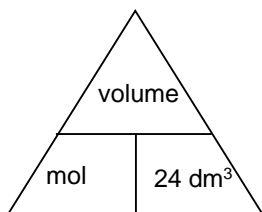


mass =

mol =

RMM =

b)



Volume =

mol =

c) **Rearrange:**

$$n = c v$$

c =

v =

The units of **n** is mol and the unit for **v** is dm³. **Write** down the units for **c**:

d) There are 1000 cm³ in 1dm³. **Convert** the following:

1.	250 cm ³ is	dm ³	4.	0.8 dm ³ is	cm ³
2.	30 cm ³ is	dm ³	5.	10 dm ³ is	cm ³
3.	500 cm ³ is	dm ³	6.	0.0065 dm ³ is	cm ³

SI Units

To communicate with other scientists, chemists must know and use the same units of measurements. SI units stands for *Systeme International*. Look through the following website for more information: <http://www.npl.co.uk/reference/measurement-units/>

Task 4 - Converting to SI

Convert the following into SI units

1. 67 cm
2. 30 minutes
3. 100 °c
4. - 27 °c
5. 0.1 g
6. 2.7 tonnes
7. 12 g carbon into moles

Handling Numbers

The ability to work with numbers is essential for Chemistry and the level of accuracy is very important. The numbers we use in Chemistry range from being extremely small to very large, and you must be able to deal with these.

Decimal Places – dp

Your calculator can produce lots of digits after the decimal place, and you will need to record the answer accurately and appropriately to score marks in an test / exam. The answer will also need to be rounded up or down. Make sure you give the answer to the number of decimal places the exam question has asked for. If in doubt, 2 dp is the norm.

Significant Figures – SF

Significant figures are useful when quoting numbers when decimal places are not appropriate. These numbers tell you about the magnitude of a figure. You will need *to count the significant figure as soon as you come across a non-zero number* reading from left to right.

Examples to 3 SF:

3.81

0.0000381

3.81

3.00

Standard Form

Some numbers are far too large to write out in full so a shorthand called 'standard form' or 'scientific notation' is used.

Examples:

$$1.0 \times 10^6 = 1,000,000$$

$$1.0 \times 10^6 = 0.000001$$

Task 5 - Significant Figures and Standard Form

Significant Figures

You need to be able to quote answers to the correct number of significant figures.

1) Write the following numbers to the quoted number of significant figures.

- a) 345789 4 sig figs d) 6 3 sig figs
b) 297300 3 sig figs e) 0.001563 3 sig figs
c) 0.07896 3 sig figs f) 0.01 4 sig figs

2) Complete the following sums and give the answers to 3 significant figures.

- a) 6125×384 d) $750 \div 25$
b) 25.00×0.01 e) 0.000152×13
c) $13.5 + 0.18$ f) 0.0125×0.025

Standard Form

You need to be able to work with numbers in standard form.

3) Write the following numbers in non standard form.

- a) 1.5×10^{-3} d) 0.0534×10^4
b) 0.046×10^{-2} e) 10.3×10^5
c) 3.575×10^5 f) 8.35×10^{-3}

4) Write the following numbers in standard form.

- a) 0.000167 d) 34500
b) 0.0524 e) 0.62
c) 0.000000015 f) 87000000

5) Complete the following calculations and give the answers to 3 significant figures.

- a) $6.125 \times 10^{-3} \times 3.5$
b) $4.3 \times 10^{-4} \div 7.0$
c) $4.0 \times 10^8 + 35000$
d) $0.00156 + 2.4 \times 10^3$
e) $6.10 \times 10^{-2} - 3.4 \times 10^{-5}$

Task 6 - Balancing equations

Look at the following equations – some need balancing, others do not.

Balance the equations that need it.

- 1) $C + O_2 \rightarrow CO$
- 2) $Na + O_2 \rightarrow Na_2O$
- 3) $H_2 + O_2 \rightarrow H_2O$
- 4) $Na + I_2 \rightarrow NaI$
- 5) $CH_4 + O_2 \rightarrow CO_2 + H_2O$

Task 7 - Relative formula mass

Use a Periodic Table to work out the relative formula mass of the following compounds

NaOH : $Na + O + H = 23 + 16 + 1 = \mathbf{40}$

NH₄NO₃

CuCO₃

Ca(OH)₂

H₂SO₄

NH₄Fe(SO₄)₂.12H₂O

K₄Fe(CN)₆

Al₂(SO₄)₃

Task 8 - Calculations

These calculations should be completed on a separate sheet of paper to clearly show ALL working.

a) Calculate the mass of aluminium that can be formed from 1020g of aluminium oxide. $2 Al_2O_3 \rightarrow 4 Al + 3 O_2$

b) Calculate the mass of oxygen needed to react with 10g of calcium to form calcium oxide. $2 Ca + O_2 \rightarrow 2 CaO$

c) What mass of propane could burn in 50g of oxygen? $C_3H_8 + 5 O_2 \rightarrow 3 CO_2 + 4 H_2O$

d) What mass of ammonia can be made from 20g of hydrogen? $3 H_2 + N_2 \rightarrow 2 NH_3$

e) What mass of sodium hydroxide is needed to neutralise 10kg of sulphuric acid? $H_2SO_4 + 2 NaOH \rightarrow Na_2SO_4 + 2 H_2O$

(Possible answers include 3.99g 13.75g 540 g 2038g 113g)

Task 9 - Formulae

Work out the formula of the following compounds

- a) aluminium nitrate
- b) potassium bromide
- c) hydrogen sulfide
- d) vanadium (V) oxide
- e) copper (II) hydroxide

Task 10 - Definitions

Look up these definitions and, write them out and learn them word for word.

Stoichiometry	Titration	Atom economy	Percentage yield
London Forces	Covalent bonding	Ionic bonding	Metallic bonding
Oxidation	Reduction	Unsaturation	Alkenes

Extra stuff (optional)

1. Reading

Choose an article from the magazines available from The Mole.

<https://eic.rsc.org/section/the-mole>

2. Join an Educational Society

Joining an Educational Club It's free to join, and very helpful with resources and advice. Click 'Join us' , then select 'are you still studying?', then 'under 18's'.

<http://www.rsc.org/membership-and-community/>

3. Challenge Yourself

Try the tasks on the Cambridge Chemistry Challenge. We enter Year 12 students in the summer every year to stretch them.

<http://c3l6.com/>