



When you start the course in September you will want to make the best start possible. Independent study is a vital for success at A level and beyond. It is advisable to reflect on the revision strategies you used during your exams and think about what worked and how to study more efficiently. Time management is vital for A level success so begin to plan how you can effectively manage your time both during the school day and beyond.

The first topic you will meet in the course is about atomic structure, within which you will both build upon GCSE material and meet new ideas. Historically students have found some of the ideas challenging and so we strongly recommend that you take time during the summer to do some background reading. To help you we are setting a chemistry task that everyone must complete and, have also directed you to specific topics that we recommend you familiarise yourself with before starting the course.

Atomic structure: Sub shells, shapes of s and p orbitals and writing configurations.

Bonding & shapes of molecules: Broadly speaking the detail on bonding is the same as for GCSE. However, students struggle often to then understand ideas about shapes of molecules. Look into VSEPR theory and shapes of simple covalent molecules.

Calculations: Calculations from titrations involving moles (amount of substances), calculations for working out how to create solutions of known concentration or to dilute to a desired concentration.

Use <http://www.chemguide.co.uk/> and <http://www.docbrown.info/AlphaIndexA.htm>

Compulsory Tasks

Sign up (free) and complete lesson 1 on this website 'Head start to A Level Chemistry' course

[My Courses - CK Chemistry](#)

Once you have worked through the material here, complete the questions that follow and bring these with you to your first lessons for us to go through.

1 Complete the table using ✓s to show which type of structure the following substances have.

(8)

Substance	Monatomic	Simple molecular	Giant covalent	Ionic	Metallic
helium (He)					
nitrogen fluoride (NF ₃)					
silicon chloride (SiCl ₄)					
strontium chloride (SrCl ₂)					
iron oxide (Fe ₂ O ₃)					
phosphorus (P ₄)					
silicon dioxide (SiO ₂)					
iridium (Ir)					

2 Give the formula of each of the following ionic substances.

(8)

- | | |
|------------------------------|-------------------------------|
| a) potassium bromide | e) cobalt(II) carbonate |
| b) aluminium sulfide | f) ammonium nitrate |
| c) magnesium hydroxide | g) titanium(IV) oxide |
| d) iron(III) nitrate | h) rubidium sulfate |

3 Write a balanced equation for each of these reactions.

(10)

- a) potassium oxide + hydrochloric acid
.....
- b) barium + water
.....
- c) propane (C₃H₈) + oxygen
.....
- d) magnesium + nitric acid
.....
- e) zinc(II) carbonate + sulfuric acid
.....

4 Write an ionic equation for each of these reactions. (3)

a) redox reaction between solution of copper(II) sulfate and magnesium metal

b) acid-base reaction between nitric acid and calcium hydroxide

c) precipitation of silver(I) bromide when solutions of potassium bromide and silver(I) nitrate are mixed

5 Convert these quantities into the units shown.

a) 25 cm^3 to m^3

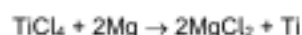
b) 150 cm^3 to dm^3

c) 40 MPa to Pa (1)

d) 7.5 mg to g (1)

6 6.15 g of hydrated magnesium sulfate, $\text{MgSO}_4 \cdot x\text{H}_2\text{O}$ decompose to form 3.00 g of anhydrous magnesium sulfate on heating. Calculate the formula mass of hydrated magnesium sulfate and the value of x .

7 Determine the limiting reagent and then calculate the mass of titanium produced when 10.00 g of titanium chloride react with 2.00 g of magnesium.



8 Describe what each of the following formulae tells you about the substance shown.

a) Ammonia has the molecular formula NH_3
.....
..... (2)

b) Silicon dioxide has the formula SiO_2
.....
..... (2)

c) Aluminium oxide has the formula Al_2O_3
.....
..... (2)

d) Sulfur has the molecular formula S_8
.....
..... (2)

9 The element carbon exists in several different forms (allotropes), including diamond, graphite and graphene.

a) Explain why these forms of carbon all have high melting points.
.....
.....
.....
.....
..... (3)

b) Explain why graphite and graphene are electrical conductors but diamond is not.
.....
.....
.....
.....
..... (3)

- c) Buckminsterfullerene is another form of carbon with the formula C_{60} . Explain how the formula C_{60} tells us that this is a molecular substance and not a giant covalent substance.

.....

.....

.....

.....

.....

..... (2)

Area	Strength	To develop	Area	Strength	To develop	Area	Strength	To develop
Done with care and thoroughness			Write formulae (ionic)			Understands limiting reagents		
Good SPG			Write formulae (other)			What formulas mean		
Shows full working			Write balanced equations			Link structure types to properties		
Explanations are clear			Write ionic equations			Identify structure types of substances		
Convert units			Can work out formula mass					
Work to appropriate sig figs			Find moles from mass (and vice versa)					
Gives units when appropriate			Can do reacting mass calculations					

Sodium thiosulfate solution reacts with hydrochloric acid to form a precipitate of sulfur

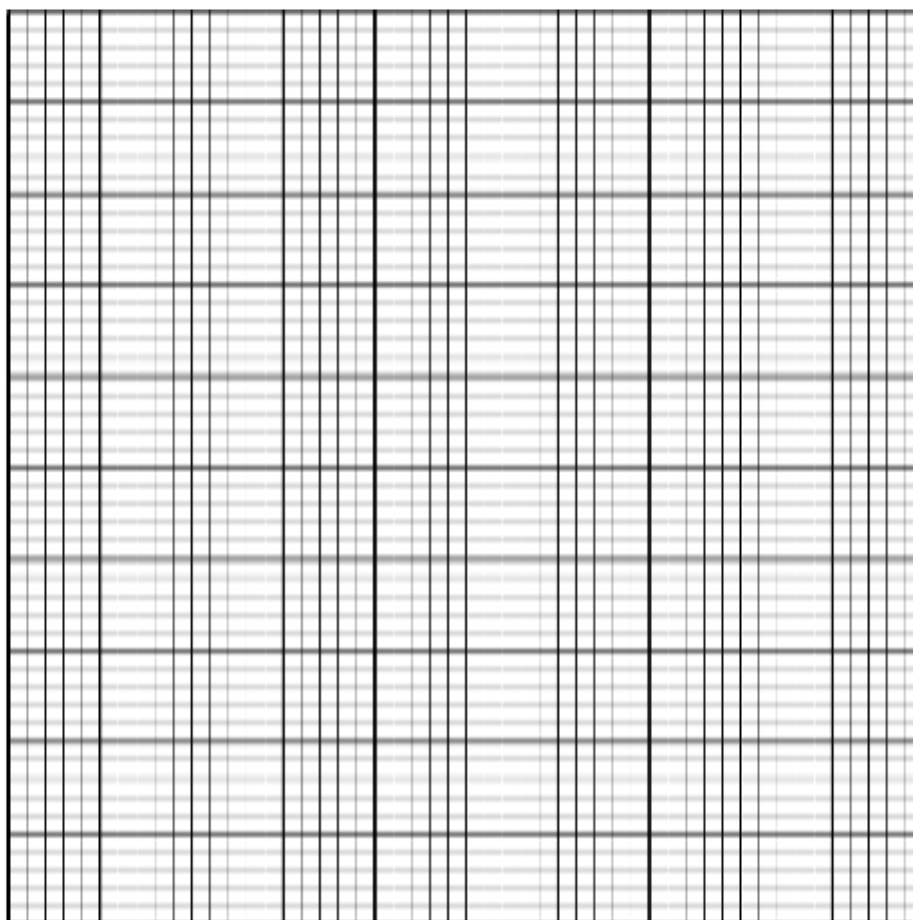


The rate of this reaction can be determined by measuring the time it takes for the mixture to become too cloudy to see through.

A student carried out an experiment to see how changing the concentration of sodium thiosulfate affects the rate of reaction. The results are shown in the table

Volume of $\text{Na}_2\text{S}_2\text{O}_3(\text{aq}) / \text{cm}^3$	10	20	30	40	50
Volume of water / cm^3	40	30	20	10	0
Concentration of $\text{Na}_2\text{S}_2\text{O}_3(\text{aq}) / \text{mol dm}^{-3}$	0.04	0.08	0.12	0.16	0.20
Time for solution to become too cloudy to see through / s	125	61	42	33	25
$\frac{1}{\text{time}} / \text{s}^{-1}$					

- a) Calculate $\frac{1}{\text{time}}$ for each experiment and fill it in the table. (1)
- b) Plot a graph of $\frac{1}{\text{time}}$ (y axis) against concentration of sodium thiosulfate including a best-fit line. (4)



- c) Define the term rate of reaction. And explain why it is possible to use $\frac{1}{\text{time}}$ as a measure of the rate of this reaction.

.....

.....

.....

.....

(2)

- d) Suggest why the hazard associated with the formation of sulfur dioxide in this reaction may be considered to be low.

.....

.....

(1)

The graph shows how the rate of a gas phase reaction varies with time.

Explain the shape of the curve in terms of the behaviour of the molecules.



.....

.....

.....

.....

.....

(3)

Use your knowledge of ionic equations to give the molar ratio in which the following acids react with bases. Copy and complete the table to show your answers. (3)

Acid	Formula of acid	Base	Formula of base	Molar ratio of acid:base
hydrochloric acid		sodium carbonate		
sulfuric acid		magnesium hydroxide		
phosphoric acid		ammonia		

Write ionic equations for each of the following reactions.

- a) precipitation of iron(III) hydroxide by reaction of solutions of iron(III) nitrate and sodium hydroxide

..... (1)

- b) reaction of potassium hydrogencarbonate solution with sulfuric acid

..... (1)

- c) displacement of silver from silver(I) nitrate by copper

..... (1)

Additional information and support:

Download AQA Chemistry specification, read through it and then refer back to it as you progress through the course.

<https://filestore.aqa.org.uk/resources/chemistry/specifications/AQA-7404-7405-SP-2015.PDF>

AQA Chemistry specification exam board information

We highly recommend that anyone studying A Level chemistry joins ChemNet for free to gain access to a range of helpful resources and events.

<https://edu.rsc.org/news/rsc-chemnet-online/2020800.article>

Explore your knowledge and understanding <http://www.rsc.org/learn-chemistry/resources/gridlocks/>

The Royal Society of Chemistry provides excellent resources for those studying A level as well as information about courses and careers beyond school:

<http://www.rsc.org/resources-tools/education-resources/>

If you feel you'd benefit from additional support with calculations we recommend Jim Clarks book "Calculations in AS and A level Chemistry and the online resource. It is expensive on Amazon but can be purchased elsewhere for a far more reasonable price.

[chemistry calculations](#)