



Hermes Grammar



Chemistry

Induction Materials

To be completed by Monday 5th September

Welcome to Chemistry at Urmston Grammar!

Chemistry at AS can be a very academically demanding course and requires a lot of *independent study* in your own time. All students should feel comfortable with the basic chemistry from their GCSE course. **In order for you to settle in as quickly as possible with chemistry, it is important that you complete the following exercises by the start of the second week in September.**

At Urmston Grammar, we teach the AQA AS Chemistry specification which links very well with the AQA GCSE Chemistry specification. If you have not studied AQA before, there is no need to worry, but it is recommended that you read through the specification at GCSE on the link below:

<http://www.aqa.org.uk/subjects/science/gcse/chemistry-4402>

Useful Websites

Webpage	Detail
www.s-cool.co.uk	Excellent revision materials provided and a good place to recap your GCSE knowledge.
www.chemguide.co.uk	Some brilliant notes provided on all of the topics at AS and A2 level.
www.rsc.org	The royal society of chemistry website, good for anyone keen on continuing the subject to university level. Lots of news of up to date chemistry.
www.chemistrygeek.com	An interactive website with some good resources.
www.mp-docker.demon.co.uk	Includes revision quizzes for A level students but requires Java on your computer.

Top Tips in AS Chemistry:

- **Hit the ground running!** Don't fall into the trap of leaving all of your revision until just before the exams. THERE IS TOO MUCH TO REMEMBER AND UNDERSTAND! You need to start revising your work as soon as you can.
- **Make Mind Maps** every time you complete a topic in chemistry. This makes revision a lot easier by the summer as you already have your notes in the form of mind maps.
- **Do your homework as soon as you get it.** This seems obvious but the pace in lessons is a lot faster than GCSE and so late homework's can soon build up and your grades can suffer. Also, you will have two chemistry teachers who each set their own homework so you will need to keep up to date.
- **Ask for help.** You can ask any teacher in the Chemistry department at Urmston Grammar and they would be happy to spend time to run through some areas with you. Don't feel like you are on your own.
- **Revise by doing past papers.** Re-writing the same notes out over and over again will not be as beneficial as completing past exam papers. Doing the past papers will help you to refine your technique and you will learn the language that the exams use.
- **Don't give up.** Chemistry is a difficult topic and will require lots of time and practice. If you follow the steps above, you will find it much easier.

Maths for Chemists

AS level chemistry relies on good mathematical skills as many of the topics use equations and problem solving.

The following information and exercises will help you to practice your skills. **These exercises must be completed by the second week of the first half term.**

Moles

The mole is most simply expressed as the relative 'formula mass in g' or the 'molecular mass in g' of the defined chemical 'species', and that is how it is used in most chemical calculations.

The formula mass in grams = one mole of the defined substance.

One mole of a substance equals the molecular mass in grams.

$$\text{moles of species} = \frac{\text{actual mass of species in g}}{\text{atomic/formula mass of species}}$$

1. What do we mean by the term "mole"?

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2. What is the molar mass (g/mol) of the following elements?

a. Calcium

b. Aluminium

3. Calculate the number of moles in 120 grams of calcium.

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4. Calculate the number of moles in 500 grams of calcium carbonate (CaCO₃).

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5. Calcium carbonate and hydrochloric acid react together to produce calcium chloride, carbon dioxide and water. Below is the balanced symbol equation for this reaction.



- a) Work out the M_r for each of the reactants and products shown in the equations and write them below.

(i) CaCO_3 (ii) HCl (iii) CaCl_2

(iv) CO_2 (v) H_2O

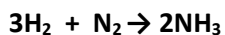
- b) What mass of calcium chloride can be produced from 2 grams of calcium carbonate ?

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- c) How much calcium carbonate is needed to produce 1kg (1000 grams) of calcium chloride?

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6. The reaction for making ammonia from hydrogen and nitrogen gas is shown by the following equation:



The industrial process for making ammonia produces 5.1 tonnes of ammonia from 6 tonnes of hydrogen gas. Calculate the percentage yield of this process.

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7. a) What is meant by the term "atom economy?"

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b) what equation is used for calculating atom economy?

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8. Write a short definition for.....

a. The relative atomic mass (A_r) of an element?

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b. The relative formula mass (M_r) of a compound?

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Moles in solutions (This part is tricky!)

Titration can be used to find the concentration of an acid or alkali from the relative volumes used and the concentration of one of the two reactants. **You should be able to carry out calculations involving neutralisation reactions in aqueous solution given the balanced equation or from your own practical results.**

Note again: $1\text{ dm}^3 = 1\text{ litre} = 1000\text{ ml} = 1000\text{ cm}^3$, so dividing $\text{cm}^3/1000$ gives dm^3 .

Other useful formulae or relationships are:

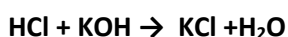
- **moles = concentration** (mol/dm^3) **x volume** ($\text{dm}^3 = \text{cm}^3/1000$),
- **concentration** (mol/dm^3) = **mol / volume** ($\text{dm}^3 = \text{cm}^3/1000$),
- **1 mole = formula mass in grams.**

In most volumetric calculations of this type, you **first calculate the known moles of one reactant from a volume and molarity.**

Then, **from the equation, you relate this to the number of moles of the other reactant**, and then with the **volume of the unknown concentration**, you work out its molarity.

- 1) A titration is carried out and 0.05 dm^3 of hydrochloric acid neutralises 0.3 dm^3 of potassium hydroxide of concentration 0.5 mol dm^{-3} . The equation for this reaction is shown below.

Calculate the concentration of this hydrochloric acid.



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2. Given the equation: $\text{NaOH}_{(aq)} + \text{HCl}_{(aq)} \rightarrow \text{NaCl}_{(aq)} + \text{H}_2\text{O}_{(l)}$

25.0 cm³ of a sodium hydroxide solution was pipetted into a conical flask and titrated with a standard solution of 0.200 mol dm⁻³ (0.2M) hydrochloric acid. It was found that 15 cm³ of hydrochloric acid was needed to neutralise the sodium hydroxide. What was the concentration of the acid?

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