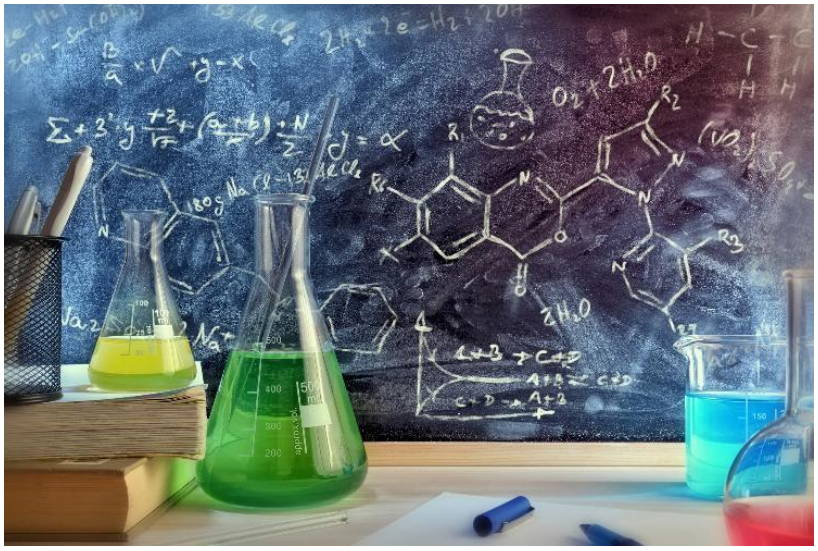
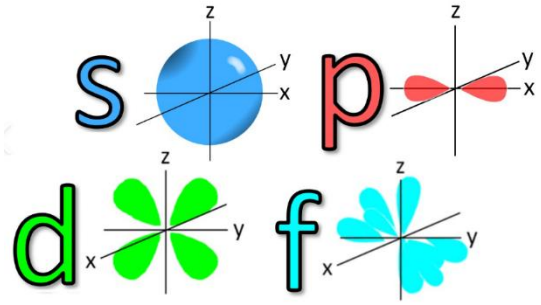
THE BRUNTS ACADEMY

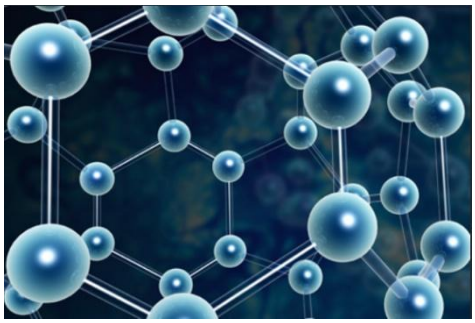


Brunts Academy

Introduction to

A level Chemistry





Contact details:

Miss S. Dickinson – **2nd in Science Teacher of Chemistry**

sdickinson@bruntsacademy.org

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Welcome to your 'A' level Chemistry course at the Brunts Academy.

Course Details:

You will be following the AQA A level chemistry specification over the next two years. The specification can be found to download along with other course information from AQA at: https://www.aqa.org.uk/subjects/science/as-and-a-level/chemistry-7404-7405

The AQA A-level chemistry course is a linear qualification and assessments take place at the end of the two year course which can be broken down into 1st year topics (AS) and 2nd year topics (A level).

1st year

Physical chemistry	Inorganic chemistry	Organic chemistry
• Atomic structure • Amount of substance • Bonding • Energetics • Kinetics • Chemical equilibria, Le Chatelier's principle and K_c • Oxidation, reduction and redox equations	• Periodicity • Group 2, the alkaline earth metals • Group 7 (17), the halogens	• Introduction to organic chemistry • Alkanes • Halogenoalkanes • Alkenes • Alcohols • Organic analysis

2nd year

Physical chemistry	Inorganic chemistry	Organic chemistry
• Thermodynamics • Rate equations • Equilibrium constant K_p for homogeneous systems • Electrode potentials and electrochemical cells • Acids and bases	• Properties of Period 3 elements and oxides • Transition metals • Reactions of ions in aqueous solution	• Optical isomerism • Aldehydes and ketones • Carboxylic acids and derivatives • Aromatic chemistry • Amines • Polymers • Amino acids, proteins and DNA • Organic synthesis • NMR spectroscopy • Chromatography

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These topics are then assessed over 3 exams at the end of the two year course:

Paper 1	Paper 2	Paper 3
What's assessed • Relevant Physical chemistry topics (sections 3.1.1 to 3.1.4, 3.1.6 to 3.1.8 and 3.1.10 to 3.1.12) • Inorganic chemistry (section 3.2) • Relevant practical skills	What's assessed • Relevant Physical chemistry topics (sections • 3.1.2 to 3.1.6 and 3.1.9) • Organic chemistry (section 3.3) • Relevant practical skills	What's assessed • Any content • Any practical skills
How it's assessed • Written exam: 2 hours • 105 marks • 35% of A-level	How it's assessed • Written exam: 2 hours • 105 marks • 35% of A-level	How it's assessed • Written exam: 2 hours • 90 marks • 30% of A-level
Questions • 105 marks of shortand long answerquestions	Questions • 105 marks of shortand long answerquestions	Questions • 40 marks of questions on practical techniques and data analysis • 20 marks of questions testing across the specification • 30 marks of multiple choice questions

Aims & Expectations:

Our aim is to help you achieve the best possible grade in A Level Chemistry, develop your critical thinking and analysis skills and help prepare you for your future.

Our commitment to you is:

- To help you achieve through interactive and experimental learning
- To support you with class work and core practical and provide guidance for your independent study
- To provide you with the opportunity to practise exam standard questions (end of unit tests and independent study) and full, timed past papers (mocks) before sitting the exams for real

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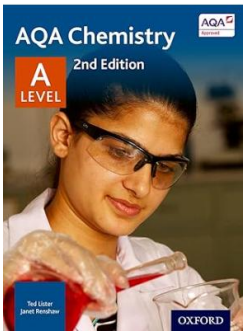
- To recommend you with a comprehensive A level text book
- To set appropriate cover work in the event of staff absence

Our Expectations of you:

- Exemplary attendance; if you are away you should catch up with missed work, ideally before your next lesson
- Approach lessons with a positive and focussed attitude
- Meet deadlines
- Notes; during lessons your teacher may ask you to write some information down but this may not always be the case. It is up to you to make your own revision notes. The purchase of a revision guide may help in this respect.
- Keep an orderly file; it is expected that you have a file to show evidence of your working. Your file should be split into clearly labelled sections for: Notes, Keywords (A-Z), Practical Write-up, Questions.
- **Take responsibility for your learning.** If you are having difficulties, speak to your teacher as soon as these arise.
- That you commit a minimum of 1 hour of your time after **each** lesson to review your work.
- Complete cover work set during any lessons if your teacher is absent as this will be reviews in the subsequent lesson.

Course book



At the start of the year you will be need to buy a copy of the course-specific textbook (Oxford University Press AQA A Level Chemistry Student book) to support your learning. It is your responsibility to take care of this and bring it to lessons for reference.

Revision Guide:

There are CGP A level revision guides that take a similar format to the GCSE revision guides, if you found these useful at GCSE we would highly recommend you purchasing these, either through ourselves or another retailer.

End of topic tests and mock exams:

For each topic outlined in the course details above, the topic will culminate in an end of topic test, made from past exam questions and become cumulative over time of content to aid with long term retention. These will support you to understand your strengths and areas of development as you revision for mock exams and final exams. Please note you should take these very seriously as your performance will be

recorded to help track your progress through the course. If you score below your target level then you may be asked to re-sit the test in your own time (free or lunchtime).

Work outside of class:

In the early stages of your course, you will often find that work outside of class is prescribed to you by your class teacher. Usually this will take the form of past paper questions or exam- style questions. One of the reasons for issuing you with a copy of the AQA A level chemistry textbook is so that you have the wealth of resources that are contained within it immediately available at your fingertips to help with the out of class work.

In addition to this you should also be keeping good, clear notes about the content outlined in the topic checklists as well as researching further topics of interest to you.

As a guide, for each hour that you spend working in class you should spend the same amount of time working outside of class to review/extend the work carried out.

'Exam support' sessions:

As a 6th form student you are expected to take responsibility for your own learning, working in an independent and mature manner. This is also true for your preparation for external exams as it will be you that drives this, ultimately determining the grade that you achieve.

The majority of input from us (the school) will take place during scheduled lesson time. Over and above the normal range of lessons that we offer at Brunts Academy, we may offer a small number of 'exam support' sessions, though this will depend upon our workloads as subject teachers and will not be guaranteed. If we are able to then they will take place either at lunchtime or after school in the weeks leading up to the assessments and exams. You will be notified nearer the time of exams.

They are called 'exam support' sessions, where the agenda is set (very much) by the attendees and the topics and needs or requests that they bring with them at that point in their learning.

Students in previous years have found these to be very useful in supporting them as independent learners; indeed, the open-door and open-agenda nature of the sessions comes at their request. Some students have found them useful to use as times to get together in small groups of students to work through some problems together. We will not chase students to attend; if they choose not to attend they miss out.

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Support during core practical tasks:

One of the features of our course is that you have to do 12 core practicals. Many students find this a challenging yet stimulating aspect of the course. These practicals are externally assessed in the exam. Practical work is central to any study of Chemistry. For this reason, the core practical activities form a thread linking theoretical knowledge and understanding to practical scenarios. By following this thread, students will build on practical skills learned at GCSE, becoming confident practical physicists and handling apparatus competently and safely.

Preparing for the start of A level Chemistry:

To ensure that all the hard work you have put into your GCSE exams is not lost between now and September, we have a series of activities for you to complete. These appear later in this booklet. Work through the activities and bring your answers to the first lesson in September where we will review your summer activities.

Final message:

If you are stuck with a particular topic or question within the course then please see one of your teachers who will be happy to help you further. We are here to try and help you and will do everything practically possible to support you throughout the course.

As a future A-level student, you are responsible for your own progress now. It is your responsibility to adapt to the more mature working environment of the Sixth Form. Clearly, there is a strong link between the amount of work done and final grade achieved – please make sure that you work steadily and hard so that you can look back on your time studying A-levels with no regrets.

We look forward to you joining us in September and hope this information. We hope the Chemistry transition activities and this booklet help you understand how to start your Chemistry journey, in addition to what A Level Chemistry at the Brunts Academy will look like over the next 2 years.

Kind Regards

Miss Dickinson

SDickinson

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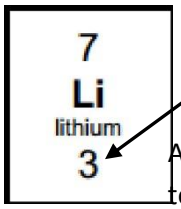
Week 1

Chemistry topic 1 - Electronic structure, how electrons are arranged around the nucleus

A periodic table can give you the proton / atomic number of an element, this also tells you how many electrons are in the ***atom***.

You will have used the rule of electrons shell filling, where:

The first shell holds up to 2 electrons, the second up to 8, the third up to 8 and the fourth up to 18 {or you may have been told 8).



Atomic number =3, electrons = 3, arrangement 2 in the first shell and 1 in the second or Li = 2,1

At **A level** you will learn that the electron structure is more complex than this, and can be used to explain a lot of the chemical properties of elements.

The 'shells' can be broken down into 'orbitals', which are given letters: 's' orbitals, 'p' orbitals and 'd' orbitals.

You can read about orbitals here:

http://bit.ly/pixlchem1

http://www.chemguide.co.uk/atoms/properties/atomorbs.html#top

Now that you are familiar with s, p and d orbitals try these problems, write your answer in the format:

$1s^2$, $2s^2$, $2p^6$ etc.

Q1.1 Write out the electron configuration of:

a) Ca b) Al c) S d) Cl e) Ar f) Fe g) V h) Ni i) Cu j) Zn k) As Q1.2

Extension question, can you write out the electron arrangement of the following ***ions***:

a) K^+ b) O^{2-} c) Zn^{2+} d) V^{5+} e) Co^{2+}

Chemistry topic 2 - Oxidation and reduction

At GCSE you know that oxidation is adding oxygen to an atom or molecule and that reduction is removing oxygen, or that oxidation is removing hydrogen and reduction is adding hydrogen. You may have also learned that oxidation is removing electrons and reduction is adding electrons.

At A level we use the idea of ***oxidation number*** a lot!

You know that the metals in group 1 react to form ions that are +1, i.e. Na^+ and that group 7, the halogens, form -1 ions, i.e. Br -.

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We say that sodium, when it has reacted has an oxidation number of +1 and that bromide has an oxidation number of -1.

All atoms that are involved in a reaction can be given an oxidation number.

An element, Na or O_2 is always given an oxidation state of zero {0), any element that has reacted has an oxidation state of + or -.

As removing electrons is **reduction**, if, in a reaction the element becomes **more** negative it has been reduced, if it becomes more positive it has been oxidised.

You can read about the rules for assigning oxidation numbers here:

http://www.dummies.com/how-to/content/rules-for-assigning-oxidation-numbers-to-elements.html

Elements that you expect to have a specific oxidation state actually have different states, so for example you would expect chlorine to be -1, it can have many oxidation states: NaClO, in this compound it has an oxidation state of +1

There are a few simple rules to remember:

Metals have a + oxidation state when they react.

Oxygen is 'king' it always has an oxidation state of -2 Hydrogen has

an oxidation state of +1 {except metal hydrides)

The charges in a molecule must cancel.

Examples: Sodium nitrate, $NaNO_3$

Na +1 3x O^{2-}

+1 -6

sulfate ion, SO_4^{2-}

$4xO^{2-}$ and 2- charges 'showing'

-8 -2

To cancel: N = +5

S = +6

Q2.1 Work out the oxidation state of the **underlined** atom in the following:

a) $Mg\underline{C}O_3$ b) $\underline{S}O_3$ c) $NaClO_3$ d) $\underline{Mn}O_2$ e) $\underline{Fe}_2O_3$ f) $\underline{V}_2O_5$

g) $KMnO_4$ h) $\underline{Cr}\ O_2^{2-}{}_7$ i) $\underline{Cl}\ O_2{}_4$

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Week 2

Chemistry topic 3 - Isotopes and mass

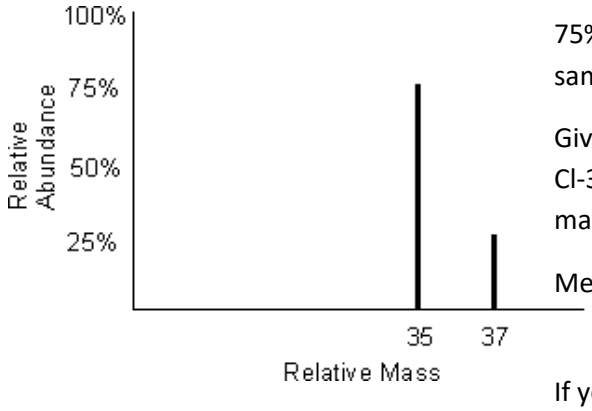
You will remember that an isotopes are elements that have differing numbers of neutrons. Hydrogen has 3 isotopes; H_1^1 H_1^2 H_1^3

Isotopes occur naturally, so in a sample of an element you will have a mixture of these isotopes. We can accurately measure the amount of an isotope using a **mass spectrometer**. You will need to understand what a mass spectrometer is and how it works at A level. You can read about a mass spectrometer here:

http://filestore.aqa.org.uk/resources/chemistry/AQA-7404-7405-TN-MASS-SPECTROMETRY.PDF

Q3.1 What must happen to the atoms before they are accelerated in the mass spectrometer? Q3.2 Explain why the different isotopes travel at different speeds in a mass spectrometer.

A mass spectrum for the element chlorine will give a spectrum like this:



75% of the sample consist of chlorine-35, and 25% of the sample is chlorine-37.

Given a sample of naturally occurring chlorine ¾ of it will be Cl-35 and ¼ of it is Cl-37. We can calculate what the **mean** mass of the sample will be:

Mean mass = $\frac{75}{100} \times 35 + \frac{25}{100} \times 37 = 35.5$

If you look at a periodic table this is why chlorine has an atomic mass of 35.5.

An A level periodic table has the masses of elements recorded much more accurately than at GCSE. Most elements have isotopes and these have been recorded using mass spectrometers.

GCSE

11 **B** boron 5	12 **C** carbon 6	14 **N** nitrogen 7	16 **O** oxygen 8	19 **F** fluorine 9
27 **Al** aluminium 13	28 **Si** silicon 14	31 **P** phosphorus 15	32 **S** sulfur 16	35.5 **Cl** chlorine 17

A level

10.8 **B** 5 boron	12.0 **C** 6 carbon	14.0 **N** 7 nitrogen	16.0 **O** 8 oxygen	19.0 **F** 9 fluorine
27.0 **Al** 13 aluminium	28.1 **Si** 14 silicon	31.0 **P** 15 phosphorus	32.1 **S** 16 sulphur	35.5 **Cl** 17 chlorine

Given the percentage of each isotope you can calculate the mean mass which is the accurate atomic mass for that element.

Q3.3 Use the percentages of each isotope to calculate the accurate atomic mass of the following elements.

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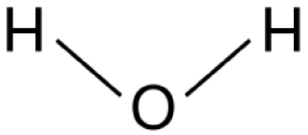
a) Antimony has 2 isotopes: Sb-121 57.25% and Sb-123 42.75%
b) Gallium has 2 isotopes: Ga-69 60.2% and Ga-71 39.8%
c) Silver has 2 isotopes: Ag-107 51.35% and Ag-109 48.65%
d) Thallium has 2 isotopes: Tl-203 29.5% and Tl-205 70.5%
e) Strontium has **4** isotopes: Sr-84 0.56%, Sr-86 9.86%, Sr-87 7.02% and Sr-88 82.56%

Chemistry topic 4 - The shapes of molecules and bonding.



Have you ever wondered why your teacher drew a water molecule like this?

The lines represent a covalent bond, but why draw them at an unusual angle? If you are unsure about covalent bonding, read about it here:

http://bit.ly/pixlchem5

http://www.chemguide.co.uk/atoms/bonding/covalent.html#top

At A level you are also expected to know how molecules have certain shapes and why they are the shape they are.

You can read about shapes of molecules here:

http://bit.ly/pixlchem6

http://www.chemguide.co.uk/atoms/bonding/shapes.html#top

Q4.1 Draw a dot and cross diagram to show the bonding in a molecule of aluminium chloride ($AlCl_3$}

Q4.2 Draw a dot and cross diagram to show the bonding in a molecule of ammonia (NH_3}

Q4.3 What is the shape and the bond angles in a molecule of methane (CH_4}?

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Week 3

Chemistry topic 5 - Chemical equations

Balancing chemical equations is the stepping stone to using equations to calculate masses in chemistry.

There are loads of websites that give ways of balancing equations and lots of exercises in balancing.

Some of the equations to balance may involve strange chemical, don't worry about that, the key idea is to get balancing right.

http://bit.ly/pixlchem7

http://www.chemteam.info/Equations/Balance-Equation.html

This website has a download; it is safe to do so:

http://bit.ly/pixlchem8

https://phet.colorado.edu/en/simulation/balancing-chemical-equations

Q5.1 Balance the following equations

a. $H_2 + 0_2 \rightarrow H_20$

b. $S_8 + 02 \rightarrow S0_3$

c. $HgO \rightarrow Hg + 0_2$

d. $Zn + HCl \rightarrow ZnCl_2 + H_2$

e. $Na + H_20 \rightarrow NaOH + H_2$

f. $C_{10}H_{16} + Cl_2 \rightarrow C + HCl$

g. $Fe + 0_2 \rightarrow Fe_20_3$

h. $C_6H_{12}0_6 + 0_2 \rightarrow C0_2 + H_20$

i. $Fe_20_3 + H_2 \rightarrow Fe + H_20$

j. $Al + FeO \rightarrow Al_2O_3 + Fe$

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Chemistry topic 6 - Measuring chemicals - the mole

From this point on you need to be using an A level periodic table, not a GCSE one you can view one here:

http://bit.ly/pixlpertab

https://secondaryscience4all.files.wordpress.com/2014/08/filestore_aqa_org_uk_subjects_aqa-2420-w-trb-ptds_pdf.png

Now that we have our chemical equations balanced, we need to be able to use them in order to work out masses of chemicals we need or we can produce.

The ***mole*** is the chemists equivalent of a dozen, atoms are so small that we cannot count them out individually, we weigh out chemicals.

For example: magnesium + sulfur ➔ magnesium sulfide

Mg + S ➔ MgS

We can see that one atom of magnesium will react with one atom of sulfur, if we had to weigh out the atoms we need to know how heavy each atom is.

From the periodic table: Mg = 24.3 and S = 32.1

If I weigh out exactly 24.3g of magnesium this will be 1 mole of magnesium, if we counted how many atoms were present in this mass it would be a huge number {6.02×10^{23}!!!!), if I weigh out 32.1g of sulfur then I would have 1 mole of sulfur atoms.

So 24.3g of Mg will react precisely with 32.1g of sulfur, and will make 56.4g of magnesium sulfide.

Here is a comprehensive page on measuring moles, there are a number of descriptions, videos and practice problems.

You will find the first 6 tutorials of most use here, and problem sets 1 to 3.

http://bit.ly/pixlchem9

http://www.chemteam.info/Mole/Mole.html Q6.1

Answer the following questions on moles.

a) How many moles of phosphorus pentoxide {P_4O_{10}) are in 85.2g?
b) How many moles of potassium in 73.56g of potassium chlorate {V) {$KClO_3$)?
c) How many moles of water are in 249.6g of hydrated copper sulfate{VI) {$CuSO_4.5H_2O$)? For this one, you need to be aware the dot followed by $5H_2O$ means that the molecule comes with 5 water molecules so these have to be counted in as part of the molecules mass.
d) What is the mass of 0.125 moles of tin sulfate {$SnSO_4$)?
e) If I have 2.4g of magnesium, how many g of oxygen{O_2) will I need to react completely with the magnesium? $2Mg + O_2$ ➔ MgO

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Week 4

Chemistry topic 7 - Solutions and concentrations

In chemistry a lot of the reactions we carry out involve mixing solutions rather than solids, gases or liquids.

You will have used bottles of acids in science that have labels saying 'Hydrochloric acid 1M', this is a solution of hydrochloric acid where 1 mole of HCl, hydrogen chloride {a gas) has been dissolved in 1dm^3 of water.

The dm^3 is a cubic decimetre, it is actually 1 litre, but from this point on as an A level chemist you will use the dm^3 as your volume measurement.

http://bit.ly/pixlchem10

http://www.docbrown.info/page04/4_73calcs11msc.htm Q7.1

a) What is the concentration {in mol dm^{-3}) of 9.53g of magnesium chloride {$MgCl_2$) dissolved in 100cm^3 of water?
b) What is the concentration {in mol dm^{-3}) of 13.248g of lead nitrate {$Pb(NO_3)_2$) dissolved in 2dm^3 of water?
c) If I add 100cm^3 of 1.00 mol dm^3 HCl to 1.9dm^3 of water, what is the molarity of the new solution?
d) What mass of silver is present in 100cm^3 of 1moldm^{-3} silver nitrate {$AgNO_3$)?
e) The Dead Sea, between Jordan and Israel, contains 0.0526 moldm^{-3} of Bromide ions {Br^-), what mass of bromine is in 1dm^3 of Dead Sea water?

Chemistry topic 8 - Titrations

One key skill in A level chemistry is the ability to carry out accurate titrations, you may well have carried out a titration at GCSE, at A level you will have to carry them out very precisely **and** be able to describe in detail how to carry out a titration - there will be questions on the exam paper about how to carry out practical procedures.

You can read about how to carry out a titration, the next page in the series {page 5) describes how to work out the concentration of the unknown.

Remember for any titration calculation you need to have a balanced symbol equation; this will tell you the ratio in which the chemicals react.

E.g. a titration of an unknown sample of sulfuric acid with sodium hydroxide.

A 25.00cm^3 sample of the unknown sulfuric acid was titrated with 0.100moldm^{-3} sodium hydroxide and required exactly 27.40cm^3 for neutralisation. What is the concentration of the sulfuric acid?

Step 1: the equation $2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$

Step 2; the ratios 2 : 1

Step 3: how many moles of sodium hydroxide 27.40cm^3 = 0.0274dm^3

number of moles = c x v = 0.100 x 0.0274 = 0.00274 moles

step 4: Using the ratio, how many moles of sulfuric acid

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for every 2 NaOH there are 1 H_2SO_4 so, we must have 0.00274/2 =0.00137 moles of H_2SO_4

Step 5: Calculate concentration. concentration = moles/volume f-in dm^3 = 0.00137/0.025 = ***0.0548 moldm^{-3}***

Here are some additional problems, which are harder, ignore the questions about colour changes of indicators.

http://bit.ly/pixlchem12

http://www.docbrown.info/page06/Mtestsnotes/ExtraVolCalcs1.htm Use

the steps on the last page to help you

Q8.1 A solution of barium nitrate will react with a solution of sodium sulfate to produce a precipitate of barium sulfate.

$Ba\{NO_3)_2\{aq) + Na_2SO_4\{aq) \rightarrow BaSO_4\{s) + 2NaNO_3\{aq)$

What volume of 0.25moldm^{-3}sodium sulfate solution would be needed to precipitate all of the barium from 12.5cm^3 of 0.15 moldm^{-3} barium nitrate?

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Week 5

Chemistry topic 9 - Organic chemistry - functional groups

At GCSE you would have come across **hydrocarbons** such as alkanes {ethane etc) and alkenes {ethene etc). You may have come across molecules such as alcohols and carboxylic acids. At A level you will learn about a wide range of molecules that have had atoms added to the carbon chain. These are called functional groups, they give the molecule certain physical and chemical properties that can make them incredibly useful to us.

Here you are going to meet a selection of the functional groups, learn a little about their properties and how we give them logical names.

You will find a menu for organic compounds here:

http://bit.ly/pixlchem13

http://www.chemguide.co.uk/orgpropsmenu.html#top

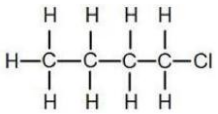
And how to name organic compounds here:

http://bit.ly/pixlchem14

http://www.chemguide.co.uk/basicorg/conventions/names.html#top

Using the two links see if you can answer the following questions:

Q9.1 Halogenoalkanes



What is the name of this halogenoalkane? How could you make it from butan-1-ol?

Q9.2 Alcohols

How could you make ethanol from ethene?

How does ethanol react with sodium, in what ways is this a) similar to the reaction with water, b) different to the reaction with water?

Q9.3 Aldehydes and ketones

Draw the structures of a) propanal b) propanone

How are these two functional groups different?

Chemistry topic 10 - Acids, bases, pH

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At GCSE you will know that an acid can dissolve in water to produce H^+ ions, at A level you will need a greater understanding of what an acid or a base is.

Read the following page and answer the questions

http://bit.ly/pixlchem15

http://www.chemguide.co.uk/physical/acidbaseeqia/theories.html#top Q10.1 What is your new definition of what an acid is?

Q10.2 How does ammonia {NH_3) act as a base?

http://bit.ly/pixlchem16

http://www.chemguide.co.uk/physical/acidbaseeqia/acids.html#top

Q10.3 Ethanoic acid {vinegar) is a weak acid, what does this mean?

Q10.4 What is the pH of a solution of 0.01 $moldm^{-3}$ of the strong acid, hydrochloric acid?

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Further activities

SI units

Every measurement must have a size (eg 2.7) and a unit (eg metres or ºC). Sometimes there are different units available for the same type of measurement, for example ounces, pounds, kilograms and tonnes are all used as units for mass.

To reduce confusion and to help with conversion between different units, there is a standard system of units called the SI units which are used for most scientific purposes.

These units have all been defined by experiment so that the size of, say, a metre in the UK is the same as a metre in China.

The seven SI base units are:

Physical quantity	Usual quantity symbol	Unit	Abbreviation
mass	*m*	kilogram	kg
length	*l* or *x*	metre	m
time	*t*	second	s
electric current	*I*	ampere	A
temperature	*T*	kelvin	K
amount of substance	*N*	mole	mol
luminous intensity	(not used at A-level)	candela	cd

All other units can be derived from the SI base units.

For example, area is measured in square metres (written as m^2) and speed is measured in metres per second (written as ms^{-1}).

It is not always appropriate to use a full unit. For example, measuring the width of a hair or the distance from Manchester to London in metres would cause the numbers to be difficult to work with.

Prefixes are used to multiply each of the units. You will be familiar with centi (meaning 1/100), kilo (1000) and milli (1/1000) from centimetres, kilometres and millimetres.

There is a wide range of prefixes. The majority of quantities in scientific contexts will be quoted using the prefixes that are multiples of 1000. For example, a distance of 33 000 m would be quoted as 33 km.

THE BRUNTS ACADEMY

The most common prefixes you will encounter are:

Prefix	Symbol	Multiplication factor		
Tera	T	10^{12}	1 000 000 000 000	
Giga	G	10^{9}	1 000 000 000	
Mega	M	10^{6}	1 000 000	
kilo	k	10^{3}	1000	
deci	d	10^{-1}	0.1	1/10
centi	c	10^{-2}	0.01	1/100
milli	m	10^{-3}	0.001	1/1000
micro	μ	10^{-6}	0.000 001	1/1 000 000
nano	n	10^{-9}	0.000 000 001	1/1 000 000 000
pico	p	10^{-12}	0.000 000 000 001	1/1 000 000 000 000
femto	f	10^{-15}	0.000 000 000 000 001	1/1 000 000 000 000 000

Activity 1

Which SI unit and prefix would you use for the following quantities?

1. The mass of water in a test tube.
2. The time taken for a solution to change colour.
3. The radius of a gold atom.
4. The volume of water in a burette.
5. The amount of substance in a beaker of sugar.
6. The temperature of the blue flame from a Bunsen burner.

THE BRUNTS ACADEMY

Sometimes, there are units that are used that are not combinations of SI units and prefixes.

These are often multiples of units that are helpful to use. For example, one litre is 0.001 m^3.

Activity 2

Rewrite the following in SI units.

1. 5 minutes
2. 2 days
3. 5.5 tonnes

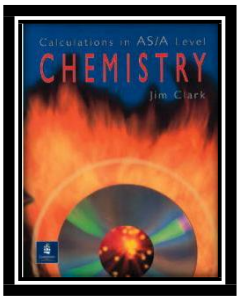
Activity 3

Rewrite the following quantities.

1. 0.00122 metres in millimetres
2. 104 micrograms in grams
3. 1.1202 kilometres in metres
4. 70 decilitres in millilitres
5. 70 decilitres in litres
6. 10 cm^3 in litres

Book Recommendation

Calculations in AS/A Level Chemistry (Paperback) Jim Clark



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If you struggle with the calculations side of chemistry, this is the book for you. Covers all the possible calculations you are ever likely to come across. Brought to you by the same guy who wrote the excellent chemguide.co.uk website.

Videos to watch online

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