Bridging the Gap

Welcome to Dereham Sixth Form College. Before you start your Chemistry course in September you need to have completed this booklet and all associated tasks. It has been written for you, as students, to help give you some practice of key skills that you will be using over the next two years. There will be some GCSE content that you need to be confident with and some A-Level material that will be part of the foundation we will build on in lessons.

Deadline—This is to be completed over the summer and handed in during your FIRST chemistry lesson in September.

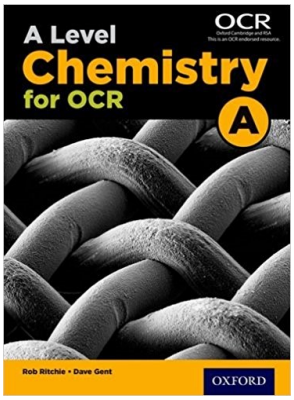
Name: . . . . . .

High School: . . . . . .

Induction Teacher: . . . . . .

Course Material

The following textbooks are used throughout the course and will form the basis for your examinations, you will need to purchase your own copy of this book:



Places you can purchase this book:

Oxford University Press—https://goo.gl/sj2BBd

Amazon UK—https://goo.gl/pGLMDg

WHSmith—https://goo.gl/7K8VJs

ISBN: 978-0-19-835197-9

Price Range: £33—£42 (including second hand prices)

It is highly recommended that you have a look at the following links as they contain information that is relevant to the chemistry course or are useful places to find additional material that will help develop your understanding in the subject.

OCR Chemistry A A-Level Specification: https://goo.gl/MCo5dj

OCR Practical Skills Handbook: https://goo.gl/SbXUTM

OCR Maths Skills Handbook for GCE Chemistry: https://goo.gl/52gGpz

OCR Periodic Table of Elements: https://goo.gl/XXu1ja

Royal Society of Chemistry; Learn Chemistry: http://www.rsc.org/learn-chemistry/

Royal Society of Chemistry Resources: http://www.rsc.org/learn-chemistry/resource

Chemicool Interactive Periodic Table: www.chemicool.com

Chemguide—www.chemguide.co.uk

Doc Brown—https://goo.gl/FhFJM8

edmodo

Edmodo is an online education network that enables students and teachers to communicate and interact with digital resources. Throughout the Chemistry course you will find that lots of resources, lessons and messages are passed through Edmodo. You will need to create an account (if you don't already have one) and sign up to the A-Level Chemistry 2018-20 group. The Group code will be given to you in lesson.

PLEASE BE AWARE THAT THE GROUP CODE IS ONLY ACTIVE FOR A COUPLE OF WEEKS SO PLEASE SIGN UP QUICKLY

Group Code: . . . . . .

Part of your bridging work is to complete the questions by using this link: https://goo.gl/2itjyD

This is assessed online; instructions are provided when you log in. This is not a compulsory assignment but there is a prize for the two people with the highest scores. For your login details and further information please email Mr Russell: srussell.northgate@dsfc.org.uk

Complete the table below using the periodic table to help:

Element/Ion	Symbol	Atomic Number	Atomic Mass	Number of protons	Number of neutrons	Number of electrons
Sodium						
		6	12			
		7	15			
Chlorine			35			
Chloride			37			
Iron (III) ion			56			

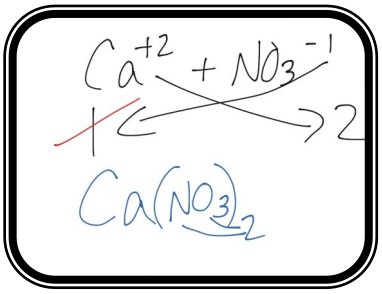
Balance these equations:

1. $K_{(s)} + Cl_{2(g)} \rightarrow KCl_{(s)}$
2. $Zn_{(s)} + HF_{(aq)} \rightarrow ZnF_{2(s)} + H_{2(g)}$
3. $H_2O_{(l)} + Na_{(s)} \rightarrow$
4. $C_6H_{12}O_{6(s)} + O_{2(g)} \rightarrow CO_{2(g)} + H_2O_{(g)}$
5. $H_3PO_{4(aq)} + Ca(OH)_{2(aq)} \rightarrow Ca_3(PO_4)_{2(s)} + H_2O_{(l)}$

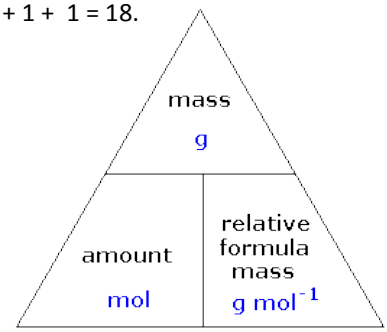
Determine the chemical formulae of the following ionic substances (SOME of the ions have been given to you, others you should know from GCSE)

1. Silver nitrate: _____
2. Ammonium Hydroxide: _____
3. Calcium Chloride: _____
4. Iron (II) sulphide: _____
5. Sodium Nitride: _____
6. Copper Sulphate: _____
7. Potassium Carbonate: _____
8. Iron (III) Nitrate: _____
9. Aluminium Oxide: _____

Positive Ions	Negative Ions
Ag^+	NO_3^-
NH_4^+	OH^-
Fe^{2+} (iron II)	SO_4^{2-}
Fe^{3+} (iron III)	CO_3^{2-}
Cu^{2+}	NO_3^-



A mole is a chemical unit based on Avogadro's Number. One mole of atoms contains 6 x 10^{23} atoms, no matter what element it is. This number is used in chemistry because if you could count out this many carbon atoms, the total mass of carbon you would have is 12 g, which is the same as its atomic mass. One mole of water weighs 18g because the atomic mass of oxygen is 16, the atomic mass of hydrogen is 1, water has the formula H_2O → 16 + 1 + 1 = 18.



Calculate the number of moles or mass of the materials below;

Moles:

1. 22g CO_2:
2. 75g $CaCO_3$:
3. 16g $CuSO_4$:
4. 46.1g $Mg(NO_3)_2$:
5. 13.6g $Fe(OH)_3$:
6. 19.44g $NiCl_2(PC_{18}H_{15})_2$:

Mass

1. 0.125 mol $LiAlH_4$:
2. 0.002 mol C_{60}:
3. 2.8 mol NaCl:
4. 3 mol $(NH_4)_3PO_4$:
5. 0.5 mol $CaCO_3$:
6. 0.92 mol $NaBH_4$:

How may individual atoms are in the following materials:

1. 0.5 mol of Na: _____
2. 1.0 mol of O_2:_____
3. 0.75 mol Li:_____
4. 3.5 mol K:_____
5. $4x10^{-6}$ mol N_2:_____
6. 2.125 mol H_2SO_4:_____

Describe the similarities and differences between a base and an alkali:

. . . . . .
. . . . . .
. . . . . .

Give an example of the following chemical reactions, with the products, as a word and balanced symbol equation and identify what type of reaction they are:

Inorganic Acid + Metal Oxide

Inorganic Acid + Metal Hydroxide

Inorganic Acid + Metal Carbonate

Type of reaction: . . . . . .
Ionic Equation:

For the experiment you did in your introductory lesson, write a method and include a labelled diagram of the equipment you used.

Draw and complete a results table for the titration you completed. Show your workings for your averages.

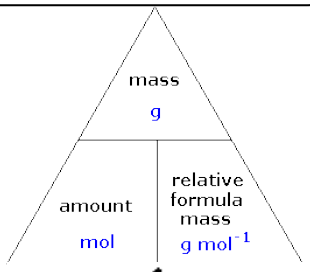
Concentration is measured in mol dm^{-3} (moles per decimetre cubed / moles per litre). From this you can calculate the amount of a substance used and do mole calculations for a solution.

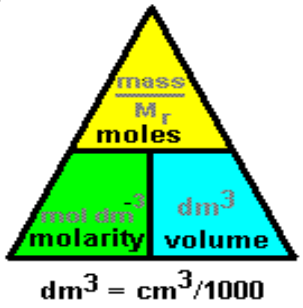
Calculate the concentration of the solution you made using the two triangles below:

Write a balanced symbol equation for the reaction that you carried out.

. . . . . .

What is the ratio of sodium hydroxide to hydrochloric acid?





$dm^3 = cm^3/1000$

Calculate the concentration of the hydrochloric acid solution using your titration results.

Assuming that the stock solution your acid came from had a total volume of 5L, what mass of anhydrous hydrogen chloride would be needed to make a stock at this concentration?

Past Paper Questions

(b) One form of naturally occurring carbon is graphite.

The table below lists some properties of graphite.

electrical conductivity	good conductor
hardness	soft
melting point	very high

- Describe the bonding and structure in graphite.
- Explain, in terms of bonding and structure, the properties of graphite shown above.

In your answer, you should use appropriate technical terms, spelt correctly.

..... **[5]**

Chemists have developed models for bonding and structure which are used to explain different properties.

Ammonia, NH_3, is a covalent compound.

Explain what is meant by a *covalent bond*.

..... [1]

Draw a '*dot-and-cross*' diagram to show the bonding in NH_3.

Show **outer** electrons only.

[1]

Name the shape of the ammonia molecule.

Explain, using your '*dot-and-cross*' diagram, why ammonia has this shape and has a bond angle of 107°.

shape: .....

explanation: .....

.....

.....

.....

.....

.....

..... [3]

The alcohols are an example of an homologous series.

The table shows the boiling points for the first four members of straight-chain alcohols.

alcohol	structural formula	boiling point / °C
methanol	CH_3OH	65
ethanol	CH_3CH_2OH	78
propan-1-ol	$CH_3CH_2CH_2OH$	97
butan-1-ol	$CH_3CH_2CH_2CH_2OH$	118

What is the general formula of a member of the alcohol homologous series?

..... [1]

Deduce the molecular formula of the alcohol that has 13 carbon atoms per molecule.

..... [1]

Alcohols contain the hydroxyl functional group.

What is meant by the term *functional group*?

.....

.....

.....

..... [2]

At room temperature and pressure, the first four members of the alcohol homologous series are liquids whereas the first four members of the alkanes homologous series are gases.

Explain this difference.

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.....

..... [3]

A student investigated the conductivity of ammonium chloride.

She noticed that when the ammonium chloride was solid it did **not** conduct electricity. However, when ammonium chloride was dissolved in water, the resulting solution did conduct electricity.

Explain these observations.

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..... **[2]**

Ammonium compounds such as ammonium sulfate, $(NH_4)_2SO_4$, can be used as fertilisers.

Write a balanced equation to show how ammonium sulfate could be formed by the reaction between aqueous ammonia and sulfuric acid.

..... **[1]**

Ammonium sulfate is an example of a salt formed when an acid is neutralised by a base.

Explain what is meant by the term *salt*.

.....

..... **[1]**

Why is ammonia acting as a base in this neutralisation?

.....

.... **[1]**

What is the relative formula mass of $(NH_4)_2SO_4$?

Give your answer to **one** decimal place.

..... **[1]**

Flipped Learning

What is Flipped Learning

Flipped learning is a style of teaching that we used in Chemistry and in various subjects at Dereham Sixth Form College. The main principle of this style of learning is to generally improve your own study skills and help develop you into a confident and independent learner. You will make notes on topics and chapters in the textbook before the lesson and come to every lesson with your pr-e-prepared notes. Then in class you spend more time on exam technique and question practice.

Your Notes

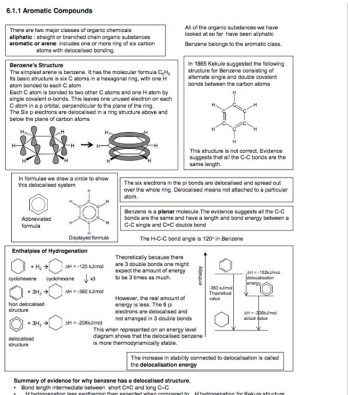
Before you are taught each chapter in the course, you will prepare a set of notes. These do not have to be pages of rewriting the textbooks; examples of different methods of note-taking can be found in one of the folders on the transition Edmodo page. Your notes can be in the form of mind-maps , flash cards or typed bullet points. Your notes should contain all key diagrams, structures, mechanisms and key equations. This then means you already have them and don't need to spend time in lesson writing these down/drawing them. You should always bring the relevant notes to the lesson you are in as a reference and aid when answering questions in class. You can add to your notes in lesson but you should not be making a whole new set of notes during class.

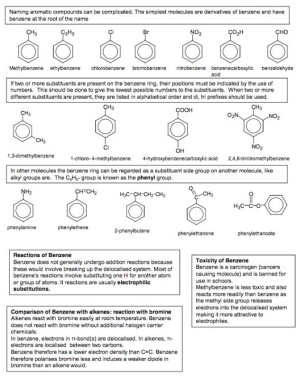
What This Means in Practice

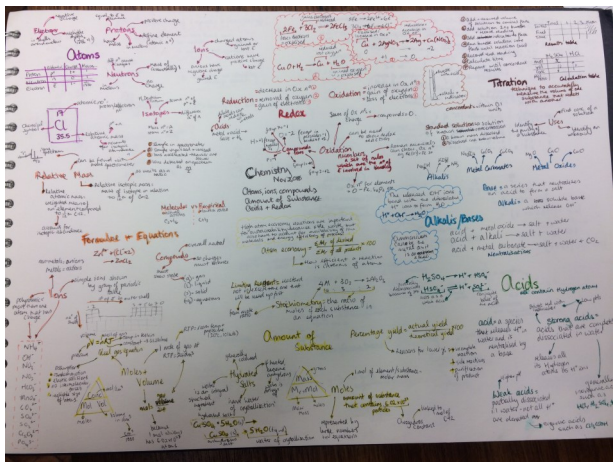
The course in Chemistry largely follows the same structure as the course textbook. At the start of each chapter you will be given a note-taking quiz. This is to make sure you have got all the key concepts in your notes and there are no gaps in your basic knowledge. You will be able to refer to your notes during these quizzes so it is important that you have them prepared in advance.

An key thing to bear in mind is that we are not expecting you to be confident or necessarily understand all of the information you have written down.

The course material will still be taught in lesson but will be taught at quite a fast pace. This means that more time can be spent securing understanding, developing exam technique and answering any questions you have from the notes you have taken.







Make your First Flipped Learning Notes

The first topics you will be taught are: Atoms, Ions and Compounds and Electrons and Bonding Below are some links to online resources and videos. You will also find slides that will be used on the Chemistry Transition Edmodo page. These links are starting points for you, as you can always do some additional research basing it on the OCR H032/H432 specification:

Atoms Ions and Compounds

- https://chemrevise.org/ocr-revision-guides/
- https://tinyurl.com/psut5nt
- https://tinyurl.com/y2mu8nkx
- https://tinyurl.com/y6qgxw6j
- https://www.youtube.com/watch?v=xjY5p-1CDr8
- https://www.youtube.com/watch?v=hUVzb0fzHsk
- https://www.youtube.com/watch?v=SdhLTfma_Eg
- https://www.youtube.com/watch?v=URc75hoKGLY
- https://www.youtube.com/watch?v=p9iQ5Qn42DM

Electrons and Bonding

- https://tinyurl.com/y39bdhos
- https://tinyurl.com/yyyr2wfr
- https://www.diffen.com/difference/Covalent_Bonds_vs_Ionic_Bonds
- https://tinyurl.com/y7s2ejps
- https://tinyurl.com/y3n6xvhp
- https://www.youtube.com/watch?v=Aoi4j8es4gQ
- https://www.youtube.com/watch?v=Lc-QVVFuoj0
- https://www.youtube.com/watch?v=P5iCRKxd37Q
- https://www.youtube.com/watch?v=vp9mfW7dqE0
- https://www.youtube.com/watch?v=Qf07-8Jhhpc
- https://www.youtube.com/watch?v=IV404giwIE0
- https://www.youtube.com/watch?v=CGA8sRwqIFg
- https://www.youtube.com/watch?v=cKOGMNpNeQo

Links for both aspects

- https://www.youtube.com/watch?v=oH0tpyrIcSY