Summer **Bridging Work**

KWS SIXTH FORM

Chemistry A Level

You will be studying **Chemistry A Level - AQA** exam board.

It is important that you familiarise yourself with the course specifications over the summer, in order that you are ready to embark on your KS5 journey from day one.

For course specification: Please click here

Here are the details of your summer bridging work for Chemistry. This will need to be completed and submitted in your first Chemistry lesson in September. The bridging work will contribute to your first subject report at the end of September.

Task 1: Charges on ions
Memorise the ion charges on page 2.

Task 2: Working out Formulas of ionic compounds
Use what you learnt in task 1 to write formula for ionic compounds on page 3.

Task 3: Balancing equation
Memorise the general reactions, then complete the balancing equation questions on page 4.

Task 4: Dot and cross diagrams
Draw dot and cross diagrams for the given compounds on page 5.

Task 5: Moles
Complete the moles questions on page 6.

Task 6: Hydrogen bonding essay
Write a 500 word report on how Hydrogen bonding works, and it's importance to life. The FutureLearn course Discovering Science: Science writing could help with the structure of your report.
https://www.futurelearn.com/courses/discovering-science-science-writing

Task 7: Learn triple content
Learn the triple content of the GCSE. All of you will have a short test on this in the first couple of weeks.

Useful things to do:
Download the AQA Chemistry Specification and read through it:
https://www.aqa.org.uk/subjects/science/as-and-a-level/chemistry-7404-7405
Choose some of the Become a better Chemist tasks from page 7.

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Task 1: **Charges on ions**

Learn the formulas of the ions in the table below:

Positive ions		Negative ions	
Group 1 ions: Lithium, Li^+ Sodium, Na^+ potassium, K^+ Group 2 ions: magnesium, Mg^{2+} calcium Ca^{2+} barium Ba^{2+}	Group 3 ions: aluminium, Al^{3+} Other common ions: Silver, Ag^+ Zinc, Zn^{2+} Ammonium, NH_4^+ Hydrogen, H^+	Group 7 ions: fluoride, F^- chloride Cl^- bromide Br^- iodide I^- Group 6 ions: oxide, O^{2-} Sulphide, S^{2-}	Other common ions: Nitrate, NO_3^- Sulfate, SO_4^{2-} Carbonate, CO_3^{2-} Hydrogencarbonate, HCO_3^- Hydroxide, OH^- Hydride, H^- Phosphate, PO_4^{3-}

You will need to learn the formulas of all the above ions, as it essential that you can have them at your fingertips for writing equations throughout the course.

Task 2: **Working out Formulas of ionic compounds**

Use the charges on the ions to work out the formulas of the ionic compounds listed below:

1) silver bromide .....

2) sodium carbonate .....

3) potassium oxide .....

4) iron (III) oxide .....

5) chromium (III) chloride .....

6) calcium hydroxide .....

7) aluminium nitrate .....

8) sodium sulfate .....

9) lead (II) oxide .....

10) sodium phosphate .....

11) zinc hydrogencarbonate .....

12) ammonium sulphate .....

13) gallium hydroxide .....

14) strontium selenide .....

15) radium sulfate .....

16) sodium nitride .....

Task 3: **Balancing equations**

Some general equations you should know:

General Reaction	Examples
substance + oxygen → oxides	$2\ Mg + O_2 \rightarrow 2MgO$ $2\ H_2S + 3\ O_2 \rightarrow 2\ H_2O + 2\ SO_2$ $C_3H_8 + 5\ O_2 \rightarrow 3\ CO_2 + 4\ H_2O$
metal + water → metal hydroxide + hydrogen	$2\ Na + 2\ H_2O \rightarrow 2\ NaOH + H_2$
metal + acid → salt + hydrogen	$Mg + 2\ HCl \rightarrow MgCl_2 + H_2$
oxide + acid → salt + water	$MgO + 2\ HNO_3 \rightarrow Mg(NO_3)_2 + H_2O$
hydroxide + acid → salt + water	$2\ NaOH + H_2SO_4 \rightarrow Na_2SO_4 + H_2O$
carbonate + acid → salt + water + carbon dioxide	$CuCO_3 + 2\ HCl \rightarrow CuCl_2 + H_2O + CO_2$
hydrogencarbonate + acid → salt + water + carbon dioxide	$KHCO_3 + HCl \rightarrow KCl + H_2O + CO_2$
ammonia + acid → ammonium salt	$NH_3 + HCl \rightarrow NH_4Cl$
metal carbonate → metal oxide + carbon dioxide (on heating)	$CaCO_3 \rightarrow CaO + CO_2$

1) Balance the following equations.

$Mg + HNO_3 \rightarrow Mg(NO3)_2 + H_2$ .....

$CuCl_2 + NaOH \rightarrow Cu(OH)_2 + NaCl$ .....

$SO_2 + O_2 \rightarrow SO_3$ .....

$C_4H_{10} + O_2 \rightarrow CO_2 + H_2O$ .....

2) Give balanced equations for the following reactions.

a) sodium + oxygen → sodium oxide

b) aluminium + chlorine → aluminium chloride

c) calcium + hydrochloric acid → calcium chloride + hydrogen

d) ammonia + sulphuric acid → ammonium sulphate

Task 4: **Dot and cross diagrams**

Draw dot and cross diagrams to represent the covalent bonding in the following molecules:

a) CH_4

b) NH_3

c) HCl

d) O_2

e) CO_2

Task 5: **Moles**

1) Calculate the number of moles in the following:

a) 1.82g of KOH **(2)**

b) 14.85g of $Cu(NO_3)_2$ **(2)**

c) 4.12g of magnesium hydroxide **(3)**

2) Calculate the mass in grams of the following:

a) 0.50 moles of CO_2 **(2)**

b) 2.13 moles of H_2SO_4 **(2)**

c) 1.25 moles of aluminium oxide **(3)**

3) A student makes some sodium chloride by reacting sodium carbonate with hydrochloric acid.

a) Balance the equation for this reaction:

$Na_2CO_3 + HCl \rightarrow NaCl + H_2O + CO_2$ **(1)**

The student reacts 12.16g of sodium carbonate with an excess of hydrochloric acid.

b) Calculate the moles of sodium carbonate that he used. **(2)**

c) Calculate the mass of sodium chloride that would be formed. **(2)**

d) Suggest another chemical that would react with hydrochloric acid to form sodium chloride **(1)**

4) Titanium is a transition metal used as pins and plates to support badly broken bones.

Titanium is extracted from an ore that contains the mineral titanium oxide. This oxide is converted into titanium chloride. Titanium chloride is heated with sodium to form titanium metal. This reaction takes place in an atmosphere of a noble gas, such as argon.

$4Na(s)+TiCl4(l)\rightarrow Ti(s)+4NaCl(s)$

Calculate the mass of titanium that can be extracted from 570kg of titanium chloride.

Relative atomic masses: Cl:35.5; Ti:48.

Mass of titanium = _____ kg

(Total 3 marks)

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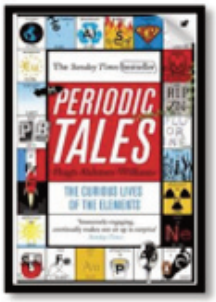
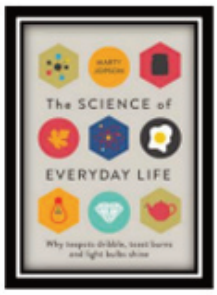
Become a better Chemist

Read books

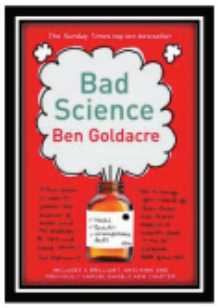
It will help to stand back and see physics in its wider context, and also to look in more detail at some areas of physics that you may currently know very little about. I consider reading the two books in bold below to be the easiest way for you to do this, and they're something that would be easy to obtain and simple for you to take away with you on holiday.



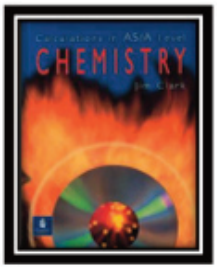
Periodic Tales: The Curious Lives of the Elements (Paperback) Hugh Aldersey-Williams
ISBN-10: 0141041455
This book covers the chemical elements, where they come from and how they are used. There are loads of fascinating insights into uses for chemicals you would have never even thought about.



The Science of Everyday Life: Why Teapots Dribble, Toast Burns and Light Bulbs Shine (Hardback) Marty Jopson
ISBN-10: 1782434186
The title says it all really, lots of interesting stuff about the things around you home!



Bad Science (Paperback) Ben Goldacre
ISBN-10: 000728487X
Here Ben Goldacre takes apart anyone who published bad / misleading or dodgy science – this book will make you think about everything the advertising industry tries to sell you by making it sound 'sciency'.



Calculations in AS/A Level Chemistry (Paperback) Jim Clark
ISBN-10: 0582411270
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.

Interact with Chemists in the real-world

Read magazines such as New scientist

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