

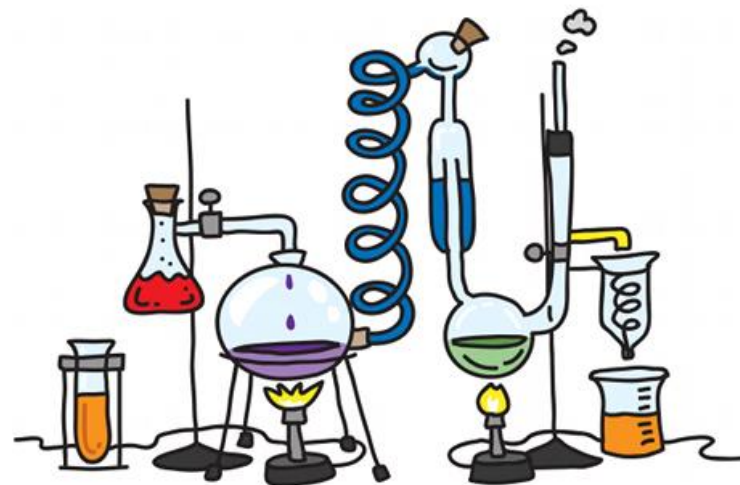


# CHEMISTRY

## INDUCTION 2024

### CONTENTS:

- *SUITABILITY (2)*
- *WHY CHOOSE IT? (3)*
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# CHEMISTRY



## SUITABILITY:

- APS 5.2
- Grade 6 in GCSE Sciences. If more than one Science at least two must be at a grade 6 (one must be Chemistry).
- Grade 6 in GCSE Maths (discussion with department if a grade 5 is achieved)
- Pass the entry exam.

In all topics, you will need to learn facts and build a body of knowledge but also to understand and apply the ideas. Many topics include calculations and so you should feel comfortable rearranging equations and using numbers.

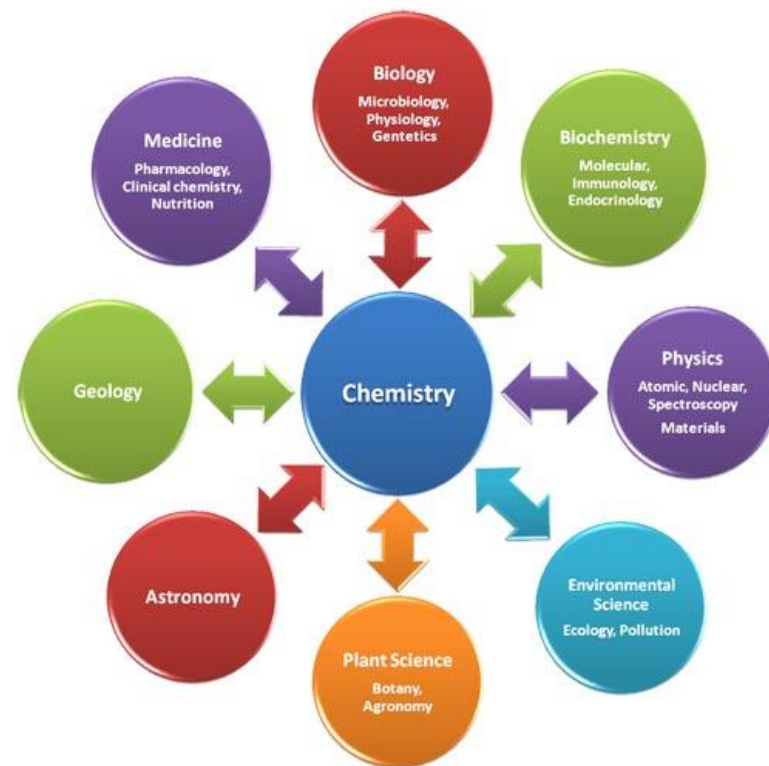
Importantly, chemistry is a hands-on science and you will carry out experiments on a regular basis. This is to consolidate your theory work, but also provide you with the opportunity to use new apparatus and build your skills and confidence to complete safe and accurate practical work.

# CHEMISTRY



## WHY CHOOSE IT?

- Chemistry A level is a highly respected A level, with its broad variety of tested skills, and it is a good choice for many degrees and careers. Chemistry has been described as the 'central science' and is often combined with either physics or biology. It is usually a compulsory choice for anyone wishing to pursue medicine, dentistry and veterinary science, as well as chemistry-based degrees such as pharmacy, pharmacology and biochemistry.
- It has both theoretical and practical aspects which keeps lessons interesting and varied.
- It is taught by very experienced members of staff.
- It enables you to develop crucial employability skills including researching, problem solving and analysing. Chemistry often requires teamwork and communication skills too, which is great for project management.

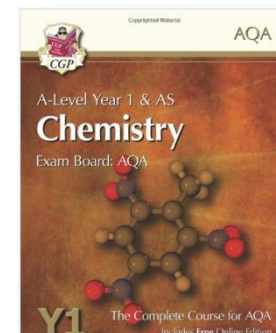


# CHEMISTRY



## EXPECTATIONS:

- **ATTENDANCE-** needs to be extremely high otherwise you won't do well. A level chemistry is tough and every year we have students who find the transition difficult. What ever the topic, activity, or task you are set you will have to give your **FULL** commitment.
- **DEADLINES-** always must be met.
- **RECORD KEEPING-** you need to keep your study notes/work in an organised folder. You will also need to buy an A4 hardback lab book to write up your experiments in. You will have a minimum of 12 experiments over the two years. If your lab book is assessed as up to standard you will also be accredited with the experimental award on your final certificate.
- **TEXTBOOKS-** we strongly advise you to purchase the recommended book(s).



[https://www.amazon.co.uk/New--Level-Chemistry-AQA-Student/dp/1782943218/ref=sr\\_1\\_3?s=books&ie=UTF8&qid=1467284369&sr=1-3&keywords=aqa+chemistry+as+year+1](https://www.amazon.co.uk/New--Level-Chemistry-AQA-Student/dp/1782943218/ref=sr_1_3?s=books&ie=UTF8&qid=1467284369&sr=1-3&keywords=aqa+chemistry+as+year+1)

# CHEMISTRY



## SPECIFICATION:

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



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## AS AND A-LEVEL CHEMISTRY

AS (7404)  
A-level (7405)

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### Specifications

For teaching from September 2015 onwards  
For AS exams in May/June 2016 onwards  
For A-level exams in May/June 2017 onwards

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Version 1.1 December 2015



# CHEMISTRY



## CONTENT:

### 3 main topics:

1. Physical Chemistry
2. Inorganic Chemistry
3. Organic Chemistry

3.1 [Physical chemistry](#) page 11

3.1.1 [Atomic structure](#) page 11

3.1.2 [Amount of substance](#) page 13

3.1.3 [Bonding](#) page 16

3.1.4 [Energetics](#) page 19

3.1.5 [Kinetics](#) page 20

3.1.6 [Chemical equilibria, Le Chatelier's principle and  \$K\_c\$](#)  page 22

3.1.7 [Oxidation, reduction and redox equations](#) page 24

3.1.8 [Thermodynamics \(A-level only\)](#) page 25

3.1.9 [Rate equations \(A-level only\)](#) page 27

3.1.10 [Equilibrium constant  \$K\_p\$  for homogeneous systems \(A-level only\)](#) page 29

3.1.11 [Electrode potentials and electrochemical cells \(A-level only\)](#) page 30

3.1.12 [Acids and bases \(A-level only\)](#) page 32

3.2 [Inorganic chemistry](#) page 34

3.2.1 [Periodicity](#) page 34

3.2.2 [Group 2, the alkaline earth metals](#) page 35

3.2.3 [Group 7\(17\), the halogens](#) page 36

3.2.4 [Properties of Period 3 elements and their oxides \(A-level only\)](#) page 38

3.2.5 [Transition metals \(A-level only\)](#) page 39

3.2.6 [Reactions of ions in aqueous solution \(A-level only\)](#) page 44

3.3 [Organic chemistry](#) page 45

3.3.1 [Introduction to organic chemistry](#) page 45

3.3.2 [Alkanes](#) page 47

3.3.3 [Halogenoalkanes](#) page 48

3.3.4 [Alkenes](#) page 49

3.3.5 [Alcohols](#) page 51

3.3.6 [Organic analysis](#) page 53

3.3.7 [Optical isomerism \(A-level only\)](#) page 54

3.3.8 [Aldehydes and ketones \(A-level only\)](#) page 55

3.3.9 [Carboxylic acids and derivatives \(A-level only\)](#) page 56

3.3.10 [Aromatic chemistry \(A-level only\)](#) page 57

3.3.11 [Amines \(A-level only\)](#) page 58

3.3.12 [Polymers \(A-level only\)](#) page 59

3.3.13 [Amino acids, proteins and DNA \(A-level only\)](#) page 60

3.3.14 [Organic synthesis \(A-level only\)](#) page 63

3.3.15 [Nuclear magnetic resonance spectroscopy \(A-level only\)](#) page 64

3.3.16 [Chromatography \(A-level only\)](#) page 65

# CHEMISTRY



AS

## EXAMS:

Content that will be taught and internally examined in year 12 but will not count to your overall grade.

### Assessments

Paper 1	+	Paper 2
<p><b>What's assessed</b></p> <ul style="list-style-type: none"> <li>• Relevant Physical chemistry topics (sections 3.1.1 to 3.1.4, 3.1.6 and 3.1.7)</li> <li>• Inorganic chemistry (Section 3.2.1 to 3.2.3)</li> <li>• Relevant practical skills</li> </ul>		<p><b>What's assessed</b></p> <ul style="list-style-type: none"> <li>• Relevant Physical chemistry topics (sections 3.1.2 to 3.1.6)</li> <li>• Organic chemistry (Section 3.3.1 to 3.3.6)</li> <li>• Relevant practical skills</li> </ul>
<p><b>How it's assessed</b></p> <ul style="list-style-type: none"> <li>• written exam: 1 hour 30 minutes</li> <li>• 80 marks</li> <li>• 50% of the AS</li> </ul>		<p><b>How it's assessed</b></p> <ul style="list-style-type: none"> <li>• written exam: 1 hour 30 minutes</li> <li>• 80 marks</li> <li>• 50% of the AS</li> </ul>
<p><b>Questions</b></p> <p>65 marks of short and long answer questions</p> <p>15 marks of multiple choice questions</p>		<p><b>Questions</b></p> <p>65 marks of short and long answer questions</p> <p>15 marks of multiple choice questions</p>



# CHEMISTRY

A-level

## EXAMS:

Content that will be taught and externally examined in year 13 and will count to your overall grade.

### Assessments

Paper 1	+	Paper 2	+	Paper 3
<b>What's assessed</b> <ul style="list-style-type: none"> <li>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)</li> <li>Inorganic chemistry (Section 3.2)</li> <li>Relevant practical skills</li> </ul>		<b>What's assessed</b> <ul style="list-style-type: none"> <li>Relevant Physical chemistry topics (sections 3.1.2 to 3.1.6 and 3.1.9)</li> <li>Organic chemistry (Section 3.3)</li> <li>Relevant practical skills</li> </ul>		<b>What's assessed</b> <ul style="list-style-type: none"> <li>Any content</li> <li>Any practical skills</li> </ul>
<b>How it's assessed</b> <ul style="list-style-type: none"> <li>written exam: 2 hours</li> <li>105 marks</li> <li>35% of A-level</li> </ul>		<b>How it's assessed</b> <ul style="list-style-type: none"> <li>written exam: 2 hours</li> <li>105 marks</li> <li>35% of A-level</li> </ul>		<b>How it's assessed</b> <ul style="list-style-type: none"> <li>written exam: 2 hours</li> <li>90 marks</li> <li>30% of A-level</li> </ul>
<b>Questions</b> 105 marks of short and long answer questions		<b>Questions</b> 105 marks of short and long answer questions		<b>Questions</b> 40 marks of questions on practical techniques and data analysis 20 marks of questions testing across the specification 30 marks of multiple choice questions



Weighting (%)	AS		A2		
	Paper 1	Paper 2	Paper 1	Paper 2	Paper 3
50	50		35	35	30
<b>3.1 Physical chemistry</b>					
3.1.1 Atomic structure					
3.1.2 Amount of substance					
3.1.3 Bonding					
3.1.4 Energetics					
3.1.5 Kinetics					
3.1.6 Chemical equilibria, Le Chatelier's principle and Kc					
3.1.7 Oxidation, reduction and redox equations					
3.1.8 Thermodynamics					
3.1.9 Rate equations					
3.1.10 Equilibrium constant Kp for homogeneous systems					
3.1.11 Electrode potentials and electrochemical cells					
3.1.12 Acids and bases					
<b>3.2 Inorganic chemistry</b>					
3.2.1 Periodicity					
3.2.2 Group 2, the alkaline earth metals					
3.2.3 Group 7(17), the halogens					
3.2.4 Properties of Period 3 elements and their oxides					
3.2.5 Transition metals					
3.2.6 Reactions of ions in aqueous solution					
<b>3.3 Organic chemistry</b>					
3.3.1 Introduction to organic chemistry					
3.3.2 Alkanes					
3.3.3 Halogenoalkanes					
3.3.4 Alkenes					
3.3.5 Alcohols					
3.3.6 Organic analysis					
3.3.7 Optical isomerism					
3.3.8 Aldehydes and ketones					
3.3.9 Carboxylic acids and derivatives					
3.3.10 Aromatic chemistry					
3.3.11 Amines					
3.3.12 Polymers					
3.3.13 Amino acids, proteins and DNA					
3.3.14 Organic synthesis					
3.3.15 Nuclear magnetic resonance spectroscopy					
3.3.16 Chromatography					

**EXAMS:**







# CHEMISTRY



## INDUCTION TEST:

First lesson in September.

We would expect you to know the following as a minimum:

- **4.1 Atomic Structure and the periodic table:**
  - subatomic particles, electronic structure, noble gases, halogens, alkali metals
- **4.2 Bonding, structure and the properties of matter :**
  - bonding x3, properties of small molecules/alloys/ionic/covalent compounds
- **4.3 Quantitative chemistry:**
  - balancing equations, Mr, moles, amount of substances in equations, limiting reactions
- **4.4 Chemical changes:**
  - reactivity series, metal extraction, salts, electrolysis, metal+acid reactions,
- **4.5 Energy changes:**
  - exothermic and endothermic reactions, reaction profiles
- **4.6 The rate and extent of chemical change:**
  - calculating rate, factors, reversibility/equilibrium
- **4.7 Organic chemistry :**
  - crude oil, hydrocarbons, alkanes, fractional distillation, cracking
- **4.8 Chemical analysis:**
  - chromatography, gas tests,
- **4.9 Chemistry of the atmosphere:**
  - atmosphere composition, atmosphere evolution, climate change, pollutants
- **4.10 Using resources:**
  - sustainable development, potable water, waste water treatment

<https://filestore.aqa.org.uk/resources/chemistry/specifications/AQA-8462-SP-2016.PDF>

**INCLUDING 'TRIPLE'  
(CHEMISTRY ONLY)  
TOPICS**

# CHEMISTRY



## SUMMER PREP WORK:

booklet

The most important thing you can do to prepare over summer is to know GCSE Chemistry like the back of your hand. You cannot build a tower block on shaky foundations. If you were a 'triple' student then revise all Chemistry you were ever taught for GCSE. If you were a 'combined' student then it is expected that you to **learn the extra 'triple' content** before the induction test in September....on top of revising the 'combined' content.

<https://filestore.aqa.org.uk/resources/chemistry/specifications/AQA-8462-SP-2016.PDF>

Pre-reading:

'Head Start to A-Level Chemistry'- GCP

'Essential Maths Skills for A-Level Chemistry'- GCP

List of good A-Level Chemistry websites: (with the caveat that I cannot check every web page that appears on these websites)

<http://www.chemguide.co.uk>

<http://www.s-cool.co.uk/a-level/chemistry>

<http://www.a-levelchemistry.co.uk>

<http://www.physicsandmathstutor.com/chemistry-revision/a-level-aqa/>

[http://www.rsc.org/learn-chemistry/wiki/A-Level\\_Chemistry\\_Revision](http://www.rsc.org/learn-chemistry/wiki/A-Level_Chemistry_Revision)

<http://www.docbrown.info/page13/page13.htm>



# CHEMISTRY

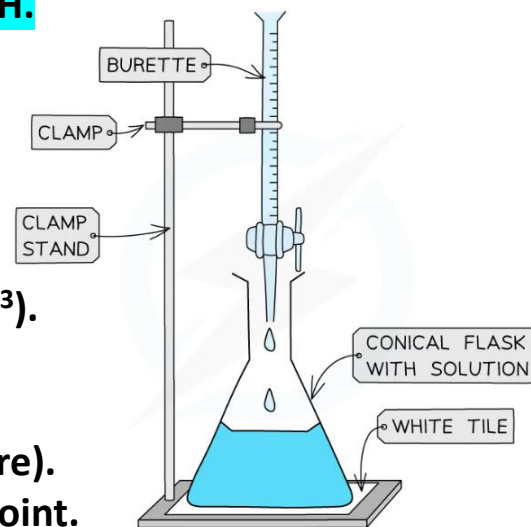
## INDUCTION TASK

COMBINED KIDS PAIR UP WITH TRIPLE AS YOU'VE NOT DONE TITRATIONS...watch a video if you're struggling

1. 25 cm<sup>3</sup> of NaOH (unknown concentration) and few drops of indicator in conical flask.
2. H<sub>2</sub>SO<sub>4</sub> in burette
3. Titrate the alkali with acid and find unknown concentration of the NaOH.

### EXTRA HELP

1. Use the volumetric pipette to measure 25 cm<sup>3</sup> of alkali.
2. Transfer the alkali to a conical flask and place on a white tile.
3. Add a few drops of indicator to the conical flask.
4. Using a funnel fill a burette with acid and record the starting volume (cm<sup>3</sup>).
5. Add the acid to the alkali whilst swirling the conical flask.
6. Keep adding alkali until the colour changes (end point).
7. Record the final volume of acid and calculate the total volume added (titre).
8. Repeat steps 1-6 but add the acid drop by drop when you near the end point.
9. Repeat the process until you get at least two concordant results ( $\pm 0.10$  cm<sup>3</sup>).
10. Use the concordant results to calculate an average titre.
11. Use the titre volume to calculate the unknown concentration of the alkali.



# IN FOLDER IF NECESSARY

3-Info---Titration-steps.pdf

File | G:/Shared%20drives/Dan%20Hardy%20Data/Samuel%20Whitbread/science/Chemistry/ALL%20GCSE%20CHEMISTRY\_DAN/4.%20Chemical%20changes/4.4.2.5%20Titrations...

Google GCSE Science - BBC... ExamPro K! Log in - Kahoot!

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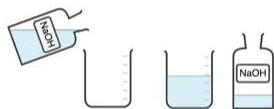
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## TITRATION STEPS

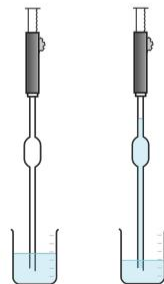
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### Steps to carry out a titration:

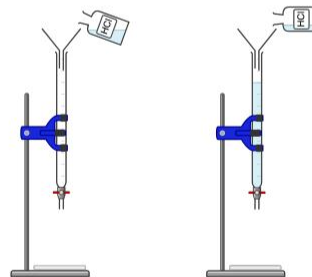
1. Pour some of the known concentration of alkali into a beaker.



2. Using a volumetric pipette and a pipette filler draw up exactly 25 cm<sup>3</sup> of alkali.



5. Set up the retort & burette then fill the burette with acid of an unknown concentration using a funnel. Be careful not to overfill the burette. Run a small amount of acid through the tap of the burette and discard. Record the starting volume of acid in the burette e.g. 01.20 cm<sup>3</sup>. **NOTE:** Burette readings must end in 0 or 5.



6. Place the conical flask on a white tile under the tap of the burette. Allow acid to run into the alkali whilst swirling the conical flask.
7. Reduce the flow to drop-by-drop of

