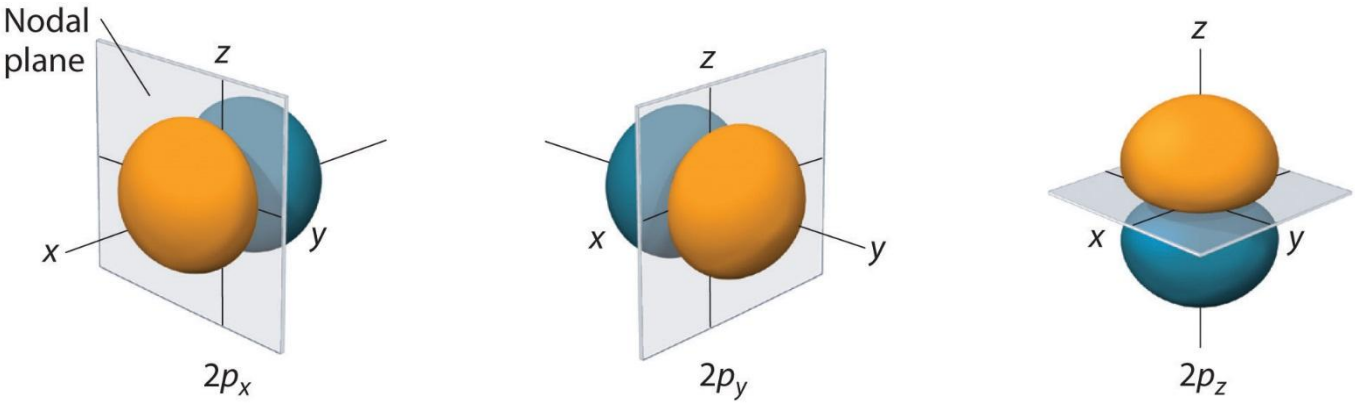
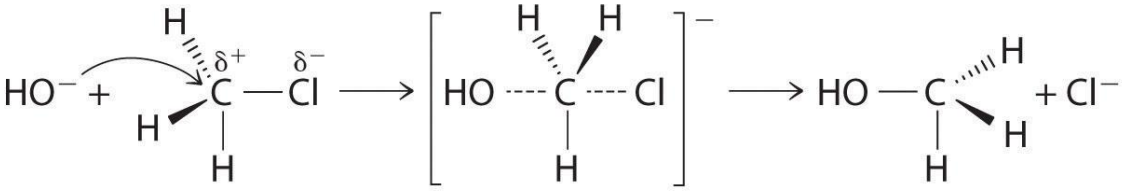
HS6

A Level

CHEMISTRY





"A scientist in his laboratory is not a mere technician: he is also a child confronting natural phenomena that impress him as though they were fairy tales." — Marie Skłodowska Curie *(Nobel Prize in Chemistry 1911)*

Chemistry A Level

Key stage 5 content

Exam Board: OCR
Course Details: http://www.ocr.org.uk/qualifications/as-a-level-gce-chemistry-a-h032-h432-from-2015/

The new OCR Chemistry Specification for AS and A2 level started in September 2015. The course is no longer modular; the examinations will employ multi-faceted questions that test students' understanding of the entire syllabus.

The two-year A Level is made up of **six** units which are assessed in three written papers taken at the end of the second year. These papers test both the students' theoretical knowledge and their understanding of, and application of, the practical chemistry skills that they have accumulated over the two years. The Practical Endorsement is a skills-based certification that runs the length of the course and which prepares students for successful progress in practical sciences at degree level.

Please see below the simplified structure for your first year of A level content.

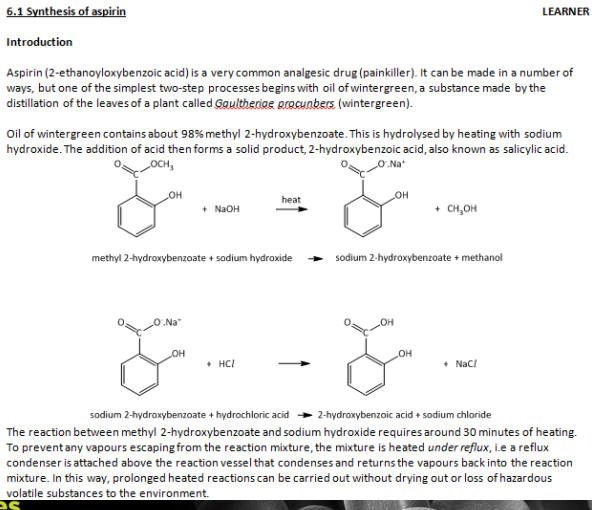
Course structure

			Miss Hern — Content Overview	Miss Anwar
Y12 content	Autumn 1	Module 1 – Development of practical skills in chemistry	• 2.1.1 Atomic structure and isotopes • 2.1.2 Compounds formulae and equations • 2.1.3 Amounts of substance	• 2.2.2 Electron structure • 3.1.1 Periodicity • 2.2.2 Bonding and structure
	Autumn 2		• 2.1.4 Acids • 2.1.5 Redox • 3.2.1 Enthalpy changes	• 3.1.2 Group 2 • 3.1.3 The Halogens • 3.1.4 Qualitative analysis • 4.1.1 Basic concepts of organic chemistry
	Spring 1		• 3.2.1 Enthalpy changes • 3.2.2 Rates	• 4.1.2 Alkanes • 4.1.3 Alkenes • 4.2.1 Alcohols
	Spring 2		• 3.2.3 Chemical equilibrium • 4.2.4 Analytical techniques	• 4.2.2 Haloalkanes • 4.2.3 Organic synthesis
	Summer 1		• 5.1.1 How fast • 5.1.2 How far	• Module 4 catch-up • 6.1.1 Aromatic compounds
	Summer 2		• Revision	• Revision

Assessment overview (at the end of Y13)		Weight
Periodic table, elements and physical chemistry	2 hours 15 minutes, written paper	37%
Synthesis and analytical techniques	2 hours 15 minutes, written paper	37%
Unified chemistry	1 hour 30 minutes, written paper	26%
Practical endorsement in chemistry	(04 non-exam assessment)	Pass or Fail

Practical Endorsement

The new Chemistry specification has changed (for the better) the way in which practical work is conducted at A Level. Through a minimum of twelve practical investigations (in practice there are more), students accumulate the scientific skills and laboratory techniques that will result in a smooth transition to degree-level study. There is no formal assessment, although the end-of-course examinations will test students' understanding of the experimental techniques they have employed.



6.1 Synthesis of aspirin LEARNER

Introduction

Aspirin (2-ethanoyloxybenzoic acid) is a very common analgesic drug (painkiller). It can be made in a number of ways, but one of the simplest two-step processes begins with oil of wintergreen, a substance made by the distillation of the leaves of a plant called *Gaultheria procumbens* (wintergreen).

Oil of wintergreen contains about 98% methyl 2-hydroxybenzoate. This is hydrolysed by heating with sodium hydroxide. The addition of acid then forms a solid product, 2-hydroxybenzoic acid, also known as salicylic acid.

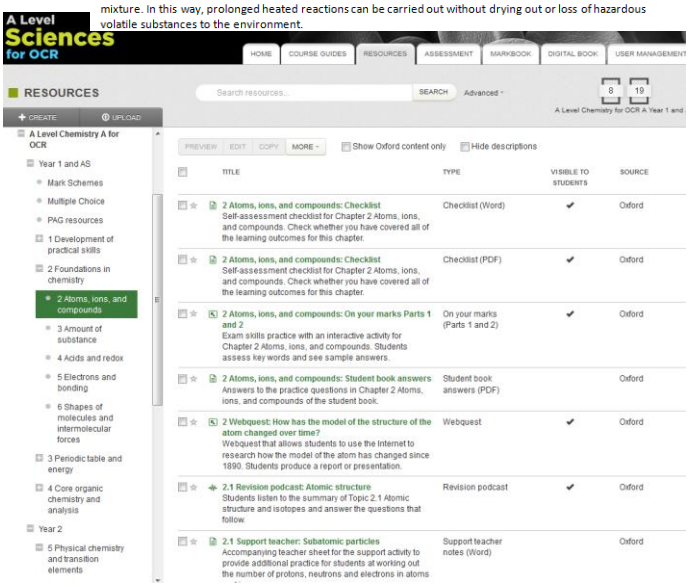
methyl 2-hydroxybenzoate + sodium hydroxide → sodium 2-hydroxybenzoate + methanol

sodium 2-hydroxybenzoate + hydrochloric acid → 2-hydroxybenzoic acid + sodium chloride

The reaction between methyl 2-hydroxybenzoate and sodium hydroxide requires around 30 minutes of heating. To prevent any vapours escaping from the reaction mixture, the mixture is heated *under reflux*, i.e a reflux condenser is attached above the reaction vessel that condenses and returns the vapours back into the reaction mixture. In this way, prolonged heated reactions can be carried out without drying out or loss of hazardous volatile substances to the environment.

Independent Learning

We make use of the OCR online resources that are stored on Kerboodle. These provide many interactive self-testing tasks that encourage independent learning. Students have access to the digital version of the Oxford OCR textbook



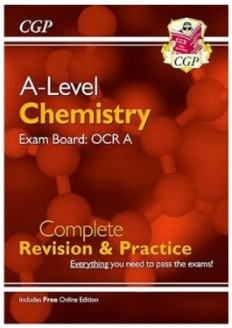
Lesson powerpoints and resources are uploaded to onedrive to allow students to review classwork in their own time.

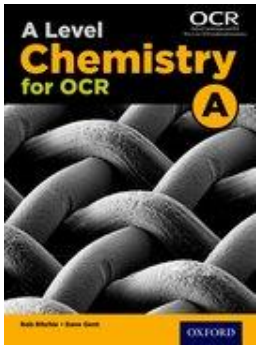
A Level Chemistry A for OCR Student Book

Written by curriculum and specification experts, this Student Book supports and extends students through the new linear course while delivering the breadth, depth, and skills needed to succeed in the new A Levels and beyond. It develops true subject knowledge while also developing essential exam skills.

CGP Revision Guide

This revision guide does not contain all the content, however provides a good overview and clear summary of the content. **A recommended purchase for every student!**





Contact Details

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herns@hendonschool.co.uk

Onedrive

All lesson resources will be accessible on the chemistry onedrive. You will be added to this in September using your school email.

Progression pathways and careers

Chemistry A Level is

- Required for: Chemistry, Chemical Engineering; Medicine; Pharmacy; Dentistry; Veterinary Science
- Supportive Subject for: Forensic Science; Engineering; Biological Sciences (e.g. Biochemistry, Biomedical Science, Microbiology); Physics; Environmental Science

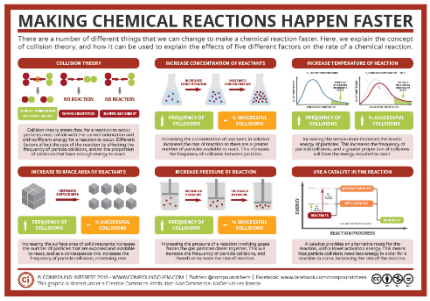
Chemistry is a route to many science careers but it is also a subject that incorporates with many transferable skills that are valued highly in the marketplace; it is not unusual for Chemistry graduates to move into other fields such as law and finance.

Useful websites to explore

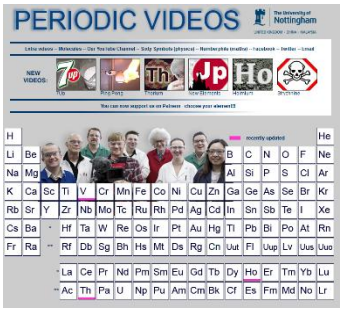
http://www.rsc.org/learn-chemistry/
Royal Society of Chemistry website has all kinds of resources for students of all ages and abilities.

http://chemnet.rsc.org/home
Free to join, portal of the Royal Society of Chemistry specifically for 14-18 year-olds. Chemnet keeps you up to date with upcoming Chemistry events.

http://www.compoundchem.com/
Free-to-access site that produces elegant posters about all aspects of Chemistry from core theoretical ideas to the constituents of chocolate, beetroot and tea



http://www.periodicvideos.com/about.htm
When you want to watch things catch fire rather than read about them, then Professor Martyn Poliakoff's collection of videos will make those long winter evenings just fly by



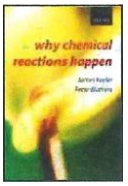
Sixth Form Extended Reading List

Chemistry

Ball, Philip. (2005) *Elegant solutions: ten beautiful experiments in chemistry* Cambridge: Royal Society of Chemistry. 542 BAL

Suitable: General reader
Where does beauty reside in experimental chemistry? Offering ten suggestions of what may be the most beautiful experiments in chemistry, Philip Ball provides an insight into the way chemists think and work, and demonstrates how what they do affects the rest of science and the wider
world

Keeler, James and Wothers , Peter (2003) Why chemical reactions happen Oxford: Oxford University Press. 541 KEE



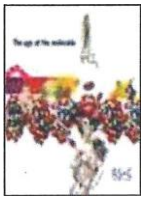
Suitable: Intending Chemistry undergraduate
By tackling the most central ideas in chemistry by cJiemicnl *reactions* Jisppen provides the reader with all the tools and concepts needed to think like a chemist. A unified approach to the subject helps the reader to develop a real overview of chemical processes.

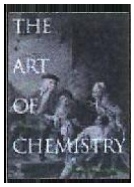
Garfield, Simon (2001) Mauve. London: Faber & Faber 535.6 GAR
Suitable: General reader
Mauve is the beguiling story of a man who invented a colour, and in the process transformed the world around him. The book will appeal to anyone interested in popular histories of science, society and fashion.

Emsley, John (2008) Molecules of murder. Cambridge: Royal Society o1 Chemistry 616.9 EMS
Suitable: General reader
Taking the reader on a journey of discovery into the world of dangerous organic poisons, this title describes ten highly toxic molecules which are of particular interest due to their use in notorious murder cases.

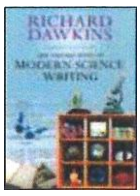
Atkins, Peter (2003) Galileo's finger. Oxford: OUP 500
Suitable: intending undergraduates in Maths & Science.
Galileo, one of whose fingers is preserved in a vessel displayed in Florence, provided much of the impetus for modern science, pointing the way out of medieval ignorance. In this brilliant account of the central ideas of contemporary science, Peter Atkins celebrates the effectiveness of Galileo's symbolic finger for revealing the nature of our universe, our world and ourselves.

Royal Society of **Chemistry** (1999) The age of the molecule. Cambridge: Royal Society of Chemistry 540
Suitable: Chemistry A level & intending undergraduates
The achievements and excitement of chemistry are evident in everyday life. Scientific research has led to cures for serious diseases and has offered profound insights into nature. This book describes the key developments in the molecular sciences.

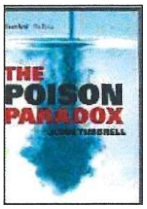




Greenberg, Arthur (2003) The art of chemistry: myths, medicines and materials. Hoboken: Wiley-Interscience. 540.9 GRE
Suitable: Chemistry A level
This volume presents thematic sections featuring a pictorial history of chemistry accompanied by short essays. It examines a number of modern concepts and cutting-edge research topics as they are applied to themes that have existed from the beginning of this field of science.



Dawkins, Richard (ed) (2009) The Oxford book of modern science writing. Oxford: OUP 500
Suitable: A level Science
Selected and introduced by Richard Dawkins, *The Oxford Book of Modern Science* Writing is a celebration of the finest writing by scientists for a wider audience - revealing that many of the best scientists have displayed as much imagination and skill with the pen as they have in the laboratory.



Timbrell, John (2008) The poison paradox: chemicals as friends and foes. Oxford: OUP 615.9 TIM

Suitable: intending undergraduates in Medicine, Pharmacy, Pharmacology, Biochemistry, Chemistry, Biology

Every day we are surrounded by chemicals that are potentially harmful. Some of these we take intentionally in the form of drugs; some we take unknowingly through the food we eat and the environment around us. The author explores what makes particular chemicals harmful, what their effects are, and how we can test for them.

PiXL recommended reading list:

There are specialist variations on the themes from biochemistry and chemical engineering, through to very niche specialisms such as colour chemistry. You may wish to research these and consider which aspects you are most interested in.

- Chemistry of Life (Steven Rose)
- Chemistry (Brock)
- Principles of Biochemistry (White, Handler and Smith)
- Chemistry for Changing Times (Hill, McCreary and Kolb)
- Materials Science (Ramsden)
- The Periodic Kingdom (Atkins).
- Mendeleyev's Dream — The Search for the Elements (Strathern)
- Periodic Tables — The Curious Life of the Elements (Aldersty and Williams)
- The Disappearing Spoon (Kean)
- 50 Ideas You Really Need to Know About Chemistry (Birch)
- The Periodic Table — A Field Guide to the Elements (Parsons and Dixon)
- A Short History of Everything (Bryson)

As part of your reading, you could consider exploring the periodicals New Scientist, Nature, Chemistry World and Education in Chemistry. For websites, look at www.ted.com, www.thenakedscientists.com, www.isaacchemistry.org; you could also search 'chemistry websites' as there are several on different areas of chemistry and from a number of UK and US universities. You may also wish to read other sites to do with biology and material sciences.

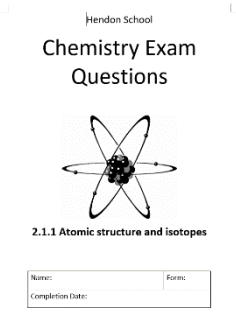
Homework booklets

For each specification point you will have a **homework booklet** to complete of **past-paper questions**.

These homework booklets will be handed out by your teacher, and the deadline for them will be given to you.

Your marks for these booklets will be collected, and will be a useful way for both you and your teacher to track progress, and identify areas of weakness.

These booklets will then be peer/self-assessed.


Hendon School
Chemistry Exam Questions
2.1.1 Atomic structure and isotopes
Name: Form:
Completion Date:

Library sessions

Each term you will have a library session with a different aim. After these sessions, different assignments will be given to you based on the skills/topics covered in the library session.

Broadly, the aims of these sessions are as follows:

1. To learn how to conduct research using academic support resources, apply advanced research strategies, and evaluate information effectively.
2. Plagiarism and writing citations and references using Harvard style referencing.
3. To understand the importance of academic honesty, learn the principles of proper citation and referencing using the Harvard style. And recognise how to avoid plagiarism through responsible research practices.

Assessments

After the end of each specification point covered, you will have a **mini assessment** in class (~45 mins). These are to help you and your teacher understand your progress, and they will be either peer-self-assessed or assessed by your teacher.

In December of Y12 you will sit **two mock papers**. 1 paper will cover Miss Hern's content, and 1 Miss Anwar's content. These papers will be 90 marks long.

At the end of Y12 you will sit **two UCAS mocks** – these will include all the content from the year.

Paper 1 will contain modules 1, 2 and 3
Paper 1 will contain modules 1, 2 and 4