

Syllabus 9701 Chemistry AS

Recommended Prior Knowledge

Students should have completed an IGCSE chemistry course or its equivalent.

GENERAL RESOURCES

- (a) **General Internet Sites.** These sites are a selection of the more reliable of the many available, and several of them include useful external links to other sites. Teachers are strongly recommended to consult the index pages of these sites for useful resources for each section of the Scheme of Work. Space does not permit more than a few specific references to be given in the individual sections of the Schemes of Work that follow. Teachers are recommended to develop their own libraries of URLs that suit their courses and styles of teaching.
- site 1** <http://teachers.cie.org.uk>
- site 2** <http://www.chem.ox.ac.uk/vrchemistry/> The virtual chemistry site from the University of Oxford, UK, with several interesting animations and links. In particular the following sub-site is worth a look:
site 2a <http://www.chem.ox.ac.uk/vrchemistry/foundation.html> A complete pre-university textbook with animated illustrations.
- site 3** http://www.rod.beavon.clara.net/chemistry_contents.htm Rod Beavon's "Chemistry Pages", from Westminster School, UK.
- site 4** <http://www.chemistryrules.me.uk/index.htm> A new URL address for Dr Richard Clarkson's useful site of revision notes and external links. Follow the links to AS or A2 units.
- site 5** <http://www.docbrown.info/page19/CIE9701.htm> Doc Brown has provided a most useful cross-referenced section dealing specifically with the 9701 syllabus. Just scroll down to the section you're interested in.
- site 6** <http://www.carlton.srsd119.ca/chemical/> David Dice's *Chemistry Stuff*, Includes some notes and background articles. Mainly physical chemistry.
- site 7** <http://www.creative-chemistry.org.uk/index.htm> Dr Nigel Saunders's extensive site from Harrogate Grammar School, UK. Follow the links to A level. There are also some good *fun stuff* activities.
- site 8** <http://www.s-cool.co.uk/alevel/chemistry.html> An A level revision site with many short tutorials on specific topics.
- site 9** <http://www.chemistry.co.nz/chem.htm> A New Zealand site with an eclectic mixture of topics, including help with equations, moles, redox, periodic tables, Avogadro, acids and bases.
- site 10** <http://www.chem.vt.edu/chem-ed/index.html> The *Chemistry Hypermedia Project* from Virginia Tech., USA: An accessible collection of articles for university students and lecturers, mostly on physical chemistry topics, with a few inorganic ones, but no organic.
site 10a <http://www.chem.vt.edu/chem-ed/genchem.html> The most generally useful of several sub-sites.
- site 11** <http://www.mp-docker.demon.co.uk/home.html> Mike Docker's site from Farnborough Sixth Form College, UK, filled with an enormous quantity of quizzes on all aspects of the AS and A level syllabus.
- site 12** <http://www.wiley.com/college/webercises/> An enormous and highly useful compendium of links to many other chemical internet sites – worth an exploration!
- site 13** <http://antoine.frostburg.edu/chem/senese/101/index.shtml> This is a US site intended for first year undergraduates, but much is relevant to AS/A Level Chemistry. Notes, articles and tutorial are included. A number of experiment simulations can be accessed. The compound library is very good.
- site 14** <http://www.chemmybear.com/> An excellent and comprehensive resource by Paul Groves of South Pasadena High School.. The chemmybear site contains some light-hearted looks at many aspects of Chemistry but also lots of links to useful pages written by teachers and students. Teachers will find the link to the SPHS site really useful for ideas for lectures, home-works, illustrative demonstrations etc. Mostly concerned with the American AP qualification, understandably. Not all of this is relevant to AS/A Level, but much is. You could spend many worthwhile days trawling through this site and its links.
- site 15** <http://www.shef.ac.uk/chemistry/orbitron/> A gallery of 3-D images representing atomic orbitals and molecular orbitals. Stunning images with comprehensive notes.

- site 16** http://www.revision-notes.co.uk/A_Level/Chemistry/index.html Concise revision notes on a number of aspects in AS/A Level Chemistry.
- site 17** <http://www.ausetute.com.au/index.html> An Australian site containing a multitude of free chemistry tutorials, which, for a small annual fee, provides access to an enormous selection of questions and tests, all with the advantage of worked answers.
- site 18** http://uk.geocities.com/help_with_chemistry/ A useful and detailed compendium of practical chemistry techniques, ranging from crystallisation to HPLC.
- site 19** <http://www.chemguide.co.uk/> Jim Clark's useful guide to some aspects of A level chemistry. We include this site here despite its occasional negative references to our esteemed syllabus!
- site 20** <http://www.rsc.org/chemsoc/> Lots of links to other useful sites. The visual periodic table is worth a look.
- site 21** <http://www.chemit.co.uk/default.aspx?sitemapID=116> This is the index page of a site which has collected together many teaching resources contributed by teachers. PowerPoint presentations, video clips, worksheets etc. Several useful links to other sites too.
- site 21a** <http://www.chemit.co.uk/default.aspx?sitemapID=112> The link to the video clips.
- site 22** <http://www.btinternet.com/~chemistry.diagrams/index.htm> A useful site containing over 400 copyright-free items, including a useful selection of animations.
- site 23** <http://www.chem.leeds.ac.uk/delights/> A site containing a host of short video clips of various demonstrations, experimental methods and photos.
- site 24** <http://jchemed.chem.wisc.edu/JCESoft/CCA/pirelli/index.html> A high-quality collection of about 16 video clips of a variety of demonstrations.
- site 25** <http://www.science.demon.co.uk/handbook/> A Salters Chemistry site containing recipes for about 30 interesting demonstrations.
- site 26** <http://www.chalkbored.com/lessons/chemistry-11.htm> A comprehensive site with about 80 lessons/worksheets/laboratory exercises for each of the last two years of "high school", i.e. years 11 and 12.

- (b) **Periodic Tables on the Web:** An exhaustive compilation is to be found at: <http://www.liv.ac.uk/Chemistry/Links/refperiodic.html>
 Some specific ones are: <http://www.webelements.com/> (the **definitive** Table from Sheffield, UK – includes lots of compounds too)
<http://pearl1.lanl.gov/periodic/default.htm> (lots on the history of the elements)
<http://www.chemicool.com/> (succinct and fact-filled)
<http://www.chemsoc.org/viselements/>
<http://www.colorado.edu/physics/2000/applets/a2.html> (good animations of electrons)

(c) **Resources for Experiments and Practical Work**

- The practical skills support booklet "Teaching AS Practical Skills" published by CIE is available from the Teachers Support website. References in the Scheme of Work are given the abbreviation **P(AS)**.

(d) **General textbooks for reference**

The following books have been endorsed by CIE for use with this syllabus. They have been through an independent quality assurance process and match the syllabus content closely.

- Chemistry for Advanced Level** by P. Cann & P. Hughes, (Edition 2002), published by John Murray, www.johnmurray.co.uk (ISBN 071958602X)
 This recent text has been developed to cover the new AS-A2 syllabuses of the UK Boards and also the CIE syllabuses. The specification chart for the 9701 syllabus is available [here](#), to help locate relevant sections. Explanations are thorough, the more advanced ones being placed in boxes, to separate them from the main text for ease of location. The style of the AS chapters is suitable for those starting a post-IGCSE course. References in the Scheme of Work are given the abbreviation **C+H**.

- **AS Level and A Level Chemistry** (Edition 2004) by B. Ratcliff, H. Eccles, J. Raffan, J. Nicholson, D. Johnson, & J. Newman, published by Cambridge University Press, www.cambridge.org (ISBN 0521544718) . This new text uses as its base the CUP booklets produced for the OCR AS/A2 syllabus, but it has been edited to cover the CIE AS and A level syllabus. References in the Scheme of Work are given the abbreviation **R+N**.

Both texts include questions within each chapter (with answers), and a bank of past examination questions at the end of the book.

In addition the following text will be found useful by teachers.

- **Advanced Chemistry**, by Philip Matthews (CUP Low Price Edition, 1992),
This large volume covers all syllabuses, including the 9701 syllabus, and a lot more – up to first or second year University level. Explanations of theories and mechanisms are very thorough, but because of the detail included, finding one's way around the book maybe slow at first, especially for students starting the AS course. References in the Scheme of Work are given the abbreviation **M**.

The AS Scheme of Work

UNITS

	<unit title>	<outline>	<syllabus reference>
1	Theoretical Chemistry: (Atoms, Molecules and Chemical Bonding)	Calculations involving the mole; empirical and molecular formulae; the structure of the atom; electron arrangements; ionic, covalent and metallic bonding; intermolecular forces; gases and the use of the ideal gas equation; the liquid and solid states.	sections 1, 2, 3 and 4
2	Physical Chemistry: (Enthalpy changes, Equilibria and Kinetics)	Enthalpy changes of reactions; bond energies; Hess's law; redox and electrolysis; chemical equilibrium; le Chatelier's principle; the Haber and Contact processes; Bronsted-Lowry theory; strong and weak acids and bases; simple rate equations; orders of reaction; rate constants; effect of temperature on rate constants; Boltzmann distribution; activation energy; catalysis; enzymes.	sections 5, 6, 7 and 8
3	Inorganic Chemistry	Physical and chemical properties of the elements in Period 3 and their compounds; trends in the properties of the elements in Groups II and VII and their compounds; their uses; ammonia; nitric acid; nitrogen oxides; sulfur dioxide and sulfuric acid.	sections 9.1, 9.2, 9.4 and 9.6
4	Organic Chemistry I	Formulae, names and shapes of organic compounds; isomerism; alkanes; alkenes; addition polymerisation; halogenoalkanes.	sections 10.1, 10.2, 10.3, 10.8
5	Organic Chemistry II	Preparation and reactions of alcohols, aldehydes, ketones, carboxylic acids and esters.	sections 10.4, 10.5, 10.6

TEACHING ORDER

Each unit is designed to take about half a term of teaching. Unit 1 should be taught first. After that the units can be taught in any order. The order given above: 2 Physical – 3 Inorganic – 4 Organic I – 5 Organic II, may be thought excessively to bunch together similar topics and extended periods of little practical activity. Alternating the units thus:

4 Organic I – 2 Physical – 5 Organic II – 3 Inorganic *or*

4 Organic I – 2 Physical– 3 Inorganic – 5 Organic II

would be an alternative approach. Only a few topics from unit 2, e.g. bond energies, need to be covered before unit 4 is started. Much more of unit 2 needs to be covered before unit 3 is started, so it is recommended that unit 2 is taught before units 3 and 5.