Chemistry Syllabus resource links

This supporting document is provided to assist you in starting your research and collating resources, including articles and websites, in preparing programs, units of work and lesson plans. They are only provided as a suggestion.

Although this document may contain links to third party websites and resources, the NSW Department of Education is not responsible for the condition or content of these sites or resources as they are not under the control of the Department.

## Electronic configuration and SPDF notation

* Bozeman Science [Electron configuration](https://www.youtube.com/watch?v=2AFPfg0Como) (duration 10:16)
* Khan academy [Introduction to electron configurations](https://www.khanacademy.org/science/ap-chemistry-beta/x2eef969c74e0d802:atomic-structure-and-properties/x2eef969c74e0d802:atomic-structure-and-electron-configuration/v/introduction-to-electron-configurations) (duration 5:07)
* Khan Academy [Shells, subshells, and orbitals](https://www.khanacademy.org/science/biology/chemistry--of-life/electron-shells-and-orbitals/v/orbitals) (duration 9:40)
* [S P D F orbitals Explained - 4 Quantum Numbers, Electron Configuration, & Orbital Diagrams](https://www.youtube.com/watch?v=CP35NuspGlk) (duration 12:00)
* [quantum model and spdf orbitals](https://www.youtube.com/watch?v=bq8ZLECxKhc) (duration 20:52)
* [Atoms: Orbitals](http://www.chem4kids.com/files/atom_orbital.html) – Chem4Kids

## The Bohr and Shrödinger models

* [Emission spectrum – evidence for the Bohr’s model of the atom](https://www.youtube.com/watch?v=4JGUZQOQjBA) (duration 3:36)
* NESA Sample units – [Properties and Structure of Matter](https://educationstandards.nsw.edu.au/wps/portal/nesa/11-12/stage-6-learning-areas/stage-6-science/chemistry-2017)
* [Model of the Hydrogen atom](https://phet.colorado.edu/en/simulation/legacy/hydrogen-atom) – PhET
* [Bohr model of the atom for chemistry](https://phet.colorado.edu/en/contributions/view/3070) – PhET
* [The Bohr Model vs. The Quantum Model](https://www.youtube.com/watch?v=j_SWkMXGo_E) (duration 2:42)
* Bozeman Science [Quantum Mechanical Model](https://www.youtube.com/watch?v=accyCUzasa0) (duration 4:35)

## Gas Laws

* [chemguide.co.uk - Ideal Gases and the Ideal Gas Law](https://www.chemguide.co.uk/physical/kt/idealgases.html)
* Khan Academy - [What is the ideal gas law?](https://www.khanacademy.org/science/physics/thermodynamics/temp-kinetic-theory-ideal-gas-law/a/what-is-the-ideal-gas-law)
* Phet - [Ideal Gas Law activity](https://phet.colorado.edu/en/contributions/view/2874)
* Vitrual laboratory – [Ideal Gas Law](http://jersey.uoregon.edu/vlab/Piston/)
* Khan Academy - [Boyle’s Law](https://www.khanacademy.org/test-prep/mcat/physical-processes/gas-phase/v/boyles-law) (duration 10:44)
* [Air pressure: particles and volume](http://www.scootle.edu.au/ec/viewing/L10381/index.html) – Scootle (requires Flash)
* PhET - [Boyle’s Law](https://phet.colorado.edu/en/contributions/view/3624)
* PhET - [Boyle’s Law lab](https://phet.colorado.edu/en/contributions/view/3219)
* Khan Academy - [Charles’s Law](https://www.khanacademy.org/test-prep/mcat/physical-processes/gas-phase/v/charles-law) (duration 8:07)
* PhET - [Charles’s Law Lab](https://phet.colorado.edu/en/contributions/view/3244)
* PhET - [Charles’s Law and Gay-Lussac’s Law Lab](https://phet.colorado.edu/en/contributions/view/3404)
* [Charles’s Law](https://www.youtube.com/watch?v=oIfFoiwRCVE) (duration 6:41)
* [Chemistry: Charles's Law (Gas Laws) with 2 examples](https://www.youtube.com/watch?v=7ZpuMBkf1Ss) (duration 5:53)
* [Charles’s Law demonstration](https://www.youtube.com/watch?v=GcCmalmLTiU) (duration 1:29)

## Enthalpy and Hess’s Law

* Khan Academy - [Hess’s Law example](https://www.khanacademy.org/science/chemistry/thermodynamics-chemistry/enthalpy-chemistry-sal/v/hess-s-law-example) (duration 12:08)
* BBC Bitesize - [Hess’s Law](https://www.bbc.co.uk/bitesize/guides/z8p72hv/revision/4)
* [Hess’s Law](https://www.youtube.com/watch?v=_NLAgSnqNOE) (duration 8:54)
* Khan Academy - [Enthalpy](https://www.khanacademy.org/science/chemistry/thermodynamics-chemistry/enthalpy-chemistry-sal/v/enthalpy) (duration 15:07)
* [Making and breaking bonds](https://learn.concord.org/resources/652/making-and-breaking-bonds) – Scootle
* [Energy in senior years](https://www.scootle.edu.au/ec/login.action;jsessionid=7C88C67EE77AC9D00922466311583033?redirect=ecf454878618e4e522d8e4426988e43139704974f6ad0637f3a4ad640f0baefddb29de01a698a5362b5f6a79504be750f13e60f525ff57a102fbd1c58f83b4968489c491fe9028cf2cb9a08ae95e34c697a2aa17b63ffd4048a91338da53b3097ea48cd800710447) – Scootle
* Khan Academy - [Hess’s Law and reaction enthalpy change](https://www.khanacademy.org/science/chemistry/thermodynamics-chemistry/enthalpy-chemistry-sal/v/hess-s-law-and-reaction-enthalpy-change) (duration 15:40)
* BBC Bitesize - [Potential energy diagrams](https://www.bbc.co.uk/bitesize/guides/z8p72hv/revision/1)
* [How to calculate Enthalpy of Combustion](https://www.youtube.com/watch?v=BYPS1vkGGTM) (duration 4:22)
* [Heat of Combustion](https://edu.rsc.org/resources/heat-energy-from-alcohols/1733.article) – Royal Society of Chemistry
* [Reaction and rates](https://www.scootle.edu.au/ec/login.action;jsessionid=DDAC77CA938861DF1F784CF7ABAB1D30?redirect=ecf454878618e4e5d0e337ecfbe8bdae1e5dcdf695ed03c01b93e80dc63a869d5e512686c1abe48f617ae883b470b32193326e38cd0fc1a10227d0aefad01af5375414c9e6972d9e1309d704181a4271f138d989183bb74ef038779d66b4925acb6d601ead6e10fcae5b03b96148e9fb23302c3ecb4134615d02951b5c9c4dc01ea10aa8d766b5c1) – PhET via Scootle
* [Energy in chemical reactions](http://www.visichem.thelearningfederation.edu.au/topic04.html) – VisChem animations via Scootle
* [Chemical reactions and organic compounds: teacher resource](http://www.scootle.edu.au/ec/viewing/R11829/index.html) – Scootle

## Entropy and Gibbs Free Energy

* Khan Academy - [Introduction to entropy](https://www.khanacademy.org/science/biology/energy-and-enzymes/the-laws-of-thermodynamics/v/introduction-to-entropy) (duration 7:27)
* [What is Entropy?](https://www.youtube.com/watch?v=ykUmibZHEZk) – (duration 5:06)
* PhET - [Basic Thermodynamics inquiry](https://phet.colorado.edu/en/contributions/view/3175)
* [Enthalpy and Entropy](https://www.youtube.com/watch?v=2L2w63uz04Q) (duration 6:16)
* [Difference between Enthalpy, Entropy and Gibbs Free Energy](https://surfguppy.com/thermodynamics/difference-between-enthalpy-entropy-gibbs-free-energy-themodynamics/)
* Khan Academy - [Gibbs free energy and spontaneity](https://www.khanacademy.org/science/chemistry/thermodynamics-chemistry/gibbs-free-energy/a/gibbs-free-energy-and-spontaneity)
* Khan Academy - [Gibbs free energy and spontaneity](https://www.khanacademy.org/science/chemistry/thermodynamics-chemistry/gibbs-free-energy/v/gibbs-free-energy-and-spontaneity) (duration 17:40)
* Bozeman Science – [Gibbs free energy](https://www.youtube.com/watch?v=DPjMPeU5OeM) (duration 12:59)
* [Using Gibbs free energy](https://www.youtube.com/watch?v=huKBuShAa1w) (duration 7:56)
* Khan Academy - [Gibbs free energy example](https://www.khanacademy.org/science/chemistry/thermodynamics-chemistry/gibbs-free-energy/v/gibbs-free-energy-example) (duration 9:57)

**Aboriginal and Torres Strait Islander People’s applications of chemical practices**

It is strongly advised for consultation to occur with the [local AECG](https://education.nsw.gov.au/teaching-and-learning/aec/aboriginal-education-consultative-group-partnership-agreement) and the Land Councils.

NESA has also provided the following on [Aboriginal and Torres Strait Islander Principles and Protocols](https://educationstandards.nsw.edu.au/wps/portal/nesa/k-10/diversity-in-learning/aboriginal-education/aboriginal-and-torres-strait-islander-principles-and-protocols).

## Calculating the Equilibrium constant

* [The Equilibrium constant](https://www.youtube.com/watch?v=xfGlEXWDRZE) (duration 1:21)
* Khan Academy - [Reactions in equilibrium](https://www.khanacademy.org/science/chemistry/chemical-equilibrium/equilibrium-constant/v/reactions-in-equilibrium) (duration 14:51)
* Khan Academy - [The equilibrium constant K](https://www.khanacademy.org/science/chemistry/chemical-equilibrium/equilibrium-constant/a/the-equilibrium-constant-k)
* [Dynamic chemical equilibrium](http://www.visichem.thelearningfederation.edu.au/topic11.html) – VisChem animations via Scootle
* PhET - [Reactions and Rates: Introduction to Equilibrium](https://phet.colorado.edu/en/contributions/view/2928)
* PhET - [Reactions and Rates: Equilibrium Le Chatelier](https://phet.colorado.edu/en/contributions/view/3210)
* [Dissociation constant](https://www.youtube.com/watch?v=-3FGVURl4qM) (duration 6:48)
* [Acid/Base Dissociation Constant](https://www.youtube.com/watch?v=7C_HsfB_6PQ) (duration 7:49)
* [Calculate the Acid-Dissociation Constant (Ka) and pKa of a Weak Acid From Concentration and pH 001](https://www.youtube.com/watch?v=WPfjrVV3Thk) (duration 8:05)
* [Acid Dissociation Constant (Example)](https://www.youtube.com/watch?v=GhdDP6xe9eo) (duration 3:13)
* Khan Academy - [Ka and acid strength](https://www.khanacademy.org/science/chemistry/acids-and-bases-topic/copy-of-acid-base-equilibria/v/ka-and-acid-strength)
* PhET - [Salts and Solubility: Solutions Equilibrium and Ksp](https://phet.colorado.edu/en/contributions/view/2861)
* PhET - [Exploring Equilibrium (Le Chatelier’s Principle)](https://phet.colorado.edu/en/contributions/view/3174)
* PhET - [Strong and Weak acids](https://phet.colorado.edu/en/contributions/view/3320)

## Analysis of organic compounds

* Khan Academy - [Introduction to proton NMR](https://www.khanacademy.org/science/organic-chemistry/spectroscopy-jay/proton-nmr/v/introduction-to-proton-nmr) (duration 10:27)
* [Basics of Nuclear Magnetic Resonance Spectroscopy](https://www.youtube.com/watch?v=UF5CDUs2MhE) (duration 7:02)
* [Interpreting C-13 NMR spectra](https://www.chemguide.co.uk/analysis/nmr/interpretc13.html)
* [How2: Interpret a carbon-13 NMR spectrum](https://www.youtube.com/watch?v=8hL3GXCttuo) (duration 4:39)
* [How to understand Carbon 13 NMR spectra](https://www.youtube.com/watch?v=BeBcPQ9zGAA) (duration 23:46)
* [Simple explanation of the Mass Spectrometer](https://www.youtube.com/watch?v=tOGM2gOHKPc) (duration 4:51)
* Khan Academy - [Isotopes and mass spectrometry](https://www.khanacademy.org/science/ap-chemistry-beta/x2eef969c74e0d802:atomic-structure-and-properties/x2eef969c74e0d802:mass-spectrometry-of-elements/a/isotopes-and-mass-spectrometry)
* Khan Academy - [Mass spectrometer](https://www.khanacademy.org/test-prep/mcat/physical-processes/atomic-nucleus/v/mass-spectrometer) (duration 11:30)
* Bozeman Science [Mass Spectrometry](https://www.youtube.com/watch?v=mBT73Pesiog) (duration 8:19)
* [Mass Spectrometry](https://www.youtube.com/watch?v=hSirWciIvSg) (duration 4:50)
* [Mass spectrometry animation](https://www.youtube.com/watch?v=GSYueQzo2n8) (duration 1:19)
* Khan Academy - [Introduction to infrared spectroscopy](https://www.khanacademy.org/science/organic-chemistry/spectroscopy-jay/infrared-spectroscopy-theory/v/introduction-to-infrared-spectroscopy) (duration 9:25)
* Knowbee- [Introduction to infrared spectroscopy](https://www.youtube.com/watch?v=mZ-U7Qpkz8Y) (duration 15:33)
* [A simple explanation of Infrared spectroscopy](https://www.youtube.com/watch?v=9HfJNnoRMPA) (duration 21:57)