NSW Education Standards Authority

Chemistry 11–12 (2025)

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Chemistry 11–12 (2025)

Implementation from 2028

The new Chemistry 11–12 Syllabus (2025) is to be implemented from 2028 and will replace the **Chemistry Stage 6 Syllabus (2017)**.

2026 and 2027

- Plan and prepare to teach the new syllabus

2028, Term 1

- Start teaching the new syllabus for Year 11
- Start implementing new Year 11 school-based assessment requirements
- Continue to teach the **Chemistry Stage 6 Syllabus (2017)** for Year 12

2028, Term 4

- Start teaching the new syllabus for Year 12
- Start implementing new Year 12 school-based assessment requirements

2029

- First HSC examination for the new syllabus

Overview

Syllabus overview

The *Chemistry 11–12 Syllabus* aligns with the *Chemical World Science Life Skills 11–12 Syllabus* to provide opportunities for integrated delivery.

Through collaborative curriculum planning, it may be decided that Life Skills outcomes and content are the most appropriate option for some students with intellectual disability.

Organisation of Chemistry 11–12

The organisation of the syllabus illustrates the important role of Working scientifically across all areas of Chemistry 11–12 and its connection to scientific knowledge and concepts. Depth studies provide students with opportunities to apply their knowledge through scientific investigations.

Figure 1 shows the organisation of Chemistry 11–12.

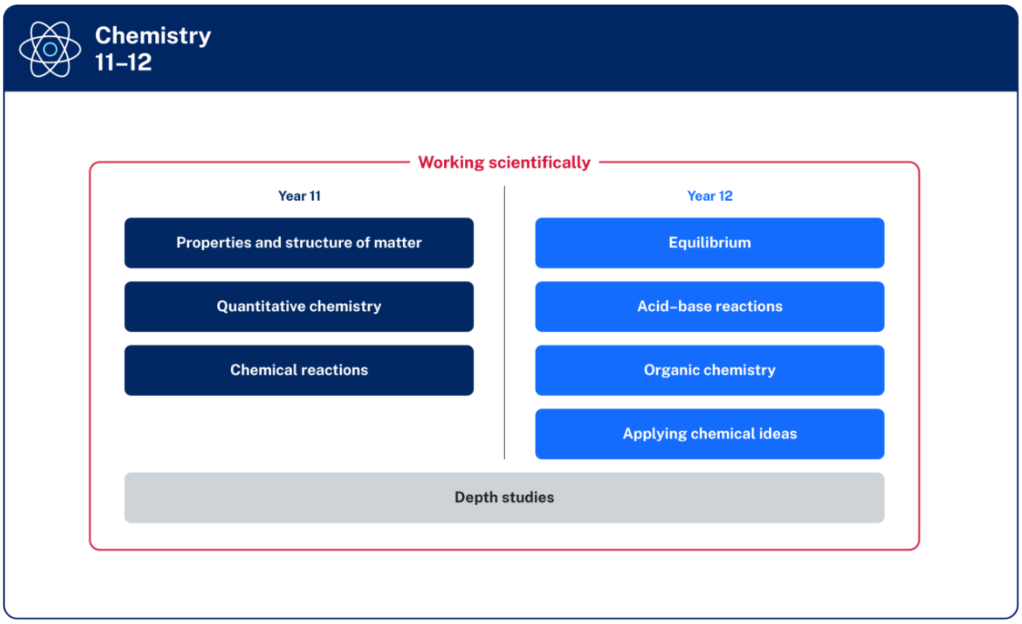

Figure 1: The organisation of Chemistry 11–12

Image long description: The focus areas are listed in 2 columns under the headings Year 11 and Year 12. The 3 focus areas for Year 11 are Properties and structure of matter, Quantitative chemistry, and Chemical reactions. The 4 focus areas for Year 12 are Equilibrium, Acid–base reactions, Organic chemistry, and Applying chemical ideas. Extending across the bottom of both columns is a rectangular box labelled ‘Depth studies’. A line labelled ‘Working scientifically’ encircles all elements listed.

Protocols for collaborating with Aboriginal and Torres Strait Islander Communities

NESA is committed to working in partnership with Aboriginal Communities and supporting teachers, schools and schooling sectors to improve educational outcomes for young people.

It is important to respect appropriate ways of interacting with Aboriginal Communities and Cultural material when teachers plan, program and implement learning experiences that focus on Aboriginal and Torres Strait Islander Priorities.

Indigenous Cultural and Intellectual Property (ICIP) protocols need to be followed. Aboriginal and Torres Strait Islander Peoples’ ICIP protocols include Cultural Knowledges, Cultural Expression and Cultural Property and documentation of Aboriginal and Torres Strait Islander Peoples’ identities and lived experiences. It is important to recognise the diversity and complexity of different Cultural groups in NSW, as protocols may differ between local Aboriginal Communities.

Teachers should work in partnership with Elders, parents, Community members, Cultural Knowledge Holders, or a local, regional or state Aboriginal Education Consultative Group. It is important to respect Elders and the roles of men and women. Local Aboriginal Peoples should be invited to share their Cultural Knowledges with students and staff when engaging with Aboriginal histories and Cultural Practices.

Course description

The *Chemistry 11–12 Syllabus* provides students with the opportunity to analyse, study and enjoy an understanding of the chemical world around us. Students build on their learning from the *Science 7–10 Syllabus* (2023) as they investigate phenomena, make predictions and solve problems related to environmental monitoring, industrial processes and innovations in materials and energy. Students generate and analyse data and evaluate results to make ethical, evidence-based decisions as informed, reflective and scientifically literate citizens.

What students learn

Through the study of Chemistry 11–12, students:

- develop knowledge and understanding of the natural and manufactured world from elements, compounds and mixtures
- explore how Aboriginal and Torres Strait Islander Peoples' ways of Knowing, Being and Doing enhance and provide social and Cultural context to the study of chemistry
- apply their knowledge of chemistry to address real-world problems and explore the impact of chemistry on society
- develop critical thinking, ethical decision-making and problem-solving skills.

Course structure and requirements

Year 11 course structure and requirements

The Year 11 Chemistry course comprises a study of:

- 120 indicative hours across 3 focus areas, including 10 hours of depth studies
- integrated Working scientifically outcomes and content.

Students are required to study all components of the course.

Year 11 focus areas	Indicative hours
Properties and structure of matter	45
Quantitative chemistry	35
Chemical reactions	40

Year 12 course structure and requirements

The Year 12 Chemistry course comprises a study of:

- 120 indicative hours across 4 focus areas, including 10 hours of depth studies
- integrated Working scientifically outcomes and content.

Students are required to study all components of the course.

Year 12 focus areas	Indicative hours
Equilibrium	30
Acid–base reactions	30
Organic chemistry	30
Applying chemical ideas	30

Working scientifically

The Working scientifically outcomes and content are integral to the study of Chemistry 11–12. The Working scientifically outcomes address:

- questioning and predicting
- planning scientific investigations
- conducting scientific investigations
- processing data and information
- analysing data and information
- problem-solving
- communicating.

Teachers must integrate relevant Working scientifically outcomes and content with each focus area. All the Working scientifically outcomes and content must be addressed by the end of Year 12.

Scientific investigations

Each focus area in the *Chemistry 11–12 Syllabus* includes content points that contain scientific investigations. These content points include practical investigations and secondary-source investigations and are conducted individually and collaboratively.

Practical investigations include:

- laboratory experiments
- computer simulations, modelling, processing and analysing primary data, and using appropriate digital technologies
- fieldwork.

Secondary-source investigations include:

- extracting, analysing and using data and information from secondary sources
- reorganising and communicating secondary-source data and information in the form of flow charts, tables, graphs, diagrams, written documents, keys, spreadsheets or databases
- using existing models to inform understanding.

Some students with disability may require adjustments to conduct scientific investigations.

Depth studies

Depth studies are targeted scientific investigations in which students deepen their understanding of course content through the application of Working scientifically knowledge. They provide opportunities for students to pursue their interests and deepen their scientific understanding of one or more focus areas.

- 10 hours of depth studies are undertaken as part of course requirements.
- At least ONE depth study must be completed in both Year 11 and Year 12.
- The depth study must include Working scientifically content from Questioning and predicting in addition to content from at least ONE other focus area.
- Depth studies may be completed individually or collaboratively.

Some students with disability may require adjustments in order to engage with the depth studies.

Safety and risk management

Schools are required to ensure they follow safety and risk management in delivering the *Chemistry 11–12 Syllabus*.

Course enrolment details

Chemistry Year 11

- Course number: 11050
- Course hours: 120
- Course units: 2
- Enrolment type: Elective
- Endorsement type: Board developed

Exclusions

- Chemical World Science Life Skills (Year 11, 2 units): 16663

Prerequisites

- Nil

Corequisites

- Nil

Chemistry Year 12

- Course number: 15050
- Course hours: 120
- Course units: 2
- Enrolment type: Elective
- Endorsement type: Board developed

Exclusions

- Chemical World Science Life Skills (Year 12, 2 units): 16663

Prerequisites

- Chemistry (Year 11, 2 units): 11050

Corequisites

- Nil

HSC information

Information about curriculum requirements for the HSC are available on Assessment Certification Examination (ACE).

Rationale

Chemistry is the study of the structure and composition of and reactions between elements, compounds and mixtures. It focuses on the exploration of models, understanding of theories and laws, and how these concepts interconnect.

The course develops a deep understanding of the natural and manufactured world. Students examine new compounds and their impact on our environment, industry and daily lives. They explore how the natural properties of matter in Aboriginal and Torres Strait Islander Knowledges and Cultures are related to Western scientific processes.

Studying Chemistry develops knowledge and understanding of the chemical world and how it works. It focuses on the exploration of models, understanding of theories and laws, and examination of the interconnectedness between seemingly dissimilar phenomena. Students develop a deeper understanding of particle theory, chemical structures, and reactions and their applications, which are central to human progress and our ability to develop sustainable future industries. They use this knowledge to make sense of chemical phenomena, both in current and future scientific contexts.

Students apply their knowledge of chemistry through Working scientifically including problem-solving, data analysis and scientific investigation. Students use this knowledge to solve equations, make predictions and analyse abstract concepts. They develop the ability to recognise valid and reliable scientific information and apply it to new challenges and complex problems.

Chemistry provides a foundation for careers in fields related to science, technology, engineering and mathematics. Knowledge of chemistry is a key link between many interdisciplinary studies, providing a strong foundation of understanding that plays a crucial role in developing future technologies and helping solve global challenges. This knowledge and understanding is essential to the continued advancement of science and society.

Aim

Chemistry 11–12 aims to develop students' appreciation and understanding of chemical systems, structures and properties, and their applications. It also enables students to apply Working scientifically knowledge to theories and models to explain phenomena and solve problems encountered in an ever-changing world.

Table of outcomes

Year 11	Year 12
CH-11WS-01 Working scientifically Questioning and predicting develops and evaluates questions and hypotheses for scientific investigations	**CH-12WS-01 Working scientifically Questioning and predicting** develops and evaluates questions and hypotheses for scientific investigations
CH-11WS-02 Working scientifically Planning scientific investigations designs and evaluates scientific investigations	**CH-12WS-02 Working scientifically Planning scientific investigations** designs and evaluates scientific investigations
CH-11WS-03 Working scientifically Conducting scientific investigations conducts scientific investigations to collect data and information	**CH-12WS-03 Working scientifically Conducting scientific investigations** conducts scientific investigations to collect data and information
CH-11WS-04 Working scientifically Processing data and information selects and processes qualitative and quantitative data and information	**CH-12WS-04 Working scientifically Processing data and information** selects and processes qualitative and quantitative data and information
CH-11WS-05 Working scientifically Analysing data and information analyses and evaluates primary and secondary data and information	**CH-12WS-05 Working scientifically Analysing data and information** analyses and evaluates primary and secondary data and information
CH-11WS-06 Working scientifically Problem-solving uses scientific processes to solve scientific problems	**CH-12WS-06 Working scientifically Problem-solving** uses scientific processes to solve scientific problems
CH-11WS-07 Working scientifically Communicating communicates scientific arguments using evidence, scientific language and terminology for a specific audience	**CH-12WS-07 Working scientifically Communicating** communicates scientific arguments using evidence, scientific language and terminology for a specific audience
CH-11-01 explains physical, structural and chemical properties of matter and their trends	**N/A**
CH-11-02 applies the mole concept and stoichiometric relationships	**N/A**
CH-11-03 analyses a variety of chemical reactions	**N/A**
N/A	**CH-12-01** explains the characteristics and factors that

Year 11	Year 12
	affect equilibrium systems
N/A	**CH-12-02** analyses acids and bases using contemporary models
N/A	**CH-12-03** analyses the structural, chemical and physical properties of carbon compounds and their uses
N/A	**CH-12-04** analyses the structures, production and uses of substances

Outcomes and content for Year 11

Working scientifically

Outcomes

A student:

- develops and evaluates questions and hypotheses for scientific investigations **CH-11WS-01**
- designs and evaluates scientific investigations **CH-11WS-02**
- conducts scientific investigations to collect data and information **CH-11WS-03**
- selects and processes qualitative and quantitative data and information **CH-11WS-04**
- analyses and evaluates primary and secondary data and information **CH-11WS-05**
- uses scientific processes to solve scientific problems **CH-11WS-06**
- communicates scientific arguments using evidence, scientific language and terminology for a specific audience **CH-11WS-07**

Related Life Skills outcomes: CW-LSWS-01, CW-LSWS-02, CW-LSWS-03, CW-LSWS-04, CW-LSWS-05, CW-LSWS-06, CW-LSWS-07

Content

Relevant Working scientifically outcomes and content must be integrated with each focus area. All the Working scientifically outcomes and content must be addressed by the end of Year 12.

Questioning and predicting

- Use observations and scientific knowledge and understanding to propose questions and hypotheses for scientific investigations involving primary and secondary data
- Evaluate questions and hypotheses based on scientific knowledge
- Modify questions and hypotheses to reflect new evidence

Planning scientific investigations

- Justify the use of independent, dependent and controlled variables, and experimental controls in a valid scientific investigation
- Explain how reliable primary data is obtained
- Assess the reliability of secondary data and information when planning
- Assess potential hazards and their associated risks to develop a risk assessment
- Select appropriate materials and technologies to design a scientific investigation
- Discuss ethical issues in the development and use of scientific knowledge

Conducting scientific investigations

- Apply safe work practices and manage risks while conducting a scientific investigation
- Construct and manipulate identified materials and technologies to perform scientific investigations
- Use equipment appropriately and systematically to collect and record data, information, evidence and findings
- Gather data and information from a range of secondary sources

Processing data and information

- Select qualitative and quantitative information from texts, diagrams, flow charts, tables, databases, graphs and multimedia resources
- Apply quantitative processes to data, including unit conversions

- Select and use a range of representations to organise data and information, including graphs, keys, models, diagrams, tables and spreadsheets
- Extract data and information from a wide range of sources and acknowledge these sources using an accepted referencing style
- Describe the Cultural Knowledges and observations of Aboriginal and Torres Strait Islander Peoples and examine how these contribute to the development of scientific knowledge

Analysing data and information

- Describe qualitative and quantitative relationships between variables
- Explain patterns and trends, including inconsistencies in data and information
- Assess error, uncertainty and limitations in data and include calculations of percentage error, range, mean and standard deviation
- Assess the validity, reliability, accuracy and precision of data and information
- Interpret data and information to identify outliers, make predictions, explain results and draw conclusions
- Evaluate data and information to suggest improvements or further investigations
- Use appropriate significant figures to express quantitative solutions
- Use appropriate scale prefixes for powers of 10: femto (f) = 10^{-15}, pico (p) = 10^{-12}, nano (n) = 10^{-9}, micro (μ) = 10^{-6}, milli (m) = 10^{-3}, kilo (k) = 10^{3}, mega (M) = 10^{6}, giga (G) = 10^{9}, tera (T) = 10^{12} and peta (P) = 10^{15}

Problem-solving

- Apply scientific principles to address real-world applications and problems
- Use modelling and cause-and-effect relationships, including mathematical examples, to make predictions, explain phenomena and solve problems
- Evaluate and modify a scientific investigation in response to new evidence
- Explain why current scientific knowledge is both contestable and testable by further inquiry

Communicating

- Construct evidence-based arguments and recognise the role of peer review in the evaluation of scientific practices, solutions or conclusions
- Select and use appropriate digital, visual, written and oral media to convey scientific arguments
- Apply appropriate scientific notations, language and nomenclature
- Use evidence and correct scientific language and terminology to address a specific audience and purpose in a variety of contexts

Properties and structure of matter

Outcomes

A student:

- explains physical, structural and chemical properties of matter and their trends **CH-11-01**

Related Life Skills outcomes: CW-LS-01, CW-LS-02

Content

Relevant Working scientifically outcomes and content must be integrated with each focus area. All the Working scientifically outcomes and content must be addressed by the end of Year 12.

Related: Working scientifically

Separation of mixtures

- Use the physical characteristics of the components in homogeneous and heterogeneous mixtures to explain how they can be separated

> **Example(s):**
>
> Filtration, sedimentation and decantation, evaporation and crystallisation, fractional distillation, chromatographic techniques.

- Discuss Aboriginal methods of separating mixtures by extracting dyes from plants and using woven baskets for filtration

> **Example(s):**
>
> The extraction of dyes from native plants involves boiling, soaking or crushing plant materials to release their pigments. Finely woven baskets made from natural fibres such as grasses, reeds or tree bark are used to filter and separate mixtures.

- Conduct a laboratory experiment to determine the percentage composition of a mixture by mass

Atomic structure and electron configuration

- Use the element symbol, atomic number and mass number from the periodic table to construct models of atoms and illustrate the particles present

> **Example(s):**
>
> Mass number is different for each isotope and therefore not able to be read from the periodic table.

- Describe the distribution of mass and charge in an atom
- Compare the number of protons and neutrons in various isotopes of an element
- Calculate the relative atomic mass from isotopic composition
- Use examples to explain why isotopes have similar chemical properties but different densities

- Relate Aboriginal Knowledge of sickness Country to the presence of radioactive material

  Example(s):

  A correlation between potentially harmful mineral deposits and Buladjang (sickness Country) of the Jawoyn People.

- Identify naturally occurring radioisotopes that undergo nuclear reactions and emit radiation, resulting in background radiation

  Example(s):

  Hydrogen-3, potassium-40, uranium-238, carbon-14.

- Describe the mass and charge properties of alpha (α), beta (β) and gamma (γ) radiations
- Construct balanced nuclear equations for nuclear decay and nuclear fission
- Explain how the emitted radiation type and half-life determine the use of natural and human-made radioisotopes
- Conduct a secondary-source investigation to justify the use of a selected radioisotope in medicine, industry or environmental monitoring
- Explain the contributions of selected scientists to society's understanding of the atom

  Example(s):

  Curie, Dalton, Goeppert Mayer, Joliot-Curie, Meitner, Rutherford.

- Compare the energy of electrons in discrete energy levels, sublevels and orbitals
- Apply spdf notation to describe electron configurations of atoms and ions of various elements up to $Z = 36$
- Relate the electron configuration of an element to its position on the periodic table
- Conduct a laboratory experiment to determine the flame colours produced by heated metal ion solutions
- Relate flame tests to emission spectroscopy
- Explain the colours emitted in flame tests in relation to changes in electron energy
- Describe a use of emission spectroscopy to qualitatively analyse mixtures in industry and medicine

Patterns and trends in the periodic table

- Distinguish between the periods, groups and blocks in the periodic table
- Determine the effective charge of an ion from the electron configuration and atomic number
- Conduct a secondary-source investigation to collect, tabulate and plot data on atomic radii, ionic radii, first ionisation energy and electronegativity of elements
- Interpret data to explain the trends in atomic radii, ionic radii, first ionisation energy and electronegativity of elements
- Predict the features of atoms based on their position in the periodic table

Chemical bonding

- Apply the International Union of Pure and Applied Chemistry (IUPAC) nomenclature to identify inorganic substances
- Explain metallic bonding in terms of electrostatic attraction

- Use models to demonstrate the features of metallic bonding and lattice formation
- Analyse the relationship between metallic bonding and the melting point, boiling point and electrical conductivity of metallic elements
- Explain the role of electronegativity in determining the ionic or covalent nature of bonds between atoms
- Predict the formation of metallic and non-metallic ions using the periodic table
- Explain the arrangement of ions in ionic lattices
- Conduct a secondary-source investigation to explain the trends in melting points within and between group 1 and group 2 chlorides
- Interpret representations to explain the formation of covalent bonds in discrete molecules and covalent network structures
- Construct electron dot diagrams for discrete molecules and simple polyatomic ions

Example(s):

Hydroxide, ammonium, acetate.

- Relate electronegativity to the polarity of covalent bonds
- Predict the molecular geometry and polarity of covalent molecules using electron dot structures, valence shell electron pair repulsion (VSEPR) theory and electronegativity
- Relate the features of dispersion, dipole–dipole and hydrogen bonding to intermolecular forces
- Use diagrams to illustrate the intermolecular forces between molecules
- Account for the strength of intermolecular forces, ionic bonds, covalent bonds and metallic bonds
- Explain the expected physical properties of common substances based on the type of chemical bonding present
- Conduct a practical investigation to determine the bonding type present in a variety of substances based on their properties
- Evaluate how models are used to illustrate the key characteristics of ionic, covalent and metallic compounds
- Conduct a secondary-source investigation to explain the differences in melting point, electrical conductivity and hardness of carbon allotropes

Quantitative chemistry

Outcomes

A student:

- applies the mole concept and stoichiometric relationships **CH-11-02**

Related Life Skills outcomes: CW-LS-03, CW-LS-04, CW-LS-05

Content

Relevant Working scientifically outcomes and content must be integrated with each focus area. All the Working scientifically outcomes and content must be addressed by the end of Year 12.

Related: Working scientifically

Conservation of mass

- Relate the law of conservation of mass to stoichiometry
- Conduct a laboratory experiment to measure the mass and volume of gas produced in a chemical reaction
- Describe the features of open and closed systems
- Explain Aboriginal cooking processes that used coals and enclosed pit ovens as examples of open and closed systems
- Conduct a practical investigation to model the law of conservation of mass in a chemical reaction
- Solve problems involving changes of mass in chemical reactions

Mole concept

- Relate the Avogadro constant to the concept of the mole
- Relate the relative atomic mass of an atom to carbon-12
- Solve problems using $n = \frac{m}{MM}$ (n = chemical amount in moles, m = mass in grams, MM = molar mass in g mol^{-1}) to determine the quantities in moles, mass in grams and molar mass in g mol^{-1}
- Conduct a practical investigation to physically compare masses of equimolar amounts of pure substances
- Conduct a practical investigation to accurately and quantitatively demonstrate how chemicals react in simple whole-number molar ratios
- Determine the percentage composition by mass (% w/w) and the empirical formulas of compounds
- Solve problems that involve limiting reagents of chemical reactions
- Solve real-world problems using combinations of stoichiometric principles that involve reacting masses

Measures of concentration

- Outline the uses of the following measures: mol L^{-1}, g L^{-1}, mg L^{-1}, % (w/w), % (w/v), % (v/v), ppm, ppb
- Manipulate variables and solve problems to calculate molar concentration, moles and volume by applying $C = \frac{n}{V}$ (molarity formula)
- Perform calculations involving mol L^{-1}, g L^{-1}, mg L^{-1}, % (w/w), % (w/v), % (v/v), ppm and ppb
- Manipulate variables and solve dilution problems by applying $C_1V_1 = C_2V_2$
- Conduct a laboratory experiment to prepare a primary standard solution and perform a dilution with a calculated concentration

- Discuss Aboriginal and Torres Strait Islander Peoples' methods of infusion, roasting, pounding and leaching to extract chemicals from plants to control the rate of chemical delivery

Example(s):

Slowly dehydrate clay by controlled heat, smash and mix the clay with plant material for a slower release (suck or place on skin) or embed into a woven material that is placed in contact with skin.

- Solve real-world problems using combinations of stoichiometric principles that involve reacting masses and solutions

Properties of gases

- Use the particle theory to describe the properties of ideal gases
- Manipulate variables and solve problems using $PV = nRT$ for ideal gases at standard temperature and pressure (STP)
- Use data to analyse the relationship between pressure in kPa and volume in L in a closed gas system at a constant temperature
- Use data to analyse the relationship between temperature in K and pressure in kPa in a closed gas system at a constant volume
- Use data to analyse the relationship between temperature in K and volume in L in a closed gas system at a constant pressure
- Solve real-world problems using combinations of stoichiometric principles that involve reacting masses, solutions and gases

Chemical reactions

Outcomes

A student:

- analyses a variety of chemical reactions **CH-11-03**

Related Life Skills outcomes: CW-LS-06, CW-LS-07, CW-LS-08, CW-LS-09

Content

Relevant Working scientifically outcomes and content must be integrated with each focus area. All the Working scientifically outcomes and content must be addressed by the end of Year 12.

Related: Working scientifically

Classifying chemical reactions

- Use balanced chemical equations to describe the features and predict the products of synthesis, decomposition, combustion, precipitation and neutralisation reactions
- Conduct laboratory experiments to demonstrate synthesis, decomposition, combustion and neutralisation reactions
- Explain how the removal of toxicity in the preparation of nardoo by Aboriginal and Torres Strait Islander Peoples is an example of a decomposition reaction
- Describe the features of and construct full and net ionic equations for precipitation reactions
- Conduct a laboratory experiment to predict the products of precipitation reactions using balanced equations and solubility rules
- Conduct a practical investigation to demonstrate a metal displacement reaction
- Explain oxidation and reduction in terms of electron transfer and change in oxidation state
- Relate electron transfer and change in oxidation state to metal displacement reactions
- Predict the products of a metal displacement reaction using half-equations
- Conduct laboratory experiments to compare the reactivity of metals in oxygen, water, dilute acid and other metal ions in solutions
- Construct a metal activity series using the data obtained from practical investigations and compare this series with secondary sources
- Analyse the relationship between metal reactivity and ionisation energy, atomic radius and electronegativity
- Conduct a secondary-source investigation to evaluate the impact of a chemical reaction in medicine or agriculture

Rates of reactions

- Explain the roles of activation energy and molecular orientation, and the frequency of successful collisions of particles in collision theory
- Analyse how concentration, temperature, surface area and catalysts affect reaction rate using collision theory
- Conduct a laboratory experiment to measure the effect of concentration, temperature, surface area or catalysts on the rate of a chemical reaction

Energy changes

- Describe the energy changes of endothermic and exothermic reactions
- Conduct a practical investigation to measure the energy changes in endothermic and exothermic reactions

- Relate heat energy changes to total bond energy changes and to the law of conservation of energy
- Analyse endothermic and exothermic energy profile diagrams in terms of chemical potential energy, and bond breaking and formation
- Conduct a laboratory experiment to measure and compare temperature changes in substances of different heat capacities
- Solve problems using $q = mc\Delta T$ for heat energy, mass, specific heat capacity or temperature change, using the known values
- Solve problems involving enthalpy changes by using $\Delta H = \frac{-q}{n}$
- Conduct a laboratory experiment using calorimetry to calculate the ΔH value for endothermic and exothermic reactions and discuss accuracy using secondary-source data
- Analyse the effect of catalysts on activation energy in endothermic and exothermic reactions and provide an alternative lower-energy pathway for a chemical reaction
- Conduct a secondary-source investigation about the economic advantages of using a catalyst on an industrial process

Outcomes and content for Year 12

Working scientifically

Outcomes

A student:

- develops and evaluates questions and hypotheses for scientific investigations **CH-12WS-01**
- designs and evaluates scientific investigations **CH-12WS-02**
- conducts scientific investigations to collect data and information **CH-12WS-03**
- selects and processes qualitative and quantitative data and information **CH-12WS-04**
- analyses and evaluates primary and secondary data and information **CH-12WS-05**
- uses scientific processes to solve scientific problems **CH-12WS-06**
- communicates scientific arguments using evidence, scientific language and terminology for a specific audience **CH-12WS-07**

Related Life Skills outcomes: CW-LSWS-01, CW-LSWS-02, CW-LSWS-03, CW-LSWS-04, CW-LSWS-05, CW-LSWS-06, CW-LSWS-07

Content

Relevant Working scientifically outcomes and content must be integrated with each focus area. All the Working scientifically outcomes and content must be addressed by the end of Year 12.

Questioning and predicting

- Use observations and scientific knowledge and understanding to propose questions and hypotheses for scientific investigations involving primary and secondary data
- Evaluate questions and hypotheses based on scientific knowledge
- Modify questions and hypotheses to reflect new evidence

Planning scientific investigations

- Justify the use of independent, dependent and controlled variables, and experimental controls in a valid scientific investigation
- Explain how reliable primary data is obtained
- Assess the reliability of secondary data and information when planning
- Assess potential hazards and their associated risks to develop a risk assessment
- Select appropriate materials and technologies to design a scientific investigation
- Discuss ethical issues in the development and use of scientific knowledge

Conducting scientific investigations

- Apply safe work practices and manage risks while conducting a scientific investigation
- Construct and manipulate identified materials and technologies to perform scientific investigations
- Use equipment appropriately and systematically to collect and record data, information, evidence and findings
- Gather data and information from a range of secondary sources

Processing data and information

- Select qualitative and quantitative information from texts, diagrams, flow charts, tables, databases, graphs and multimedia resources
- Apply quantitative processes to data, including unit conversions

- Select and use a range of representations to organise data and information, including graphs, keys, models, diagrams, tables and spreadsheets
- Extract data and information from a wide range of sources and acknowledge these sources using an accepted referencing style
- Describe the Cultural Knowledges and observations of Aboriginal and Torres Strait Islander Peoples and examine how these contribute to the development of scientific knowledge

Analysing data and information

- Describe qualitative and quantitative relationships between variables
- Explain patterns and trends, including inconsistencies in data and information
- Assess error, uncertainty and limitations in data and include calculations of percentage error, range, mean and standard deviation
- Assess the validity, reliability, accuracy and precision of data and information
- Interpret data and information to identify outliers, make predictions, explain results and draw conclusions
- Evaluate data and information to suggest improvements or further investigations
- Use appropriate significant figures to express quantitative solutions
- Use appropriate scale prefixes for powers of 10: femto (f) = 10^{-15}, pico (p) = 10^{-12}, nano (n) = 10^{-9}, micro (μ) = 10^{-6}, milli (m) = 10^{-3}, kilo (k) = 10^{3}, mega (M) = 10^{6}, giga (G) = 10^{9}, tera (T) = 10^{12} and peta (P) = 10^{15}

Problem-solving

- Apply scientific principles to address real-world applications and problems
- Use modelling and cause-and-effect relationships, including mathematical examples, to make predictions, explain phenomena and solve problems
- Evaluate and modify a scientific investigation in response to new evidence
- Explain why current scientific knowledge is both contestable and testable by further inquiry

Communicating

- Construct evidence-based arguments and recognise the role of peer review in the evaluation of scientific practices, solutions or conclusions
- Select and use appropriate digital, visual, written and oral media to convey scientific arguments
- Apply appropriate scientific notations, language and nomenclature
- Use evidence and correct scientific language and terminology to address a specific audience and purpose in a variety of contexts

Equilibrium

Outcomes

A student:

- explains the characteristics and factors that affect equilibrium systems **CH-12-01**

Related Life Skills outcomes: CW-LS-06, CW-LS-07, CW-LS-08, CW-LS-09

Content

Relevant Working scientifically outcomes and content must be integrated with each focus area. All the Working scientifically outcomes and content must be addressed by the end of Year 12.

Related: Working scientifically

Dynamic equilibrium

- Account for the characteristics of a dynamic equilibrium system using collision theory
- Explain why macroscopic properties remain constant at equilibrium
- Conduct a laboratory experiment to demonstrate the reversibility of a chemical reaction
- Conduct a practical investigation to model a dynamic equilibrium system
- Discuss the impact of a closed system on dynamic equilibrium

Factors that affect equilibrium

- Use Le Chatelier's principle to predict the effects of temperature, concentration, volume and pressure changes on equilibrium systems
- Conduct a practical investigation to analyse the effects of temperature and concentration changes on a system at equilibrium
- Use collision theory to explain the effects of concentration and temperature changes on equilibrium systems using qualitative data
- Use collision theory to explain the effect of pressure changes on gaseous equilibrium systems using qualitative data
- Conduct a practical investigation to analyse pressure and volume changes in a gaseous system at equilibrium
- Use Le Chatelier's principle and collision theory to address real-world applications involving equilibrium systems
- Justify methods associated with temperature, concentration and pressure that are used to increase yield in chemical equilibria
- Conduct a secondary-source investigation to analyse the manipulation of reaction conditions to ensure economical production of an industrial chemical

Calculating the equilibrium constant

- Determine equilibrium expressions in terms of the equilibrium constant (K_{eq}) for reactions occurring in homogeneous solution equilibrium systems and homogeneous gas equilibrium systems
- Perform calculations to find the value of K_{eq} and concentrations of substances within an equilibrium system, and use these values to predict the direction of a reaction
- Calculate the reaction quotient (Q) using concentrations of substances in chemical systems, and use these values to determine if a system is at equilibrium
- Analyse the effect of temperature on the value of K_{eq} using qualitative data
- Conduct a practical investigation to determine K_{eq} of the iron(III) thiocyanate equilibrium system

- Solve equilibrium system problems using K_{eq}, $\frac{1}{K_{eq}}$ and Q

Solution equilibria

- Use diagrams to model the processes by which bonds break and form during the dissolution of ionic compounds in water
- Conduct a laboratory experiment to construct a set of solubility rules for the cations barium (Ba^{2+}), calcium (Ca^{2+}), silver (Ag^{+}), copper(II) (Cu^{2+}), iron(II) (Fe^{2+}) and iron(III) (Fe^{3+})
- Conduct a laboratory experiment to construct a set of solubility rules for the anions chloride (Cl^{-}), bromide (Br^{-}), iodide (I^{-}), hydroxide (OH^{-}), acetate (CH_3COO^{-}), carbonate (CO_3^{2-}), sulfate (SO_4^{2-}) and phosphate (PO_4^{3-})
- Use secondary sources to assess the accuracy of the solubility rules derived in the solubility experiments
- Conduct a scientific investigation applying known solubility rules and identify 2 unknown ions in the resulting solution
- Derive equilibrium expressions for saturated solutions in terms of K_{sp}
- Use the K_{sp} value of ionic substances to determine their solubility in g L^{-1} and mol L^{-1}
- Predict the formation of a precipitate given the standard reference values for K_{sp}
- Solve problems using K_{sp} solubility and equilibrium concentration data in equilibrium systems
- Conduct a secondary-source investigation to analyse the use of solubility equilibria to monitor the presence of lead (Pb^{2+}) and phosphate (PO_4^{3-}) ions in the environment

Acid–base reactions

Outcomes

A student:

- analyses acids and bases using contemporary models **CH-12-02**

Related Life Skills outcomes: CW-LS-02, CW-LS-06, CW-LS-07, CW-LS-09

Content

Relevant Working scientifically outcomes and content must be integrated with each focus area. All the Working scientifically outcomes and content must be addressed by the end of Year 12.

Related: Working scientifically

Properties of acids and bases

- Identify the common name and International Union of Pure and Applied Chemistry (IUPAC) nomenclature of inorganic acids and bases
- Describe chemical properties of common inorganic acids and bases
- Conduct a laboratory experiment to prepare a natural indicator and compare it to a universal indicator in terms of its effectiveness in identifying a variety of acids and bases
- Conduct a scientific investigation to compare the accuracy of digital pH probes and indicators when identifying strong and weak acids and bases
- Explain how limitations in Arrhenius's theory led to the development of the Brønsted–Lowry theory of acids and bases

Using Brønsted–Lowry theory

- Use Brønsted–Lowry theory to recognise conjugate acid–base pairs and amphiprotic substances
- Use Brønsted–Lowry theory to explain the difference between monoprotic, diprotic and triprotic acids using balanced chemical equations
- Conduct a practical investigation to compare the pH of a strong acid and a strong base in a variety of concentrations
- Analyse the relationship between pH and hydrogen ion concentration ($[H^+]$)
- Calculate the pH, pOH, hydrogen ion concentration ($[H^+]$) and hydroxide ion concentration ($[OH^-]$) of solutions
- Solve dilution problems using $C_1V_1 = C_2V_2$ and $\text{pH} = -\log_{10}[H_3O^+]$
- Describe the relationship between ionisation constant for water (K_w), hydrogen ion concentration ($[H^+]$) and hydroxide ion concentration ($[OH^-]$) in solutions
- Calculate the pH of a resultant solution when solutions of acids and bases are mixed
- Conduct a practical investigation to compare the pH of a variety of acids and bases with the same concentration
- Use models and equilibrium principles to demonstrate the difference between strong and weak acids, including polyprotic acids
- Use ionic equations to explain the ionisation or dissociation of acids and bases in water, conjugate acid–base pairs, and the amphiprotic natures of some salts
- Use balanced equations to predict the acidic or basic nature of the salt produced by neutralisation reactions
- Calculate and apply the dissociation constants K_a and K_b, and pK_a and pK_b to compare the strengths of acids and bases
- Conduct a laboratory experiment to determine the K_a of a weak acid

- Solve problems to relate K_a, K_b and K_w
- Discuss the use of buffers in equilibrium systems
- Conduct a practical investigation to prepare a buffer and demonstrate its properties
- Conduct a secondary-source investigation to describe the role of buffers in a natural system

Quantitative analysis

- Conduct a laboratory experiment to prepare a primary standard solution
- Discuss the relationship between the equivalence point and endpoint, in determining the choice of an indicator for a titration
- Conduct laboratory experiments to analyse the concentration of a strong acid and a strong base by titration
- Analyse titration curves and conductivity graphs for monoprotic acids
- Solve problems using titration curves and titration data to determine the concentration of strong and weak acids and bases
- Analyse the use of limiting reagents in back titrations
- Conduct a practical investigation using back titrations to determine the concentration of an unknown substance
- Conduct a scientific investigation to analyse acid–base analysis techniques used in household digital probes and instruments

Organic chemistry

Outcomes

A student:

- analyses the structural, chemical and physical properties of carbon compounds and their uses **CH-12-03**

Related Life Skills outcomes: CW-LS-02, CW-LS-09

Content

Simple organic compounds refer only to the homologous series of alkanes, alkenes, alkynes, alcohols, haloalkanes, carboxylic acids and esters specifically addressed in the Organic chemistry focus area.

Relevant Working scientifically outcomes and content must be integrated with each focus area. All the Working scientifically outcomes and content must be addressed by the end of Year 12.

Related: Working scientifically

Hydrocarbons

- Use molecular formulas, condensed structural formulas, expanded structural formulas and skeletal structures to represent hydrocarbons
- Use International Union of Pure and Applied Chemistry (IUPAC) nomenclature to name and construct representations of straight chain and branched chain aliphatic hydrocarbons C1–C8
- Construct and model chain isomers of alkanes C1–C8 to compare their molecular shapes
- Explain why alkanes, alkenes and alkynes belong to different homologous series
- Construct and model the position isomers and geometric isomers of alkenes and alkynes C1–C8 and explore their molecular shapes
- Assess the health and safety risks when handling and disposing of gaseous and liquid hydrocarbons
- Conduct a laboratory experiment to compare the chemical properties of alkanes and alkenes
- Relate intermolecular forces to the shapes, bonding and polarity of molecules
- Conduct a secondary-source investigation to analyse the relationship between boiling point and chain length of straight chain hydrocarbons C1–C8
- Use IUPAC nomenclature to name and construct representations of haloalkanes C1–C8
- Construct chemical equations and models to represent the addition reaction of alkenes when added to hydrogen, halogens, hydrogen halides (HX) and water
- Construct chemical equations and models to represent the substitution reaction between alkanes and halogens to form haloalkanes
- Explain reactivity differences between alkanes and alkenes during addition reactions and substitution reactions
- Conduct a secondary-source investigation to discuss the uses of methane and ethene in relation to their physical and chemical properties
- Solve chemical reaction problems involving hydrocarbons to determine the quantities of reactants and products

Alcohols

- Use molecular formulas, condensed structural formulas, expanded structural formulas and skeletal structures to represent alcohols

- Use IUPAC nomenclature to name and construct representations of primary, secondary and tertiary alcohols C1–C8
- Explain the properties of homologous series of primary, secondary and tertiary alcohols in terms of intermolecular and intramolecular bonding
- Conduct a secondary-source investigation to analyse the relationship between chain length, boiling point and solubility in water in straight chain primary alcohols C1–C8
- Use IUPAC nomenclature to name and construct representations of position isomers of alcohols C1–C8
- Compare the reactants, products and experimental conditions of complete and incomplete combustion reactions
- Construct equations, state conditions and predict products to represent complete combustion of alcohols C1–C8
- Analyse the relationship between enthalpy of combustion and chain length of alcohols
- Conduct a laboratory experiment to measure the enthalpy of combustion of a variety of alcohols
- Construct equations, state conditions and predict products relating to the dehydration of alcohols
- Account for aldehyde and ketone products in the oxidation of alcohols
- Construct equations, state conditions and predict products relating to the substitution of alcohols with hydrogen halides (HX)
- Conduct a laboratory experiment to demonstrate the reactivity of primary, secondary and tertiary alcohols
- Construct equations to illustrate the production of alcohols using haloalkane substitution reactions
- Solve chemical reaction problems involving alcohols to determine the quantities of reactants and products
- Evaluate the processes involved in producing alcohol from plants and crude oil

Organic acids

- Use molecular formulas, condensed structural formulas, expanded structural formulas and skeletal structures to represent organic acids
- Use IUPAC nomenclature to name and construct representations of organic acids C1–C8
- Conduct a secondary-source investigation to analyse the relationship between chain length, boiling point and solubility in water in unbranched carboxylic acids C1–C8
- Outline the production of carboxylic acids through oxidation of primary alcohols
- Conduct a laboratory experiment to identify the presence of a carboxylic acid
- Analyse the effect of intermolecular forces on the boiling point and solubility trends of alkanes, alcohols and carboxylic acids
- Apply stoichiometric calculations to determine the quantities of reactants and products in reactions involving carboxylic acids

Esters

- Use molecular formulas, condensed structural formulas, expanded structural formulas and skeletal structures to represent esters
- Use IUPAC nomenclature to name and construct representations of esters C1–C8
- Construct representations of functional group isomers of carboxylic acids and esters C1–C8
- Relate the boiling points of esters, alcohols and carboxylic acids to their structures
- Relate the combustibility of esters, alcohols and carboxylic acids to their physical properties
- Conduct a scientific investigation to safely produce and purify an ester in the school laboratory using a condensation reaction

- Examine the role of esterification reactions in the condensation polymerisation process to produce polyester polymers
- Solve chemical reaction problems involving the production of esters to determine the amounts of reactants and products
- Construct flow charts to show reaction pathways for ester synthesis, including pathways that involve more than one step

Applying chemical ideas

Outcomes

A student:

- analyses the structures, production and uses of substances **CH-12-04**

Related Life Skills outcomes: CW-LS-10

Content

Simple organic compounds refer only to the homologous series of alkanes, alkenes, alkynes, alcohols, haloalkanes, carboxylic acids and esters specifically addressed in the Organic chemistry focus area.

Relevant Working scientifically outcomes and content must be integrated with each focus area. All the Working scientifically outcomes and content must be addressed by the end of Year 12.

Related: Working scientifically

Analysis and uses of organic substances

- Analyse the structure of simple organic compounds using mass spectrometry data
- Interpret mass spectrometry data to qualitatively and quantitatively monitor the presence of pollutants in environmental samples
- Describe the use of infrared spectrometry to identify functional groups in simple organic compounds
- Describe the composition and origin of petroleum
- Explain how fractional distillation is used to refine petroleum and separate its components
- Discuss the applications and environmental impacts of using products obtained from refining petroleum
- Analyse qualitative infrared spectrometry data from petroleum samples
- Construct flow charts to demonstrate the process of obtaining ethene from petroleum to produce chloroethene
- Model and compare the formation, structure, properties and uses of polyethylene, polyvinyl chloride, polytetrafluoroethylene and polypropylene
- Conduct a secondary-source investigation to compare organic resins used by Aboriginal Peoples to modern polymer materials
- Evaluate environmental and health impacts of using ethene, chloroethene, polytetrafluoroethylene and polypropylene, and their polymers
- Discuss the scientific evidence that a selected scientist used to confirm the structure of organic substances in medicinal and agricultural chemicals

Example(s):

Cohn, F Cori, G Cori, Franklin, Hodgkin, Strecker.

- Use chemical shift data to interpret carbon (^{13}C) nuclear magnetic resonance (NMR) spectra
- Use splitting patterns, relative peak areas and chemical shift data to interpret proton (^{1}H) NMR spectra
- Interpret mass spectroscopic, infrared spectroscopic, proton (^{1}H) and carbon (^{13}C) NMR spectra data to deduce the structures and structural features of simple organic compounds

Analysis and uses of inorganic substances

- Describe the features of a base metal ore
- Justify the need to quantify the amount of metal present in base metal ores
- Construct flow charts and use chemical equations to demonstrate the extraction and processing of a metal from the base metal ore
- Evaluate the environmental, social and economic issues involved in the extraction and processing of a base metal from its ore
- Compare atomic emission spectroscopy (AES) to flame tests for elemental analysis
- Relate atomic absorption spectroscopy (AAS) and AES to electron configuration
- Discuss the process of AAS as a quantitative method used for elemental analysis
- Solve problems and perform calculations using AAS and gravimetric data to analyse pollutants in water
- Describe redox reactions using the terms oxidant and reductant
- Construct half-equations and balanced overall equations to represent redox reactions in galvanic cells
- Use the table of standard reduction potentials to calculate cell potential and predict the spontaneity of redox reactions
- Conduct a practical investigation to construct and compare the potential of different galvanic cells
- Solve problems related to standard reduction potentials and galvanic cells
- Conduct a secondary-source investigation to analyse how understanding of redox reactions has impacted battery technology

Assessment

Course standards

Course standards are comprised of syllabus standards and performance standards. Syllabus outcomes and content form the syllabus standards that describe what students are expected to know, understand and do. Performance standards, including the Common Grade Scale for Preliminary courses, HSC Performance Band Descriptions and Achievement Level Descriptions (for HSC courses with grades only) describe how well students have achieved in relation to syllabus standards. Performance standards are used to report student achievement on NESA credentials.

Common Grade Scale for Preliminary courses

Stage 6 – Year 11

The Common Grade Scale for Preliminary courses provides generic, holistic descriptions for performance at each of the 5 grade levels. It is used to report student achievement in Year 11 courses in all NSW schools.

Performance Band Descriptions for Chemistry

Stage 6 – Year 12

HSC performance band descriptions summarise the knowledge, understanding and skills typically demonstrated by students at each band level in a particular course. NESA uses these holistic descriptions to report a student's overall level of achievement in an HSC course.

Band 6

A student who performs at this level typically:

- demonstrates extensive knowledge and understanding of scientific concepts in Chemistry
- applies knowledge and understanding to unfamiliar situations to explain and propose solutions to complex scientific scenarios
- designs and plans investigations to obtain accurate, reliable, valid and relevant primary and secondary data and information, evaluates and mitigates risks, and makes effective modifications in response to new evidence
- selects, processes, interprets and represents data using a range of scientific formats to show patterns and relationships, derive trends, explain phenomena, and make predictions
- designs solutions to complex problems, questions or hypotheses using data and by applying scientific processes, modelling and formats
- communicates scientific understanding succinctly, logically and consistently using accurate scientific terms in a variety of formats and contexts.

Band 5

A student who performs at this level typically:

- demonstrates thorough knowledge and understanding of scientific concepts in Chemistry
- applies knowledge and understanding to unfamiliar situations to explain scientific scenarios
- designs and plans investigations to obtain accurate, reliable, valid and relevant primary and secondary data and information, evaluates and mitigates risks, and makes some modifications in response to new evidence
- selects, processes, interprets and represents data using a range of scientific formats to show patterns and relationships, derive trends, describe phenomena, and make predictions

- designs solutions to problems, questions or hypotheses using data and by applying scientific processes, modelling and formats
- communicates scientific understanding succinctly and logically using accurate scientific terms in a variety of formats and contexts.

Band 4

A student who performs at this level typically:

- demonstrates sound knowledge and understanding of scientific concepts in Chemistry
- applies knowledge and information relevant to scientific issues and scenarios
- designs and plans investigations to obtain primary and secondary data and evaluates risks
- processes, interprets and represents data using a range of scientific formats
- uses scientific processes to address problems, questions or hypotheses
- communicates scientific understanding effectively using scientific terms.

Band 3

A student who performs at this level typically:

- demonstrates basic knowledge and understanding of scientific concepts in Chemistry
- recalls scientific knowledge and information
- implements scientific processes to obtain primary and secondary data and identifies risks
- processes and represents data using scientific formats
- responds to scientific problems, questions or hypotheses
- communicates basic scientific understanding.

Band 2

A student who performs at this level typically:

- demonstrates limited knowledge and understanding of scientific concepts in Chemistry
- recalls limited scientific knowledge and information in Chemistry
- outlines investigations to obtain data and information
- provides simple descriptions of scientific problems
- communicates limited scientific understanding.

Band 1

Performance reported as Band 1 indicates that the minimum standard expected was not demonstrated.

School-based assessment

Schools are required to develop an assessment program for each Year 11 and Year 12 course. NESA provides information about the responsibilities of schools in developing assessment programs in course-specific assessment requirements and in the Assessment Certification Examination (ACE) rules and requirements.

Year 11 Chemistry school-based assessment

Stage 6 – Year 11

Schools are required to submit to NESA a grade for each student based on their achievement at the end of the course.

Teachers use professional, on-balance judgement to allocate grades based on the Common Grade Scale for Preliminary courses.

Teachers consider all available assessment information, including formal and informal assessment, to determine the grade that best matches each student's achievement at the end of the course.

See Assessment Certification Examination (ACE) rules and requirements for further information.

Assessment programs must reflect course components and weightings

The course components and component weightings for Year 11 are mandatory.

Course component	Weighting %
Skills in Working scientifically	60
Knowledge and understanding of course content	40

Schools may determine specific elements of their assessment program

Schools have authority to determine the number, type of task and the weighting allocated to an assessment task. Schools may also follow the sample assessment programs provided by NESA.

Sample assessment program

NESA's sample Year 11 formal school-based assessment program for Chemistry is:

- 3 assessment tasks, including:
  - one depth study or aspect of a depth study
  - a formal written examination
  - a weighting for any individual task of 20% to 40%.

Some students with disability may require adjustments in order to access assessment opportunities and demonstrate achievement of outcomes.

Year 12 Chemistry school-based assessment

Stage 6 – Year 12

NESA requires schools to submit a school-based assessment mark for each Year 12 student who completes this course. Formal school-based assessment tasks should reflect the syllabus outcomes and content. The mark submitted by the school provides a summation of each student's achievement measured at several points throughout the course.

A school's program of school-based assessment includes both mandatory and non-mandatory elements.

See Assessment Certification Examination (ACE) rules and requirements for further information.

Assessment programs must reflect course components and weightings

The course components and component weightings for Year 12 are mandatory.

Course component	Weighting %
Skills in Working scientifically	60
Knowledge and understanding of course content	40

Schools may determine specific elements of their assessment program

Schools have authority to determine the number, type of task and the weighting allocated to an assessment task. Schools may also follow the sample assessment programs provided by NESA.

Sample assessment program

NESA's sample Year 12 formal school-based assessment program for Chemistry is:

- 4 assessment tasks, including:
  - one depth study or aspect of a depth study
  - a formal written examination
  - a weighting for any individual task of 10% to 40%.

Some students with disability may require adjustments in order to access assessment opportunities and demonstrate achievement of outcomes.

Sample assessment schedules

Stage 6

Sample assessment schedules and tasks are being updated to align with new ACE Rules. More information: New limit on take-home assessment tasks from Term 4 2026.

Further information

Stage 6 – Year 12

- Assessment in Stage 6
- Principles of effective assessment
- Assessment in practice
- School-based assessment requirements
- Adjustments to assessment for students with disability
- Life Skills
- Assessment Certification Examination (ACE)

HSC examinations

The external HSC examination measures student achievement in a range of syllabus outcomes.

The external examination and its marking relate to the syllabus by:

- providing clear links to syllabus outcomes
- enabling students to demonstrate the levels of achievement outlined in the Performance Band Descriptions
- applying marking guidelines based on criteria that relate to the quality of the response
- aligning performance in the examination each year to the standards established for the course.

Examination questions may require students to integrate knowledge, understanding and skills developed through studying the course.

The Year 11 course is assumed knowledge for the Year 12 course.

Some students with disability may be eligible for HSC exam provisions when completing the HSC examination.

Chemistry HSC examination specifications

Stage 6 – Year 12

The examination will consist of a written paper worth 100 marks.

Time allowed: 3 hours plus 10 minutes reading time.

The paper will include a data sheet, formulae sheet and Periodic table.

NESA-approved calculators may be used.

The paper will consist of two sections.

Questions assessing Working scientifically outcomes will be integrated throughout the examination.

Questions may refer to stimulus material.

Section I (20 marks)

- There will be objective-response questions to the value of 20 marks.

Section II (80 marks)

- Questions may contain parts.
- There will be 20 to 25 items.
- At least two items will be worth 7 to 9 marks.

HSC Chemistry – Sample examination materials

Stage 6 – Year 12

- HSC Chemistry – annotated sample examination materials
- HSC Chemistry – formulae sheet, data sheet and Periodic Table
- Sample HSC examinations: A4 guide for teachers

Further information

Stage 6 – Year 12

- Assessment in Stage 6
- Principles of effective assessment
- Assessment in practice
- School-based assessment requirements
- Adjustments to assessment for students with disability
- Life Skills
- Assessment Certification Examination (ACE)