

Achievement Standard

Subject Reference	Chemistry 2.4				
Title	Demonstrate understanding of bonding, structure, properties and energy changes				
Level	2	Credits	5	Assessment	External
Subfield	Science				
Domain	Chemistry				
Status	Registered	Status date	17 November 2011		
Planned review date	31 December 2019	Date version published	20 November 2014		

This achievement standard involves demonstrating understanding of bonding, structure, properties and energy changes.

Achievement Criteria

Achievement	Achievement with Merit	Achievement with Excellence
<ul style="list-style-type: none"> Demonstrate understanding of bonding, structure, properties and energy changes. 	<ul style="list-style-type: none"> Demonstrate in-depth understanding of bonding, structure, properties and energy changes. 	<ul style="list-style-type: none"> Demonstrate comprehensive understanding of bonding, structure, properties and energy changes.

Explanatory Notes

- This achievement standard is derived from *The New Zealand Curriculum*, Learning Media, Ministry of Education, 2007, Level 7. The standard is aligned to the Nature of Science achievement objectives and the Material World achievement objectives, and is related to the material in the *Teaching and Learning Guide for Chemistry*, Ministry of Education, 2010 at <http://seniorsecondary.tki.org.nz>.

This standard is also derived from Te Marautanga o Aotearoa. For details of Te Marautanga o Aotearoa achievement objectives to which this standard relates, see the [Papa Whakaako](#) for the relevant learning area.

- Procedures outlined in *Safety and Science: a Guidance Manual for New Zealand Schools*, Learning Media, Ministry of Education, 2000 should be followed.
- Demonstrate understanding* involves describing, identifying, naming, drawing, calculating, or giving an account of bonding, structure and properties of different substances and the energy involved in physical and chemical changes. This requires the use of chemistry vocabulary, symbols and conventions.

Demonstrate in-depth understanding involves making and explaining links between the bonding, structure and properties of different substances and the energy involved in physical and chemical changes. This requires explanations that use chemistry vocabulary, symbols and conventions.

Demonstrate comprehensive understanding involves elaborating, justifying, relating, evaluating, comparing and contrasting, or analysing links between bonding, structure and properties of different substances and the energy involved in physical and chemical changes. This requires the consistent use of chemistry vocabulary, symbols and conventions.

- 4 *Bonding, structure and energy changes* are limited to:
- ionic, covalent and metallic bonding
 - intermolecular forces (the distinction between the different types of intermolecular forces is not required)
 - Lewis structures, shape and polarity of simple molecules. Simple molecules have no more than four electron pairs about any atom (including multiple-bonded species)
 - molecular, ionic, metallic and covalent network substances
 - exothermic and endothermic reactions including energy (enthalpy) changes associated with differing amounts of substances and changes of state and enthalpy changes associated with the making and breaking of chemical bonds
 - calculations of energy changes using $\Delta_r H$ and reaction stoichiometry, and bond enthalpy.
- 5 *Properties* are limited to hardness, malleability, ductility, electrical conductivity, melting and boiling points and solubility.
- 6 Assessment Specifications for this achievement standard can be accessed through the Chemistry Resources page found at <http://www.nzqa.govt.nz/qualifications-standards/qualifications/ncea/ncea-subject-resources/>.
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Replacement Information

This achievement standard replaced unit standard 8944 and AS90308.

Quality Assurance

- 1 Providers and Industry Training Organisations must have been granted consent to assess by NZQA before they can register credits from assessment against achievement standards.
- 2 Organisations with consent to assess and Industry Training Organisations assessing against achievement standards must engage with the moderation system that applies to those achievement standards.

Consent and Moderation Requirements (CMR) reference

0233