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 2014  Date version published  17 November 2011

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

Achievement Criteria

<table>
<thead>
<tr>
<th>Achievement</th>
<th>Achievement with Merit</th>
<th>Achievement with Excellence</th>
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<tbody>
<tr>
<td>• Demonstrate understanding of bonding, structure, properties and energy changes.</td>
<td>• Demonstrate in-depth understanding of bonding, structure, properties and energy changes.</td>
<td>• Demonstrate comprehensive understanding of bonding, structure, properties and energy changes.</td>
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Explanatory Notes


3  *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 $\Delta H$ 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.

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**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

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