Achievement Standard

Subject Reference	Chemistry 3.4				
Title	Describe properties of particles and thermochemical principles				
Level	3	**Credits**	5	**Assessment**	External
Subfield	Science				
Domain	Chemistry				
Registration date	23 November 2005	**Date version published**	23 November 2005		

This achievement standard involves describing properties of atoms, molecules, and ions, and thermochemical principles.

Achievement Criteria

Achievement	Achievement with Merit	Achievement with Excellence
• Describe properties of particles and thermochemical principles.	• Explain and apply properties of particles and thermochemical principles.	• Discuss properties of particles and thermochemical principles.

Explanatory Notes

1 This achievement standard is derived from *Chemistry in the New Zealand Curriculum,* Learning Media, Ministry of Education, 1994, p. 28, achievement objectives 8.1, 8.2 and 8.3.

2 *Particles* are atoms, ions, and molecules.

3 *Properties of particles* include:
- electron configuration of atoms and ions of the first 36 elements (using *s,p,d* notation)
- special characteristics of transition metals (variable oxidation state, colour) related to electron configuration. Transition metals will be limited to iron, vanadium, chromium, manganese, copper and zinc
- periodic trends in atomic radius, ionisation energy, and electronegativity, and comparison of atomic and ionic radii
- Lewis structures and shapes (up to six electron pairs about the central atom for molecules and polyatomic ions, including those with multiple bonds)

- polarity of molecules
- attractive forces between atoms, ions, and molecules. These will include ionic bonds, covalent bonds, and intermolecular attractions due to temporary dipoles and permanent dipoles (including hydrogen bonding).

4 *Thermochemical principles* include:
- transfer of heat between the system and the surroundings
- calculations involving the use of specific heat capacity
- ΔcH°, ΔfH°, ΔrH°, ΔvapH°, ΔsubH°, and ΔfusH°
- Hess's Law including application of $\Delta_r H(= \Sigma\Delta_f H$((products) – $\Sigma\Delta_f H$((reactants)
- bond enthalpies.

5 Terms
- *Describe* involves identifying, naming, drawing, giving characteristics of, giving an account of, defining, and/or carrying out simple calculations.
- *Explain and apply* involves describing as well as giving reasons for, making links between chemical concepts and/or observations, or carrying out calculations.
- *Discuss* involves showing understanding by analysing, interpreting, justifying, relating, evaluating, comparing and contrasting, and/or calculating.

Replacement information
This achievement standard replaced AS90697 and AS90699.

Quality Assurance

1 Providers and Industry Training Organisations must be accredited by the Qualifications Authority before they can register credits from assessment against achievement standards.

2 Accredited providers and Industry Training Organisations assessing against achievement standards must engage with the moderation system that applies to those achievement standards.

Accreditation and Moderation Action Plan (AMAP) reference 0226