Achievement Standard

Subject Reference	Chemistry 1.5				
Title	Describe atomic structure and bonding				
Level	1	**Credits**	3	**Assessment**	External
Subfield	Science				
Domain	Chemistry				
Status	Registered	**Status date**	5 November 2007		
Planned review date	28 February 2009	**Date version published**	5 November 2007		

This achievement standard involves the description of atomic structure and bonding.

Achievement Criteria

Achievement	Achievement with Merit	Achievement with Excellence
• Describe atomic structure and bonding.	• Link principles of atomic structure, bonding and selected properties.	• Discuss selected properties in terms of atomic structure and bonding.

Explanatory Notes

1 This achievement standard is derived from *Chemistry in the New Zealand Curriculum,* Learning Media, Ministry of Education, 1994, achievement objective 6.3, p. 18.

2 For Achievement, *description of atomic structure and bonding* will involve a selection from the following:
- relating the number of protons, neutrons and electrons in an atom (including isotopes), or a monatomic ion, to the atomic number, mass number and charge
- stating the electron arrangement of atoms or ions of the first 20 elements
- relating the charge on monatomic ions to the position of the element in the periodic table
- drawing Lewis diagrams of atoms (selected from the first 20 elements) and molecules with single bonds only (eg H_2O, CH_4, H_2, Cl_2 and PCl_3). Molecules with more than four pairs of electrons around the central atom are excluded
- distinguishing between ionic and covalent bonds and predicting the type of bonding in given examples of ionic and covalent compounds (compounds are limited to those containing two elements only).

3 *Selected properties* are limited to conductivity, melting point and boiling point of ionic and molecular compounds.

4 For Achievement with Merit*, linking principles of atomic structure, bonding and selected properties* may involve:

- distinguishing between states of ionic and molecular substances, in terms of particle separation, energy, particle motion and attractive forces
- drawing Lewis diagrams of molecules with multiple bonds (eg O_2, N_2 and CO_2). Molecules with more than four pairs of electrons around the central atom are excluded
- using atomic structure to justify the type of bonding in ionic and covalent compounds
- relating the similarities in the chemical properties of elements in the same group to the number of valence electrons or the elements' positions on the periodic table. Elements will be selected from groups 1, 2, 16, 17 and 18
- relating the type of bonding to a selected property.

5 For Achievement with Excellence, *discussions of the properties* of the substances must be related to their constituent particles (molecules or ions) and the strength of attractive forces between them. Explanations in terms of forces such as hydrogen bonding and van der Waals forces are not required.

6 A periodic table showing symbols, atomic numbers and molar mass values only will be provided.

Quality Assurance

1 Providers and Industry Training Organisations must be accredited by NZQA 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