Achievement Standard

Subject Reference Chemistry 2.1

Title Carry out qualitative analysis

Level 2 **Credits** 3 **Assessment** Internal

Subfield Science

Domain Chemistry

Registration date 20 October 2004 **Date version published** 20 October 2004

This achievement standard involves carrying out procedures and using knowledge of precipitation reactions to determine ions present in solution.

Achievement Criteria

Achievement	Achievement with Merit	Achievement with Excellence
• Carry out given procedures to determine ions present in solution.	• Carry out given procedures to determine ions present in solution, and justify the identification.	• Carry out given procedures, involving the formation of complex ion(s), to determine ions present in solution, and justify the identification.

Explanatory Notes

1 This achievement standard is derived from *Chemistry in the New Zealand Curriculum*, Learning Media, Ministry of Education, 1994, achievement objectives 7.1, 7.2, and 7.3, p. 23, and the section on 'Developing Scientific Skills and Attitudes in Chemistry', pp. 34-35.

2 Procedures outlined in *Safety and Science: a Guidance Manual for New Zealand Schools*, Learning Media, Ministry of Education, 2000, should be followed.

3 A table of ions will not be provided.

4 A procedure, such as a flow chart, to assist in determining the unknown ions will be provided.

5 Ions to be identified will be limited to: Ag^+, Al^{3+}, Ba^{2+}, Cu^{2+}, Fe^{2+}, Fe^{3+}, Mg^{2+}, Pb^{2+}, Na^+, NH_4^+, Zn^{2+}, Cl^-, CO_3^{2-}, I^-, NO_3^-, OH^-, SO_4^{2-}. Na^+ and NO_3^- are identified by a process of elimination. NH_4^+ will be identified using its reaction with NaOH.

6 For achievement, determination of the ions must be supported by experimental observations and identification of precipitates formed. This could include distinguishing between named pairs of anions or pairs of cations.

7 For merit, determination of the ions must be supported by experimental observations and identification of precipitates formed. Justification must include balanced equations for the reactions where precipitates are formed.

8 For excellence, justification must include balanced equations for the formation of complex ions. Complex ions may include $FeSCN^{2+}$ and those formed when $OH^-(aq)$ or $NH_3(aq)$ react with cations listed in 5 above, such as $[Ag(NH_3)_2]^+$, $[Al(OH)_4]^-$, $[Pb(OH)_4]^{2-}$, $[Zn(OH)_4]^{2-}$, $[Zn(NH_3)_4]^{2+}$, $[Cu(NH_3)_4]^{2+}$.

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