

Achievement Standard

Subject Reference Chemistry 3.2

Title Determine the concentration of an oxidant or reductant by titration

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

Subfield Science

Domain Chemistry

Status Expiring **Status date** 04 December 2012

This achievement standard is expiring. Assessment against the standard must take place before the expiry date set out below.

Expiry date 31 December 2013 **Date version published** 04 December 2012

This achievement standard involves individually carrying out a titration involving an oxidation-reduction reaction, and calculating the concentration of the oxidant or reductant in the solution.

Achievement Criteria

Achievement	Achievement with Merit	Achievement with Excellence
<ul style="list-style-type: none"> Carry out an oxidation-reduction titration with limited precision. Calculate the concentration of the oxidant or reductant using titration data. 	<ul style="list-style-type: none"> Carry out an oxidation-reduction titration with reasonable precision. Determine the composition of the sample being analysed. 	<ul style="list-style-type: none"> Carry out an oxidation-reduction titration with high precision. Accurately calculate the composition of the sample being analysed.

Explanatory Notes

- 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.
- The titration procedure and balanced equation will be provided.
- In the calculation of the concentration of the oxidant or reductant or composition of the sample, the titration data used may be that collected by the student or that provided by the assessor.

- 4 Determination of the composition of the sample will involve one mathematical conversion between the concentration of the solution analysed and the composition of the sample, eg:
- concentration of the sample before dilution
 - concentration in grams per litre (g L^{-1}) or % (w/v)
 - % composition (or purity) of a solid.
- 5 This note provides more detailed guidance on the evidence expected for each phase of the assessment.
- For achievement
Limited precision requires:
 - at least two recorded titre values must fall within a range of 0.6 mL; the average titre value must be within 0.6 mL of the expected outcome.*Calculate the concentration* requires:
 - using only titre values within a range of 0.6 mL to calculate the average volume
 - the calculation of the concentration of the unknown solution must be carried out using an appropriate procedure (not provided). A minor numerical error is allowed.
 - For achievement with merit
Reasonable precision requires:
 - at least three recorded titre values must fall within a range of 0.4 mL; the average titre value must be within 0.4 mL of the expected outcome.*Determine the composition of the sample* requires:
 - using only titre values within a range of 0.4 mL to calculate the average volume
 - the composition of the sample being determined using a correct procedure.
 - For achievement with excellence
High precision requires:
 - at least three recorded titre values must fall within a range of 0.2 mL; the average titre value must be within 0.2 mL of the expected outcome.*Accurately calculate the composition of the sample* requires:
 - using only titre values within a range of 0.2 mL to calculate the average volume
 - correctly determining the composition of the sample, using correct units and appropriate number of significant figures
 - evidence of being able to carry out calculations involving reactions where the reactants are not in a 1:1 mole ratio.

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

0226