

## Achievement Standard

**Subject Reference** Chemistry 3.1

**Title** Carry out an extended practical investigation involving quantitative analysis

**Level** 3      **Credits** 4      **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 carrying out an extended practical chemistry investigation individually. It will involve the development of a procedure to collect data in relation to a possible trend in the amount of a substance, collecting and processing data, interpreting the results to reach a conclusion, and presenting a report.

### Achievement Criteria

Achievement	Achievement with Merit	Achievement with Excellence
<ul style="list-style-type: none"> <li>Carry out an extended practical chemistry investigation involving quantitative analysis.</li> </ul>	<ul style="list-style-type: none"> <li>Carry out a quality extended practical chemistry investigation involving quantitative analysis.</li> </ul>	<ul style="list-style-type: none"> <li>Carry out a high quality extended practical chemistry investigation involving quantitative analysis.</li> </ul>

### Explanatory Notes

- This achievement standard is derived from *Chemistry in the New Zealand Curriculum*, Learning Media, Ministry of Education, 1994, all achievement objectives from pp. 28 and 35. It also meets the requirement of p. 14 that, 'by the time they have completed Level 8, students will have carried out at least one extended practical investigation'.
- The extended practical investigation is to be done individually. Instructions for an appropriate analytical technique that can be used in a school laboratory, or equivalent, may be provided.

- 3 The investigation should be based on an analytical technique such as titration, precipitation, or colorimetry, with the degree of complexity being at curriculum Level 8 or equivalent. Pre-calibrated measuring equipment such as water test kits, and dissolved oxygen meters should not be used.
- 4 A logbook containing details of development of the procedure, raw data, and calculations must be kept throughout the investigation.
- 5 An *extended practical chemistry investigation* will involve:
- developing and carrying out a procedure to collect data about a possible trend in the amount of a substance
  - collecting and recording a sufficient quantity of data to enable a conclusion to be reached
  - processing of the data to reach a conclusion
  - presenting a report that contains:
    - a statement of the purpose of the investigation
    - a description of the procedure that includes preparation of samples and solutions used, control of significant variables, and the analytical technique used
    - summary of the collected and processed data
    - a conclusion based on the processed data.
- 6 A *quality extended practical chemistry investigation* will involve:
- developing and carrying out a procedure to collect quality data about a possible trend in the amount of a substance
  - collecting and recording a sufficient quantity of data to enable a valid conclusion to be reached
  - accurate processing of the data as appropriate to the procedure used, to reach a valid conclusion
  - presenting a report that contains:
    - a statement of the purpose of the investigation and relevant background information
    - a description of the final procedure in sufficient detail for the investigation to be duplicated
    - an example, using experimental data obtained, of the mathematical steps used to process the data
    - a summary of the collected and processed data
    - a valid conclusion based on the processed data relevant to the purpose of the investigation
    - a discussion that evaluates the procedure used or the reliability of the data.
- 7 A *high quality extended practical chemistry investigation* is a quality extended practical investigation that also involves:
- checks to determine the reliability of the procedure
  - accurate processing of data using appropriate significant figures
  - in the report:
    - a description of the final procedure that shows an understanding of the technique used, and reasons for any modifications to the procedure
    - a comprehensive evaluation of the whole investigation that considers:
      - the significance of the results in relation to the background information and the validity of the conclusion

- the reliability of the data by evaluating the procedure used and sources of error.
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### **Replacement Information**

This achievement standard and unit standard 6341 have been replaced by AS91387.

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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

0226