Title	**Demonstrate competent use of laboratory measurement and recording procedures**		
Level	**4**	**Credits**	**4**

Purpose	People credited with this unit standard are able to: convert units and quantities; explain the concept of uncertainty of a measurement quantity; record experimental observations and measurements; and process and interpret data.

Classification	Science > Science - Core

Available grade	Achieved

Guidance Information

1 All work must be carried out in accordance with the quality management system, documented protocol system or Standard Operating Procedures acceptable in a commercial or research laboratory.

2 Health and Safety practices must conform to Australian/New Zealand Standard AS/NZS 2243 – *Safety in Laboratories* Parts 1, 2, 3, 7 and 10 available at http://www.standards.co.nz

3 Legislation applicable to this unit standard includes:
Health and Safety at Work Act 2015;
Hazardous Substances and New Organisms Act 1996.

4 Glossary
Laboratory procedures refer to documented systems or processes of operation which may be found in a SOP manual, quality management system, or in protocol system documentation. These procedures are external and/or internal laboratory requirements governing laboratory work.

5 References
NZS 6501:1982 *Units of measurement;*
ISO Standards Handbook ISO1000:1992 *SI units and recommendations for the use of their multiples and of certain other units;*
ISO/IEC Guide 98-3:2008 *Uncertainty of Measurement Part 3: Guide to the Expression of Uncertainty in Measurement*, also known as GUM 1995.

Outcomes and performance criteria

Outcome 1

Convert units and quantities.

Performance criteria

1.1 Converted quantities are consistent with the initial quantity.

Range energy – J, cal, kWh;
pressure – Pa, atm, mmHg (torr), bar, in-water gauge;
volume – L, uL, m^3;
mass – kg, g, mg, ug;
time – s, min, h, d, y;
temperature – K, °C;
amount of substance – mass, volume, number of moles;
evidence of at least one conversion for each category of unit/quantity.

1.2 Quantity conversions for mixtures are consistent with the composition of the given mixture.

Range solutions – molarity, %m/m, %w/w, %m/V, %w/V, %V/V, mg/kg, mg/L;
gas mixtures – mol/mol, partial pressures, ppm;
solid mixtures – mg/kg, g/m^3;
evidence of at least one conversion for each of: solutions, gas mixtures, and solid mixtures.

Outcome 2

Explain the concept of uncertainty of a measurement quantity.

Range includes any single physical quantity.

Performance criteria

2.1 The precision and the accuracy of measurements are explained in terms of the true value and measured value of the measured quantity.

2.2 The purpose of calibration is explained in terms of the application of correction factors.

Outcome 3

Record experimental observations and measurements.

Performance criteria

3.1 Date and task are recorded in accordance with laboratory procedures.

3.2 Experimental observations and measurements are recorded in accordance with laboratory procedures.

3.3 Measurements are recorded with significant figures appropriate to the uncertainty of the measurement in accordance with laboratory procedures.

3.4 Quantities calculated from measurements are presented with uncertainties and with significant figures appropriate to the uncertainty in accordance with laboratory procedures.

3.5 Results are presented in accordance with laboratory procedures.

Outcome 4

Process and interpret data.

Performance criteria

4.1 Data is processed and presented graphically in accordance with laboratory procedures.

4.2 Data is processed in accordance with graphical principles.

4.3 Charts, graphs, tables, and nomograms are interpreted to provide specific information.

This unit standard is expiring. Assessment against the standard must take place by the last date for assessment set out below.

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	24 September 1996	31 December 2014
Review	2	24 February 1998	31 December 2014
Review	3	23 November 1999	31 December 2014
Review	4	22 September 2004	31 December 2014
Review	5	17 September 2010	31 December 2025
Rollover	6	27 January 2015	31 December 2025
Review	7	27 September 2018	31 December 2025
Review	8	30 November 2023	31 December 2025

Consent and Moderation Requirements (CMR) reference	0113

This CMR can be accessed at http://www.nzqa.govt.nz/framework/search/index.do.