

Title	Apply knowledge of the chemistry of carbohydrates, lipids and proteins		
Level	5	Credits	8

Purpose	People credited with this unit standard are able to: describe the structures, properties, and uses of carbohydrates and lipids; describe amino acids and proteins; and carry out the analysis of a carbohydrate, fats, and protein.
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Classification	Science > Chemistry
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Available grade	Achieved
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Guidance Information

- 1 Recommended skills and knowledge: Unit 16565, *Demonstrate knowledge of organic compounds*; and Unit 16566, *Perform organic chemistry functional group analysis*.
- 2 All work must be carried out in accordance with the quality management system, documented protocol system or Standard Operating Procedures typically acceptable in a commercial or research laboratory.
- 3 Health and Safety practices must conform to Australian/New Zealand Standard AS/NZS 2243:2010 Set – *Safety in Laboratories*, available at <http://www.standards.co.nz> and <http://infostore.saiglobal.com/store>.
- 4 Legislation applicable to this unit standard includes:
Health and Safety at Work Act 2015;
Hazardous Substances and New Organisms Act 1996.
- 5 Glossary
Reference value is an externally estimated value. The standard reference materials are commercially available.
Analysis of a carbohydrate refers to analyses involving simple sugars.

Outcomes and performance criteria

Outcome 1

Describe carbohydrate structure, properties, and uses.

Performance criteria

- 1.1 The structures of monosaccharides are drawn using the Fischer convention.
Range galactose, glucose, fructose.
- 1.2 Monosaccharides are described in terms of their classification.
Range furanose, pyranose, hexose, pentose, aldose, ketose.
- 1.3 Sugars are described in terms of their redox properties.
Range reducing, non-reducing.
- 1.4 Ring structure diagrams of carbohydrates are drawn using the Haworth convention.
Range monosaccharide, disaccharide, polysaccharide.
- 1.5 Carbohydrates are described in relation to their occurrence and use.
Range three of – glucose, sucrose, starch, cellulose, pectin.

Outcome 2

Describe lipid structure, properties, and uses.

Performance criteria

- 2.1 Lipids are classified in terms of structure.
Range glycerides, waxes, steroids, phospholipids.
- 2.2 Physical properties of fats, oils, and waxes are described in terms of their structure.
Range chain length, saturated, unsaturated, polyunsaturated.
- 2.3 Fats and oils are described in terms of reactions.
Range includes one of – hydrogenation, saponification, oxidation, reduction of ester.
- 2.4 Fats and oils are described in terms of use.
Range includes one of – food industry, detergents, resins.

Outcome 3

Describe amino acids and proteins.

Performance criteria

- 3.1 The structures of L-amino acids are drawn using the Fischer convention.
- Range includes two of – glycine, alanine, cysteine, tyrosine, lysine, glutamic acid, proline.
- 3.2 Amino acids are described in terms of their acid-base properties.
- Range isoelectric point, buffer action.
- 3.3 Protein structure is described in terms of secondary structure.
- Range α -helix, β -sheets.
- 3.4 Function and uses of a protein are described in terms of tertiary structure.
- Range includes one of – fibrous, globular, food, enzyme.

Outcome 4

Carry out the analysis of a carbohydrate.

Performance criteria

- 4.1 A carbohydrate is analysed and quantified in relation to the reference value.
- Range includes two of – polarimetry, refractometry, thin layer chromatography, high pressure liquid chromatography (HPLC).

Outcome 5

Carry out the analysis of fats.

Performance criteria

- 5.1 Fat content is determined by Soxhlet extraction.
- 5.2 Fats are analysed, and the results are interpreted and justified compared with the reference value.
- Range includes one of – acid value, peroxide value, saponification number, iodine value.

Outcome 6

Carry out the analysis of protein.

Performance criteria

6.1 The protein content is analysed and compared with the reference value.

Range may include but is not limited to – Kjeldahl analysis, Dumas analysis.

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	22 December 1996	31 December 2014
Revision	2	19 February 1998	31 December 2014
Review	3	23 November 1999	31 December 2014
Review	4	22 September 2004	31 December 2014
Review	5	18 June 2010	31 December 2022
Rollover	6	27 January 2015	31 December 2022
Rollover and Revision	7	15 June 2017	31 December 2022
Revision	8	26 October 2017	31 December 2022
Review	9	22 October 2020	31 December 2022

Consent and Moderation Requirements (CMR) reference	0113
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This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.