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| **Title** | **Demonstrate and apply knowledge of microorganism biochemical pathways** | | |
| **Level** | **5** | **Credits** | **6** |

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| **Purpose** | People credited with this unit standard are able to: explain microbial adenosine triphosphate (ATP) producing biochemical pathways; and perform biochemical tests for identification of microorganisms. |

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| **Classification** | Science > Microbiology |

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| **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 and http://infostore.saiglobal.com/store.

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

4 Glossary
*Anaerobic respiration* refers to respiration in the absence of oxygen and includes fermentation.
*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 Recommended for entry: Unit 8040, *Perform aseptic laboratory techniques*; and Unit 26117, *Work safely in a science laboratory*.

## Outcomes and performance criteria

### Outcome 1

Explain microbial adenosine triphosphate (ATP) producing biochemical pathways.

**Performance criteria**

1.1 Microbes are explained in terms of their electron and carbon source in biochemical pathways.

Range microbes include – chemolithotrophs, chemoorganotrophs, photolithotrophs, photoorganotrophs.

1.2 Autotrophs and heterotrophs are compared in terms of biochemical pathways.

Range biochemical pathways include – photosynthesis, respiration.

1.3 Respiration is explained in terms of biochemical pathways.

Range respiration includes – anaerobic, aerobic.

1.4 Inorganic electron donors for ATP generation are explained in terms of biochemical pathways.

**Outcome 2**

Perform biochemical tests for identification of microorganisms.

Range oxidase, catalase, oxidation-fermentation, methyl red, Vogues Proskauer, nitrate reduction, carbohydrate fermentation, citrate.

**Performance criteria**

2.1 Biochemical tests are carried out in accordance with manufacturer's instructions or laboratory procedures.

2.2 Test results are interpreted and documented in accordance with laboratory procedures.

2.3 Test results are related to the metabolic activity of bacteria.

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| **Planned review date** | 31 December 2023 |

**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 |
| Review | 2 | 24 February 1998 | 31 December 2014 |
| Review | 3 | 23 November 1999 | 31 December 2014 |
| Review | 4 | 21 May 2010 | N/A |
| Rollover | 5 | 27 January 2015 | N/A |
| Review | 6 | 27 September 2018 | N/A |

| Consent and Moderation Requirements (CMR) reference | 0113 |
|---|---|

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

**Comments on this unit standard**

Please contact NZQA National Qualifications Services nqs@nzqa.govt.nz if you wish to suggest changes to the content of this unit standard.