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| Title | Describe biofilms, microbial biodeterioration, biodegradation, and bioremediation | | |
| Level | 6 | Credits | 4 |

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| Purpose | People credited with this unit standard are able to describe: biofilms; biodegradation; the biodeterioration of materials and methods of prevention; and the bioremediation of environmental contaminants. |
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| Classification | Science > Microbiology |
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| Available grade | Achieved |
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Guidance Information

1 Glossary

Biodegradation is the process whereby large, complex compounds are broken down by microorganisms, their enzymes or secretions into smaller less complex compounds. These may be aerobic or anaerobic processes.

Biodeterioration is 'any undesirable change in the properties of a material caused by the vital activity of microorganisms' defined by Hueck, H.J. (1965). *The biodeterioration of materials as part of hylobiology*. Mater.org., 1(1), 5-34.

Bioremediation is the process that uses microorganisms, fungi, green plants or their enzymes to return the natural environment altered by contaminants to its original condition. This includes phytoremediation.

- 2 Recommended for entry: Unit 8023, *Demonstrate and apply knowledge of microorganism biochemical pathways*; or demonstrate equivalent knowledge and skills.

Outcomes and performance criteria

Outcome 1

Describe biofilms.

Performance criteria

- 1.1 Formation of a biofilm is described in terms of the five stages of biofilm development.
- 1.2 The advantages of biofilm formation are described in relation to the microorganism forming the biofilm.

- 1.3 Advantages and disadvantages of biofilm formation are described in terms of human activity.

Range human activity includes – industrial, medical.

Outcome 2

Describe biodegradation.

Performance criteria

- 2.1 The role of microorganisms is described in relation to biodegradation of natural materials.
- 2.2 The role of microorganisms is described in relation to biodegradation of xenobiotic compounds.

Outcome 3

Describe the biodeterioration of materials and methods of prevention.

Range four of – textiles, timber, fuels, glass, stone, concrete, rubber, leather, metals.

Performance criteria

- 3.1 Impact of biodeterioration on materials is described.
- 3.2 Chemical and/or physical methods for the prevention of biodeterioration are described.

Outcome 4

Describe the bioremediation of environmental contaminants.

Range environmental contaminants include but are not limited to – sewage, oils, pesticides, mine tailings.

Performance criteria

- 4.1 Bioremediation is described in terms of the environmental contaminant.
- 4.2 Microbial mode of action is described in relation to the environmental contaminant.

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| Planned review date | 31 December 2023 |
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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 | 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.