



**Australian Government**

# **MSL975062 Perform microbiological tests**

**Release: 1**

# MSL975062 Perform microbiological tests

## Modification History

Release 1. Supersedes and equivalent to MSL975035 Perform microbiological tests. Clarified that unit applies to animals only – not animals and plants. Minor changes to Performance Criteria. Oral communication removed from Foundation Skills as this is not a focus in the unit. Minor changes to Performance Evidence. Small number of items added to Knowledge Evidence to better reflect Performance Evidence and add content on more modern analysis methods.

## Application

This unit of competency describes the skills and knowledge to contribute to the culture, isolation and identification of microorganisms, such as bacteria, fungi, viruses, protozoans, algae and parasites, in order to investigate the physiology and pathology of animals, monitor the natural environment, and to assist in the production of foods, pharmaceutical goods and other manufactured materials.

This unit applies to laboratory technicians and technical officers working in the biomedical, biotechnology, environmental, manufacturing and food processing industry sectors. The results of work performed by technical personnel would normally be integrated, interpreted and reported on by scientists, medical, veterinary or plant pathologists or other responsible officers in a workplace. Although a supervisor may not always be present, the technician will follow workplace procedures that will clearly describe the scope of permitted practice in modifying testing procedures, interpreting data and for communicating test results to people outside the laboratory.

It applies to investigations as well as addressing the broader needs of biotechnology and tissue culture applications.

No licensing or certification requirements exist at the time of publication. However, regulations and/or external accreditation requirements for laboratory operations exist, so local requirements should be checked. Relevant legislation, industry standards and codes of practice within Australia must also be applied.

## Pre-requisite Unit

MSL973027 Perform techniques that prevent cross-contamination

MSL973028 Perform microscopic examination

## Competency Field

Testing

## Elements and Performance Criteria

| Elements                                                                      | Performance Criteria                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Elements describe the essential outcomes.                                     | Performance criteria describe the performance needed to demonstrate achievement of the element.                                                                                                                                                                                                                                                                                                                                            |
| 1. Receive samples and process associated request forms                       | <p>1.1 Identify specimens and request forms that do not comply with workplace requirements</p> <p>1.2 Record any discrepancies or sample quality issues and indicate action required</p> <p>1.3 Register samples in accordance with workplace procedures, recording details that allow accurate tracking and chain of custody traceable to employee</p>                                                                                    |
| 2. Prepare for safe microbiological work and aseptic applications             | <p>2.1 Apply principles of aseptic techniques to ensure sample and reagent integrity are maintained</p> <p>2.2 Apply principles of aseptic techniques to ensure personal and environmental safety</p> <p>2.3 Minimise the production and release of aerosols, using biological safety cabinets where necessary</p> <p>2.4 Safely dispose of biohazardous materials and other laboratory wastes in accordance with workplace procedures</p> |
| 3. Process samples for direct examination                                     | <p>3.1 Prepare smears of samples for subsequent staining to enable microscopic examination</p> <p>3.2 Prepare liquid films of specimens for direct observation for motility or cell structure</p> <p>3.3 Prepare samples to concentrate material for subsequent staining or microscopy</p>                                                                                                                                                 |
| 4. Prepare pure cultures for microbiological work and aseptic applications    | <p>4.1 Select culture media to maximise growth and optimise production of pure microbial cultures</p> <p>4.2 Inoculate media aseptically, applying techniques suitable for purpose of culture</p> <p>4.3 Incubate inoculated media in conditions to optimise targeted growth of organisms</p>                                                                                                                                              |
| 5. Perform procedures that can assist in the identification of microorganisms | <p>5.1 Select staining techniques to demonstrate required cellular characteristics</p> <p>5.2 Stain prepared films to demonstrate diagnostically useful characteristics</p> <p>5.3 Inoculate and incubate media with pure cultures to assist in the</p>                                                                                                                                                                                    |

| Elements                                                         | Performance Criteria                                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Elements describe the essential outcomes.                        | Performance criteria describe the performance needed to demonstrate achievement of the element.                                                                                                                                                                                                                                                                         |
|                                                                  | biochemical and immunological identification of microorganisms<br>5.4 Microscopically differentiate between, red blood cells, white blood cells, micro-organisms and epithelial cells<br>5.5 Select and perform tests on pure cultures to determine the biochemical and immunological identification of microorganisms<br>5.6 Perform antibiotic susceptibility testing |
| 6. Estimate the number and/or size of micro-organisms in samples | 6.1 Count cells in samples<br>6.2 Prepare serial dilutions of samples aseptically for culture and colony counting<br>6.3 Indicate the appropriate dilution necessary to reliably count organisms in a serially diluted sample<br>6.4 Count colonies for calculating number of viable organisms per unit volume                                                          |
| 7. Maintain records of laboratory work                           | 7.1 Record and/or check data in accordance with workplace procedures<br>7.2 Follow procedures to ensure traceability of sample from receipt to reporting of results                                                                                                                                                                                                     |

## Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance.

- Problem solving skills to identify artefacts or image aberrations attributable to misalignment or obstruction of light paths or condensers used in microscopy, or with other steps in microscopic examinations.

Other foundation skills essential to performance are explicit in the performance criteria of this unit.

## Unit Mapping Information

Supersedes and equivalent to MSL975035 Perform microbiological tests.

## Links

MSL Laboratory Operations Companion Volume Implementation Guide is available from VETNet - -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=5c63a03b-4a6b-4ae5-9560-1e3c5f462baa>

## Assessment Requirements for MSL975062 Perform microbiological tests

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### Performance Evidence

There must be evidence the candidate has completed the tasks outlined in the elements and performance criteria of this unit, and:

- identified at least 5 microorganisms to species based on colonial/microscopic morphology, biochemistry and/or immunological characteristics, including:
  - at least 1 identification must be from a mixed culture
  - at least 4 from the following list:
    - Staphylococcus spp. or another Gram-positive cocci
    - Streptococcus spp.
    - Pseudomonas spp.
    - a member of the Enterobacteriaceae family
    - Clostridium spp. or another Gram-positive rod
    - Fungi
- transferred materials aseptically to at least 1 solid culture and at least one 1 liquid culture, including sterilising inoculating loops before and after transfer, protecting sample integrity and minimising opportunities for cross-contamination and infection and performing quality control checks to ensure aseptic transfer was successful.
- safely performed at least 8 microbiological tests/procedures for culturing, isolating, identifying and counting microorganisms, including:
  - consistently and accurately performing and interpreting Gram staining of bacteria
  - using and interpreting common enriched, differential and selective media
  - performing agglutination techniques
  - coagulase testing
  - oxidase testing
  - catalase testing
  - use a biochemical test system with statistical interpretation
  - antibiotic sensitivity testing and interpretation
- completing work in ways that avoid contamination of:
  - self, other people, the work area, equipment or the samples or materials under test

- media or reagents during manipulations involving the transfer of cultures.
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## Knowledge Evidence

There must be evidence the candidate has knowledge of:

- microbiological terminology, including bacteriology, parasitology, virology and mycology
- microbial control techniques, including disinfection and sterilisation as applied to practical aspects of microbiology
- relationship between sample microscopic and macroscopic appearance and indications of infection and/or contamination
- microbial diversity and taxonomy
- microorganism structures and functions
- cell biology and chemistry related to the differential growth, isolation and identification of microorganisms
- sources of infection, including food, environment, social and physical contact, animals and medical equipment/facilities and sources of contamination
- basic principles of innate and acquired immunity as they relate the respiratory, urinary, digestive and lymphatic/immune system
- microorganisms of importance to job role and their key characteristics used for identification
- transport and storage requirements for microbiological samples to ensure sample integrity prior and post testing
- the importance of maintaining reference cultures and the use of controls in microbiological testing
- technological advances in microbiology including automation for identification, enumeration, susceptibility testing and total laboratory automation
- procedures and reporting requirements for microbiological spills
- purpose of biochemical test, media types and susceptibility testing implemented (why they are used and what they demonstrate)
- application of molecular and serological testing in microbiology, including the role of antigens and antibodies in disease diagnosis
- current and emerging methods of analysis for microbiology specimens
- importance of genetics in microbiology
- general criteria used for the identification of:
  - parasites
  - fungi and yeasts
  - viruses
- rationale for sample dilution and appropriate dilution selection when preparing materials for enumerating organisms and other pure culture work
- need for accurate identification of sample source (such as body site, specimen type, process line or field location)
- environmental sustainability issues as they relate to the work task

- legal, ethical and work health and safety (WHS) requirements specific to the work task including traceability, confidentiality and security requirements of all clinical information, and laboratory data and records.
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## Assessment Conditions

Skills must have been demonstrated in the workplace or in a simulated environment that reflects workplace conditions and contingencies. The following conditions must be met for this unit:

- use of suitable facilities, equipment and resources, including:
  - a standard microbiology laboratory with relevant samples; reagents; protective and physical containment equipment; sample preparation and storage equipment; test equipment, such as microscopes and counters; and sterilising equipment, such as autoclaves
  - workplace procedures, test methods and equipment manuals.

Assessors must satisfy the NVR/AQTF mandatory competency requirements for assessors.

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