



Australian Government

MSL975001 Perform microbiological tests

Release: 1

MSL975001 Perform microbiological tests

Modification History

Release 1. Supersedes and is equivalent to MSL975001A Perform microbiological tests

Application

This unit of competency covers the ability 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 plants and animals, monitor the natural environment, and to assist in the production of foods, pharmaceutical goods and other manufactured materials.

This unit of competency is applicable 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 standard operating procedures (SOPs) that will clearly describe the scope of permitted practice in modifying testing procedures, interpreting of data and for communicating test results to people outside the laboratory.

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

While no specific licensing or certification requirements apply to this unit at the time of publication, laboratory operations are governed by relevant legislation, regulations and/or external accreditation requirements. Local requirements should be checked.

Pre-requisite Unit

MSL973007 Perform microscopic examination

MSL973004 Perform aseptic techniques

Competency Field

Testing

Unit Sector

Elements and Performance Criteria

Elements describe the Performance criteria describe the performance needed to

essential outcomes.		demonstrate achievement of the element.	
1	Receive samples and process associated request forms	1.1	Check samples and request form details before they are accepted
		1.2	Return samples and request forms that do not comply with requirements to source with reasons for non-acceptance
		1.3	Log samples, recording details that allow accurate tracking and chain of custody
		1.4	Distribute samples for local testing or dispatch samples to other testing facilities
		1.5	Store samples appropriately where testing or transport is to be delayed
2	Prepare for safe microbiological work and aseptic applications	2.1	Select work area and equipment required for the safe handling of materials that may contain microorganisms of specified risk groups
		2.2	Wear protective apparel, replacing it when contamination is suspected
		2.3	Apply correct disinfection procedures to work areas before and after use
		2.4	Locate relevant emergency equipment for timely response to microbiological accidents
		2.5	Apply standard precautions when handling biological materials
		2.6	Minimise the production and release of aerosols, using biological safety cabinets where necessary
		2.7	Clean spills, and report all spills and suspected incidents to supervisor
		2.8	Wash hands before and after laboratory work and when contamination is suspected
		2.9	Ensure the safe disposal of biohazardous materials and other laboratory wastes in accordance with workplace procedures

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| 3 | Process samples for direct examination | 3.1 | Prepare thin smears of samples for subsequent staining to enable microscopic identification of cells |
| | | 3.2 | Prepare liquid films of specimens for direct observation for motility or cell structure |
| | | 3.3 | Prepare samples to concentrate material for subsequent staining or microscopy |
| | | | |
| 4 | Prepare pure cultures for microbiological work and aseptic applications | 4.1 | Select culture media to maximise growth of microorganisms and cells |
| | | 4.2 | Inoculate media aseptically, applying techniques suitable for purpose of culture |
| | | 4.3 | Incubate inoculated media in conditions to optimise growth of organisms and cells |
| | | 4.4 | Subculture on suitable media to optimise production of pure cultures |
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| 5 | Perform procedures that can assist in the identification of microorganisms | 5.1 | Select staining techniques to demonstrate required cellular characteristics |
| | | 5.2 | Stain prepared films to demonstrate diagnostically useful characteristics |
| | | 5.3 | Inoculate and incubate media with pure cultures to assist in the biochemical and immunological identification of microorganisms |
| | | 5.4 | Perform tests on pure cultures to assist in the biochemical and immunological identification of microorganisms |
| | | 5.5 | Perform antibiotic sensitivity testing, if required |
| | | | |
| 6 | Estimate the number and/or size of micro-organisms in samples | 6.1 | Count cells in undiluted samples to indicate the dilution necessary to reliably count organisms in culture |
| | | 6.2 | Prepare serial dilutions of samples aseptically for culture and colony counting |
| | | 6.3 | Count colonies for calculating number of viable |

		organisms per unit volume
	6.4	Count microorganisms in samples and cultures using spectrometric and electronic methodologies, where relevant
	6.5	Estimate and document uncertainty of measurement in accordance with workplace procedures, where relevant
7	Maintain records of laboratory work	7.1 Make entries on report forms or into computer systems, accurately calculating, recording or transcribing data as required 7.2 Maintain instrument logs as required by accreditation checklists 7.3 Maintain security and confidentiality of all clinical information, laboratory data and records

Foundation Skills

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

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Standards, codes, procedures and/or workplace requirements

Standards, codes, procedures and/or workplace requirements include the latest version of one or more of:

- Australian and international standards, guidelines and codes covering laboratory safety; competence of testing and calibration laboratories; occupational protective equipment; labelling of workplace substances; storage, handling and transport of dangerous goods; environmental management; physical containment levels and facility types; and safety cabinets
- national work health and safety (WHS) standards and codes of practice, and national measurement regulations and guidelines

- specific codes, guidelines and methods covering microbiological procedures, and small scale genetic manipulation work in accordance with gene technology regulations
- workplace documents, such as SOPs; quality procedures; equipment manuals; calibration and maintenance schedules; material safety data sheets (MSDS) and safety procedures; laboratory schedules; workplace recording and reporting procedures; waste minimisation, containment and safe disposal procedures; cleaning, hygiene and personal hygiene requirements
- instructions to comply with new legislation, standards, guidelines and codes
- sampling procedures (labelling, preparation, storage, transport and disposal)
- test procedures (validated and authorised)
- schematics, work flows and laboratory layouts

Communication

Communication includes interactions with one or more of:

- supervisors and managers (laboratory, quality and customer service)
- personnel in other laboratories in the workplace or in other workplaces to which work may be referred
- customers, patients and clients
- external auditors and accreditation agencies (e.g. National Association of Testing Authorities (NATA))

Safe work practices

Safe work practices include, but are not limited to, one or more of:

- ensuring access to service shut-off points
- recognising and observing hazard warnings and safety signs
- labelling of samples, reagents, aliquoted samples and hazardous materials
- handling and storage of hazardous materials and equipment in accordance with labelling, MSDS and manufacturer instructions
- identifying and reporting operating problems or equipment malfunctions
- cleaning and decontaminating equipment and work areas regularly using workplace procedures
- using personal protective equipment (PPE), such as gloves, safety glasses, coveralls and gowns
- using containment facilities (e.g. PCII, PCIII and PCIV physical containment laboratories), containment equipment (e.g. biohazard containers, laminar flow cabinets, Class I, II and

III biohazard cabinets) and containment procedures

WHS and environmental management requirements

WHS and environmental management requirements include:

- applying standard precautions relating to the potential infectivity of samples and materials presented for laboratory processing
- complying with WHS and environmental management requirements at all times, which may be imposed through state/territory or federal legislation. These requirements must not be compromised at any time
- applying standard precautions relating to the potentially hazardous nature of samples
- accessing and applying current industry understanding of infection control issued by the National Health and Medical Research Council (NHMRC) and State and Territory Departments of Health, where relevant

Unit Mapping Information

Release 1. Supersedes and is equivalent to MSL975001A Perform microbiological tests

Links

Companion Volume implementation guides are found in VETNet -

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

Assessment Requirements for MSL975001 Perform microbiological tests

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Performance Evidence

Evidence of competence in this unit must satisfy all of the requirements of the elements and performance criteria, and include demonstration of:

- safely performing at least five (5) microbiological tests/procedures for the culturing, isolating, identifying and counting microorganisms
- consistently and accurately describing different bacterial colony forms on common media
- preparing and staining thin smears and preparing liquid films
- estimating the number and size of microorganisms in samples
- selecting, inoculating and incubating culture media
- performing biochemical and immunological identification tests on pure cultures to assist in the of microorganisms
- not contaminating self, other people, the work area, equipment or the samples or materials under test
- not contaminating media or reagents during manipulations involving the transfer of cultures
- identifying artefacts or image aberrations attributable to misalignment or obstruction of light paths or condensers used in microscopy, or with other steps in microscopic examinations
- consistently and accurately performing Gram staining of bacteria
- accurately and concisely preparing data and documentation that is in accordance with workplace requirements
- reporting all incidents or accidents
- disinfecting any spillages and safely disposing of all contaminated materials
- decontaminating the work area upon completion of work.

Knowledge Evidence

Must provide evidence that demonstrates knowledge of:

- microbiological terminology, including bacteriology, parasitology, virology and mycology
- disinfection and sterilisation as applied to practical aspects of microbiology
- microbial diversity
- microorganisms of importance in medicine, in production of foods and other manufactured goods, and in assessment of the natural environment
- cell biology and chemistry related to laboratory phenomena, such as growth and isolation of organisms for identification

- microbial genetics
- rationale for sample dilution when preparing materials for enumerating organisms and other pure culture work (e.g. Most Probable Number (MPN) technique)
- need for accurate identification of sample source (e.g. body, specimen, process line and field location)
- relevant hazards, work health and safety (WHS) and environment requirements.

Assessment Conditions

- Judgment of competence must be based on holistic assessment of the evidence. Assessment methods must confirm consistency of performance over time, rather than a single assessment event.
- This unit of competency is to be assessed in the workplace or a simulated workplace environment. A simulated workplace environment must reflect realistic operational workplace conditions that cover all aspects of workplace performance, including the environment, task skills, task management skills, contingency management skills and job role environment skills.
- Foundation skills are integral to competent performance of the unit and should not be assessed separately.
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.
- Knowledge evidence may be collected concurrently with performance evidence or through an independent process, such as workbooks, written assessments or interviews (provided a record is kept in each case).
- This unit of competency may be assessed with:
 - MSL934002 Apply quality system and continuous improvement processes
- Holistic assessment methods include:
 - review of results/data/records generated by the candidate
 - feedback from peers and supervisors to confirm that the candidate consistently follows workplace procedures and generates results that meet workplace requirements
 - oral and/or written questions associated with laboratory determinations and record keeping
 - integrated assessment with a case study focus, such as the isolation and identification of bacterial species in a specimen containing two or more species by relating sample, cultural, morphological and biochemical data from other relevant tests and procedures.
- Access is required to instruments, equipment, materials, workplace documentation, procedures and specifications associated with this unit, including, but not limited to:
 - 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.
- Under duty of care requirements, off-the-job training providers will only use samples and organisms of a risk category compatible with their laboratory as defined in *AS/NZS 2243.3 Set:2006 Safety in laboratories*.

- Assessors must satisfy the assessor competency requirements that are in place at the time of the assessment as set by the VET regulator.
- The assessor must demonstrate both technical competence and currency.
- Technical competence can be demonstrated through:
 - relevant VET or other qualification/Statement of Attainment AND/OR
 - relevant workplace experience.
- Currency can be demonstrated through:
 - performing the competency being assessed as part of current employment OR
 - having consulted with a laboratory about performing the competency being assessed within the last twelve months.

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