



Australian Government

MSL974006 Perform biological procedures

Release: 1

MSL974006 Perform biological procedures

Modification History

Release 1. Supersedes and is equivalent to MSL974006A Perform biological procedures

Application

This unit of competency covers the ability to interpret work requirements, prepare samples, conduct pre-use and calibration checks on equipment, and perform routine biological procedures. These procedures may involve several steps and are used to classify cell types, species and biologically active compounds by analysing their biological and chemical characteristics. This unit includes data processing, interpretation of results and troubleshooting obvious departures from standard procedures.

This unit of competency is applicable to technical assistants working in the biomedical, environmental, biotechnology and education industry sectors.

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

Nil

Competency Field

Testing

Unit Sector

Elements and Performance Criteria

Elements describe the essential outcomes.

Performance criteria describe the performance needed to demonstrate achievement of the element.

1	Interpret and schedule work requirements	1.1	Review work request to identify samples, required procedures and materials/equipment/instruments involved
		1.2	Identify hazards and workplace control measures associated with the sample, preparation methods, reagents and/or equipment
		1.3	Plan parallel work sequences to optimise throughput of multiple sets of samples

2	Receive and prepare biological samples	2.1	Log samples using standard operating procedures (SOPs)
		2.2	Record sample description, compare with specification and note and report discrepancies
		2.3	Prepare samples in accordance with testing requirements
		2.4	Ensure traceability of sample from receipt to reporting of results
3	Perform techniques that assist in the classification of a cell or species	3.1	Select suitable techniques in accordance with workplace requirements and methods
		3.2	Set up and use equipment and reagents in accordance with the method
		3.3	Perform techniques in accordance with the method
4	Perform techniques that analyse biological activity	4.1	Select suitable techniques in accordance with workplace requirements and methods
		4.2	Set up and use equipment and reagents in accordance with the method
		4.3	Perform techniques in accordance with the method
5	Process and interpret data	5.1	Record test data noting atypical observations
		5.2	Construct calibration graphs and compute results for all samples from these graphs
		5.3	Ensure calculated values are consistent with expectations
		5.4	Record and report results in accordance with workplace procedures
		5.5	Estimate and document uncertainty of measurement in accordance with workplace procedures
		5.6	Interpret trends in data and/or results and report

			out-of-specification or atypical results promptly to appropriate personnel
		5.7	Determine if obvious procedure or equipment problems have led to atypical data or results
6	Maintain a safe work environment	6.1	Use established safe work practices and personal protective equipment (PPE) to ensure personal safety and that of other laboratory personnel
		6.2	Minimise the generation of waste
		6.3	Ensure the safe disposal of biohazardous wastes
		6.4	Clean, care for and store equipment and reagents as required
7	Maintain laboratory records	7.1	Record approved data into workplace system
		7.2	Maintain confidentiality and security of workplace information and laboratory data
		7.3	Maintain equipment and calibration logs in accordance with workplace procedures

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 covering the requirements for the competence of testing and calibration laboratories;

laboratory safety; quality management; volumetric glassware; chemical analysis using techniques, such as ultraviolet-visible (UV-VIS) spectrophotometry or atomic absorption spectrometry

- national work health and safety (WHS) standards and codes of practice, and national measurement regulations and guidelines
- specific codes, guidelines, procedures and methods, such as the Australian code of good manufacturing practice for medicinal products (GMP), principles of good laboratory practice (GLP), Royal Australian Chemical Institute (RACI) and/or American Association of Cereal Chemists (AACC) methods for inorganic constituents
- workplace documents, such as standard operating procedures (SOPs); quality and equipment manuals; calibration and maintenance schedules; material safety data sheets (MSDS) and safety procedures; material, production and product specifications; production and laboratory schedules; workplace recording and reporting procedures; and waste minimisation and safe disposal procedures

Techniques for preparation of samples

Techniques for preparation of samples include, but are not limited to, one or more of:

- dissection, such as preparation of thymus extracts from mice
- extraction (e.g. solvent extraction)
- filtration (e.g. filter water samples and plate the sediment onto agar plates for incubation and growth of *E. coli*)
- separation (e.g. dialysis)
- precipitation and flocculation
- centrifugation (excluding ultra centrifugation)
- chromatography, such as:
 - gel filtration chromatography (e.g. crude purification of proteins)
 - affinity chromatography (e.g. purification of immunoglobulins)
- electrophoresis, such as:
 - polyacrylamide gel electrophoresis for separation of DNA segments
 - agarose gel electrophoresis
 - capillary electrophoresis
 - gradient gel electrophoresis

Techniques to classify cells or species

Techniques to classify cells or species include, but are not limited to, one or more of:

- classification of species according to taxa
- classification of cells according to microscopic or staining characteristics

- characteristics of bacterial colonies:
 - growth on differential media
 - colony morphology (size and shape)
- biochemical reactions, such as miniaturised test strips, redox reactions and sugar tests

Techniques to analyse chemical and biological characteristics

Techniques to analyse chemical and biological characteristics include, but are not limited to, one or more of:

- staining, such as:
 - Gram stain for gram negative and positive bacteria
 - Romanowsky stain for blood films
 - Haematoxylin and Eosin for tissue sections
 - Oil red O for fatty cellular inclusions
 - spore staining
 - flagella staining
- microscopic examination, such as:
 - light
 - phase contrast
 - bright field
 - dark ground
 - enumeration
- colorimetry and spectrophotometry, such as:
 - UV-VIS
 - fluorimetric
 - infrared
 - flame emission
 - atomic absorption spectrometry
- electrochemistry, such as:
 - pH
 - ion selective electrodes and polarography (e.g. concentration of chloride ions)
- chromatography, such as:
 - column and thin layer analytical and preparative chromatography
 - gas and liquid chromatography for purity, raw material and formulation checks

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 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
- following established manual handling procedures
- reporting abnormal emissions, discharges and airborne contaminants, such as noise, light, solids, liquids, water/waste water, gases, smoke, vapour, fumes, odour and particulates, to appropriate personnel

WHS and environmental management requirements

WHS and environmental management requirements include:

- 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

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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 MSL974006 Perform biological procedures

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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) routine biological techniques that involve several steps to classify cell types, species and biologically active compounds by analysing their biological and chemical characteristics
- accurately interpreting work requirements and following test procedures and safe work practices
- safely preparing samples and using separation techniques
- conducting pre-use and calibration checks on equipment
- safely operating test equipment and instruments for qualitative and quantitative analysis in accordance with workplace procedures and manufacturer specifications
- maintaining and evaluating reagents
- processing data, estimating uncertainties, preparing calibration graphs and calculating results in appropriate units and precision
- applying basic theoretical knowledge to interpret gross features of data and making relevant conclusions
- troubleshooting obvious departures from standard procedures
- identifying atypical results as out-of-normal range or an artefact using reference material or quality control sera
- tracing and sourcing obvious causes of an artefact
- communicating problems to a supervisor or outside service technician
- recording and communicating results according to workplace procedures
- maintaining security, integrity, traceability and identity of samples, sub-samples and documentation
- safely collecting, storing and disposing of biohazardous wastes.

Knowledge Evidence

Must provide evidence that demonstrates knowledge of:

- biological principles and concepts underpinning tests and procedures associated with job role, such as:
 - chemical and biochemical characteristics of lipids, carbohydrates, nucleic acids and proteins influencing structure, function and reactivity both in vitro and in vivo

- molecular interactions within the compounds of nucleic acids and nucleotides, proteins and amino acids, carbohydrates, lipids and vitamins, influencing structure, activity, chemical reactivity and physical properties, including solubility, energy levels and emission/absorption spectra
- chemical significance of biologically significant ions, such as calcium, zinc, iron, magnesium, sodium, potassium, chloride and phosphate
- basic structure and function of organelles, cells, plant and animal tissue and organs relevant to the testing requirements
- interrelationships of biological systems (carbon cycle, energy cycle, eutrophication and the web of life)
- classification and taxonomy of organisms, such as bacteria, viruses, yeasts, single cell, multi-cellular, plants, animals, prions, helminths, prokaryotes and eukaryotes
- phases of the cell cycle
- Mendelian genetics, such as inheritance, meiosis, karyotypes, dominant and recessive traits, genotypes and phenotypes, and pedigrees
- significance of the genetic code and transcription and translation
- cell membrane activity, including diffusion (passive, facilitated and active), osmosis, tonicity and plasmolysis
- staining reactions involving acid/base, redox, complex ion formation, solubility and equilibrium
- operating principles and function of key components of the equipment and instruments used as part of job role
- effects of modifying equipment and instrument variables
- basic equipment and method troubleshooting procedures
- calculation steps to give results in appropriate units and precision
- sources of uncertainty in measurement and methods for control
- importance and appropriate use of controls and certified reference materials
- workplace and legal requirements for traceability
- relevant hazards and risks in biological laboratories, work health and safety (WHS) and environmental 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:
 - MSL924001 Process and interpret data
 - MSL974003 Perform chemical tests and procedures
- Holistic assessment methods include:
 - review of results obtained by the candidate over a period of time to ensure accuracy, consistency and timeliness
 - review of testing records and workplace documentation completed by the candidate
 - feedback from peers and supervisors about the candidate's ability to perform biological procedures safely and reliably
 - observation of candidate conducting a range of biological procedures
 - oral or written questioning of biological concepts and principles, techniques and methods and workplace procedures relevant to candidate's job role.
- Access is required to instruments, equipment, materials, workplace documentation, procedures and specifications associated with this unit, including, but not limited to:
 - a standard laboratory equipped with appropriate test equipment and instruments, safety equipment, reagents and materials
 - standard operating procedures (SOPs) and testing methods
 - records, including:
 - test calibration results
 - equipment use, maintenance and servicing history
 - faulty or unsafe equipment
 - batch number, catalogue number and use-by-date for analytical kits.
- 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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