



Australian Government

MSL974001 Prepare, standardise and use solutions

Release: 1

MSL974001 Prepare, standardise and use solutions

Modification History

Release 1. Supersedes and is equivalent to MSL974001A Prepare, standardise and use solutions

Application

This unit of competency covers the ability to prepare, standardise and monitor the quality of solutions.

This unit of competency is applicable to laboratory technicians working in all 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.

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| 1 | Prepare solutions | 1.1 | Select appropriate procedure for solution preparation |
| | | 1.2 | Select equipment, materials and solvent of specified purity |
| | | 1.3 | Measure appropriate quantities of reagents for solution preparation and record data. |
| | | 1.4 | Select and assemble specified laboratory equipment and appropriate grade of glassware |
| | | 1.5 | Perform specified dilutions |

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| | | 1.6 | Prepare solutions to achieve homogeneous mix of the specified concentration |
| | | 1.7 | Label and store solutions to maintain identity and stability |
| 2 | Standardise and use volumetric solutions | 2.1 | Assemble appropriate laboratory equipment |
| | | 2.2 | Perform serial dilutions as required |
| | | 2.3 | Standardise the solution to the required specified range and precision |
| | | 2.4 | Label and store solutions to maintain identity and stability |
| | | 2.5 | Use standard volumetric solutions to determine concentration of unknown solutions |
| 3 | Calculate and record data | 3.1 | Calculate specified concentrations |
| | | 3.2 | Use authorised procedure if data is to be modified |
| | | 3.3 | Estimate and document uncertainty of measurement in accordance with workplace procedures, as required |
| | | 3.4 | Record all relevant details according to laboratory procedures and report results |
| | | 3.5 | Report concentration with appropriate units |
| 4 | Monitor the quality of laboratory solutions | 4.1 | Check solutions for visual deterioration and expiry date |
| | | 4.2 | Re-standardise or dispose of dated or deteriorated solutions |
| | | 4.3 | Record details and label solutions according to laboratory procedures |
| 5 | Maintain a safe work environment | 5.1 | Use established safe work practices and personal protective equipment (PPE) to ensure personal safety and that of other laboratory personnel |

- 5.2 Clean up spills using appropriate techniques to protect personnel, work area and environment
- 5.3 Minimise generation of waste and environmental impacts
- 5.4 Ensure the safe collection of laboratory and hazardous waste for subsequent disposal
- 5.5 Store equipment and reagents as required

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, laboratory glassware and international system of units (SI)
- national work health and safety (WHS) standards and codes of practice, national environmental protection measures, and national measurement regulations and guidelines
- specific codes, guidelines and procedures, such as National Association of Testing Authorities (NATA) accreditation requirements, principles of good laboratory practice (GLP), and Australian code of good manufacturing practice for medicinal products (GMP)
- 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
- workplace procedures and standard methods for preparing working solutions

Solutions

Solutions may include, but are not limited to, one or more of:

- solutions of strong/weak acids and bases
- oxidising/reducing agents
- solutions used for complexometric or precipitation titrations
- stains for cells and tissues, enzymes, buffers and antibodies
- diluents for maintaining isotonicity
- organic solutions and histological fixatives

Checking useability of solutions

Checking useability of solutions includes, but is not limited to, one or more of:

- examining stained samples for correct staining reactions
- performing pH checks
- confirming enzyme activity
- checking red cell suspensions for haemolysis
- ferric chloride for phenolic solutions
- isotonicity for saline

Established safe work practices

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

- use of PPE, such as safety glasses, gloves and coveralls
- correctly labelling reagents and hazardous materials
- handling and storing hazardous material and equipment in accordance with labels, MSDS, manufacturer instructions, and workplace procedures and regulations
- regular cleaning and/or decontamination of equipment and work areas
- prompt clean-up of spills in accordance workplace procedures

WHS and environmental management requirements

WHS and environmental management requirements

- 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 MSL974001 Prepare, standardise and use solutions

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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:

- preparing and standardising at least three (3) different solutions in accordance workplace procedures and/or standard methods
- using balances and volumetric glassware accurately
- selecting and using primary and secondary standards and indicators
- performing titrations using laboratory procedures with required accuracy and precision and within required timelines
- determining equivalence points using indicators and graphical methods
- calculating the concentration of the solution with appropriate units and uncertainties given the chemical reaction for the titration
- performing quality assurance checks for solution performance
- recognising control results that are not within acceptable range
- recording and reporting results in accordance with workplace procedures
- labelling and storing solutions, safely cleaning up spills and collecting and disposing of waste in accordance with workplace procedures
- working safely at all times by following established safe work practices and using safety information and safety equipment.

Knowledge Evidence

Must provide evidence that demonstrates knowledge of:

- solution terminology
- the chemistry of acids, bases, buffers and redox reactions
- Moles and Molarity
- scientific terminology for different types of solutions
- chemical symbols and Atomic Mass
- formulae for calculating concentration
- concepts of metrology, including:
 - all measurements are estimates
 - measurements belong to a population of measurements of the measured parameters
 - precision, accuracy and significant figures
 - sources of error, uncertainty and repeatability

- traceability
- international system of units (SI)
- grades of glassware, reagents and their use
- reactions used for standardisation and desirable characteristics
- workplace procedures, standard methods and calculations used for preparing, standardising and monitoring the quality of solutions used in job role
- workplace communication and reporting procedures
- 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:
 - relevant MSL974000 series units of competency, and
 - relevant MSL975000 series units of competency dealing with sampling, tests and measurements
- Holistic assessment methods include:
 - inspection and/or testing of solutions prepared by the candidate
 - review of records and workplace documentation completed by candidate
 - review of work outputs by the candidate over time to ensure accuracy, consistency and timeliness
 - observation of the candidate preparing, standardising and using a range of solutions
 - feedback from peers and supervisors about the candidate's ability to consistently prepare and standardise solutions that are fit for purpose
 - oral/written questions about key steps in solution preparation and standardisation, calculations, common hazards and safety procedures.
- 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 reagents and equipment to prepare and standardise solutions, such as pH meters; balances; magnetic stirrers, water baths and hot plates; measuring cylinders, beakers, conical flasks, volumetric flasks, pipettes and burettes; filter papers and funnels; and fume cupboards
- standard methods and workplace procedures
- containers and storage facilities.
- 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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