



Australian Government

MSL975022 Perform food analyses

Release: 1

MSL975022 Perform food analyses

Modification History

Release 1. Supersedes and is equivalent to MSL975022A Perform food analyses

Application

This unit of competency covers the ability to analyse the nutrient and ingredient composition of foods and the identification and quantification of both chemical and biological contaminants within raw and processed foods. These tests may involve complex sample preparation followed by multi-staged and/or multi-instrumental analysis, immunoassay and computer-based nutrient analysis.

This unit of competency is applicable to laboratory technical officers and analysts working in the food and beverage processing industry sectors. All operations and analytical methods must comply with relevant standards, appropriate procedures and/or workplace requirements. The unit covers tests and procedures that are performed in a full or partially computerised and automated laboratory environment. Although a supervisor may not always be present, the technical worker will follow standard operating procedures (SOPs) that clearly describe the scope of permitted practice, including varying workplace/test procedures and communicating results to people outside the laboratory.

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

MSL974004 Perform food tests

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 | Establish client needs and | 1.1 | Liaise with client or sample provider to determine client needs and sample history |
|---|-----------------------------------|-----|--|

	schedule analysis	1.2	Record sample description, compare with specification and record and report discrepancies
		1.3	Identify non-routine samples and the possible need to vary workplace procedures
		1.4	Seek advice from supervisor about any proposed variations and document all approved changes
		1.5	Schedule analysis using workplace procedures
2	Prepare samples and standards	2.1	Obtain a representative analytical portion of the laboratory sample
		2.2	Prepare sample in accordance with testing requirements
		2.3	Prepare validation checks and/or calibration standards for analytical portion
		2.4	Use specialised procedures for ultra-trace sample and standard preparation, as required
3	Set up and optimise instrument	3.1	Perform pre-use and safety checks using workplace procedures
		3.2	Start up and condition the instrument using workplace procedures
		3.3	Optimise instrumental parameters to suit sample and test requirements
		3.4	Check calibration status of instrument and perform calibration using specified standards and procedures, as required
4	Perform analysis	4.1	Measure analyte response for standards, validation checks and samples
		4.2	Conduct sufficient measurements to obtain reliable data
		4.3	Return instruments to standby or shutdown condition as required
		4.4	Store unused/prepared laboratory samples for future

reference if required

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| 5 | Process and analyse data | 5.1 | Confirm data is the result of valid measurements |
| | | 5.2 | Perform required calculations and ensure results are consistent with standards or estimations and expectations |
| | | 5.3 | Record results with the appropriate accuracy, precision and units |
| | | 5.4 | Analyse trends in data and/or results and report out-of-specification or atypical results promptly to appropriate personnel |
| | | 5.5 | Troubleshoot analytical procedure or equipment problems which have led to atypical data or results |
| | | | |
| 6 | Maintain a safe work environment | 6.1 | Identify risks, hazards, safety equipment and control measures associated with sample handling, preparation and analytical method |
| | | 6.2 | Use personal protective equipment (PPE) and safety procedures specified for test method and materials to be tested |
| | | 6.3 | Minimise the generation of waste and environmental impacts |
| | | 6.4 | Ensure the safe disposal of laboratory waste |
| | | 6.5 | Clean, care for and store equipment and consumables in accordance with workplace procedures |
| | | | |
| 7 | Maintain laboratory records | 7.1 | Enter approved data and results into laboratory information management system (LIMS) |
| | | 7.2 | Maintain equipment logs in accordance with workplace procedures |
| | | 7.3 | Maintain security, integrity and traceability of samples and documentation |
| | | 7.4 | Communicate results to appropriate personnel |

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 design and construction, physical containment levels and facility types, laboratory safety, and quality and environmental management
- national work health and safety (WHS) standards and codes of practice, and national measurement regulations and guidelines
- Australian and international standards and guidelines covering food analyses, food microbiology, accuracy of measurement methods and results, expression of uncertainty and quantifying uncertainty
- specific codes, guidelines, procedures and methods, such as National Association of Testing Authorities (NATA) accreditation programs requirements, Australian code of good manufacturing practice for medicinal products (GMP), principles of good laboratory practice (GLP), Australia New Zealand Food Standards (ANZFS) Code and User Guides, Australian Quarantine and Inspection Service (AQIS) import and export requirements, and Therapeutic Goods Regulations
- workplace documents, such as 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; data quality procedures; workplace recording and reporting procedures; waste minimisation and safe disposal procedures; cleaning, hygiene and personal hygiene requirements; and stock records and inventory
- sampling procedures (labelling, preparation, storage, transport

and disposal)

- test procedures (validated and authorised), such as Royal Australian Chemical Institute (RACI) or American Association of Cereal Chemists (AACC) methods for colour, moisture, total ash, fats and proteins, nitrogen, fibre, microorganisms and viscosity; and Association of Analytical Communities International (AOAC International) Official Methods of Analysis

Analytical instruments

Analytical instruments include:

- spectrometric instruments, such as:
 - ultraviolet-visible (UV-VIS)
 - infrared, including Fourier transform infrared and near infrared
 - atomic absorption, including flame and flameless
 - fluorescence, flame emission, inductively coupled plasma (ICP) optical emission and inductively coupled plasma mass spectrometry (ICP-MS)
- chromatographic techniques and instruments, such as:
 - paper, such as ascending and descending
 - thin layer, such as ascending, high performance, radial and descending
 - column chromatography
 - affinity chromatography and gel filtration chromatography
 - gas liquid and gas solid chromatography
 - high performance liquid chromatography (HPLC), such as liquid-liquid (LLC), liquid-solid (LSC), ion (IC) and size exclusion (SEC)
- gas chromatography mass spectroscopy (GC-MS)
- electrophoretic techniques, such as capillary electrophoresis
- electrometric techniques, such as:
 - ion-selective electrodes
 - potentiometric titrations
 - conductometric titrations
 - amperometry
 - polarography

Sample preparation:

Sample preparation includes, but is not limited to, one or more of:

- identification of any hazards associated with the samples and/or analytical chemicals

- grinding to required particle size, milling, preparation of disks, digestion, dissolving, ashing, refluxing, extraction, filtration, evaporation, flocculation, precipitation, washing, drying, centrifugation, degassing and temperature equilibration
- culturing of microorganisms
- determination of, and if appropriate, removal of any contaminants or impurities
- ultra-trace procedures requiring high purity solvents, clean rooms, ultra clean glassware and specialised glassware

Nutrient analysis

Nutrient analysis includes, but is not limited to, one or more of:

- percentage composition of foods for major macro-nutrients, such as starch, sugars, fats, protein and fibre
- percentage composition of foods for saturated, unsaturated (mono, poly and omega3) fats and trans fatty acids
- soluble and insoluble fibre
- micro-nutrients with positive or negative health implications
- micro-nutrients that figure in Recommended Daily Intake (RDI) lists
- enzymic and immunological assays

Ingredient composition

Ingredient composition includes, but is not limited to, specification of one or more of:

- gluten-free; lactose-free; wheat-free; cholesterol; salicylates, amines; monosodium glutamate (MSG); alcohol; nuts; additives, such as maltodextrose, egg white, wheat varieties, antioxidants, flavins, soy and phytoestrogens; and glycaemic index (GI)
- probiotic claims
- genetically modified food and irradiation of foods or ingredients

Ingredient composition involved with the development of new processes, new products, and flavours

Ingredient composition involved with the development of new processes, new products, and flavours includes, but is not limited to, one or more of:

- quantitative analysis of oils in condiments and mustards
- characterisation of probiotic and prebiotic foods
- characterisation of flavins and phytoestrogens
- characterisation of starch variants, such as resistant starch
- characterisation of tannins and polyphenols in beverages

- analysis of ingredients that impart flavour and colour

Checking for contaminants

Checking for contaminants includes, but is not limited to, one or more of:

- identification of microbial contaminants
- heavy metals
- allergens
- chemical contaminants that constitute:
 - a public health risk with long-term implications, such as aflatoxin in peanuts
 - a food poisoning risk
 - spoiling of food leading to flavour changes and loss of sale

Test results

Test results contribute to, but is not limited to, one or more of:

- optimising production processes
- nutritional information
- labelling requirements
- food safety
- establishment, monitoring and troubleshooting of the hazard analysis and critical control point (HACCP) process

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's 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
- reporting abnormal emissions, discharges and airborne contaminants, such as noise, light, solids, liquids, water/wastewater, 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

Release 1. Supersedes and is equivalent to MSL975022A Perform food analyses

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 MSL975022 Perform food analyses

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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:

- analysing the nutrient and ingredient composition of foods on at least two (2) occasions
- identifying and quantifying chemical and biological contaminants within raw and processed foods on at least two (2) occasions
- accurately interpreting client requests, test methods and procedures
- safely preparing complex samples using at least three (3) different processes
- safely setting up, operating and shutting down equipment
- checking calibration and qualification status of equipment
- choosing and optimising procedures and equipment settings to suit sample and test requirements
- safely conducting multi-staged and multi-instrumental analysis, immunoassay and computer-based nutrient analysis to obtain valid and reliable data
- interpreting data, recognising atypical test data and results and making relevant conclusions
- troubleshooting common analytical procedure and equipment problems
- preparing and using calibration charts and standards
- identifying and calculating potential sources of uncertainty
- calculating analyte concentrations using appropriate equations, units, uncertainties and precision
- recording and reporting data and results using workplace procedures
- maintaining security, integrity and traceability of samples and documentation
- safely handling and storing samples and standards and disposing of waste
- following workplace safety procedures.

Knowledge Evidence

Must provide evidence that demonstrates knowledge of:

- structure, properties and nutritional value of proteins, lipids, carbohydrates, vitamins and minerals and fibre
- chemical composition of common food and beverages and the methods that can determine their composition
- key food processing and preservation techniques, packaging and controlled atmosphere storage and their effect on nutrients
- glycaemic index (GI) and its significance

- significance of digestion and absorption of macro and micro-nutrients in food and the implications of food additives and fortification on absorption of nutrients, such as fortification of milks with iron (Fe) and calcium (Ca), and breakfast cereal with Fe
- interrelationships of specific nutrient composition with public health and health promotion issues
- food labelling regulations and their implications for nutritional claims
- microorganisms responsible for food spoilage, contamination, food-borne disease, and used in food processing for preservation or probiotic application
- quality control programs for raw materials, process control and finished product inspection
- sample preparation methods and correct storage conditions for specific food samples and tests relevant to job role
- principles and concepts related to instrument operation, material preparation and testing
- function of key components and sub-system of the instrument and effects on outputs and results of modifying instrumental variables
- procedures for optimising instrument performance
- basic procedure and equipment troubleshooting techniques, equipment maintenance procedures
- calculation steps to give results in appropriate units and precision
- sources of error in specific tests and reproducibility and accuracy of commonly used test method for nutrient analysis
- workplace and legal traceability requirements
- emerging character of pharmaceutical properties of foods and probiotics
- public perception of food safety, including genetically modified foods and food irradiation
- role and methods of production of genetically modified foods in the market
- nature, structure and function of food additives
- food allergies and intolerances
- food legislation relevant for workplace
- hazard analysis and critical control points (HACCP) procedures for workplace
- relevant hazards, work health and safety (WHS) and environment requirements.

Additional specific knowledge requirements will apply for different food processing industry sectors, including dairy, grains, fruit and vegetables, meat and cereals.

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:
 - MSL925001 Analyse data and report results
- Holistic assessment methods include:
 - review of test data and results obtained by the candidate over time to ensure accuracy, consistency and timeliness of results
 - inspection of test records and workplace documentation completed by the candidate
 - observation of candidate using analytical instruments to conduct food analyses
 - feedback from clients, peers and supervisors
 - oral or written questioning of relevant principles, concepts, analytical techniques and workplace 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 with appropriate analytical instruments, laboratory reagents and equipment and samples
 - standard operating procedures (SOPs) and test methods.
- 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.

Links

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