



Australian Government

Department of Education, Employment and Workplace Relations

MSL974004A Perform food tests

Revision Number: 1

MSL974004A Perform food tests

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	This unit of competency covers the ability to interpret food test requirements, prepare samples, conduct pre-use and calibration checks on equipment and perform routine testing of raw food materials, in-process materials and final products. These tests will involve several measurement steps. The unit includes data processing and some interpretation of results and tracking of obvious test malfunctions where the procedure is standardised. However, personnel are not required to analyse data, optimise tests/procedures for specific samples or troubleshoot equipment problems where the solution is not apparent.
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Application of the Unit

Application of the unit	This unit of competency is applicable to laboratory or technical assistants and instrument operators working in the food and beverage processing industry sectors. Industry representatives have provided case studies to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. These are found at the end of this unit of competency under the section 'This competency in practice'.
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Interpret and schedule test requirements	1.1. Review test request to identify samples to be tested, test method and equipment/instruments involved 1.2. Identify hazards and enterprise controls associated with the sample, preparation/test methods, reagents and/or equipment 1.3. Plan parallel work sequences to optimise throughput of multiple sets of samples, if appropriate
2. Receive and prepare food 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 and standards in accordance with food testing requirements 2.4. Ensure traceability of samples from receipt to reporting of results
3. Check equipment before use	3.1. Set up equipment/instruments in accordance with test method requirements 3.2. Perform pre-use and safety checks in accordance with relevant enterprise and operating procedures 3.3. Identify faulty or unsafe components and equipment and report to appropriate personnel 3.4. Check equipment calibration using specified standards and procedures, if applicable 3.5. Quarantine out of calibration equipment/instruments 3.6. Ensure reagents required for the test are available and meet quality requirements
4. Test samples to determine food components and characteristics	4.1. Operate equipment/instruments in accordance with test method requirements 4.2. Perform tests/procedures on all samples and standards, if appropriate, in accordance with specified methods 4.3. Shut down equipment/instruments in accordance with operating procedures
5. Process data	5.1. Record test data noting atypical observations 5.2. Construct calibration graphs, if appropriate and compute results for all samples from these graphs 5.3. Ensure calculated values are consistent with reference standards and expectations 5.4. Estimate and document uncertainty of measurement

ELEMENT	PERFORMANCE CRITERIA
	in accordance with enterprise procedures, if required 5.5. Record and report results in accordance with enterprise 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 basic 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 to ensure personal safety and that of other laboratory personnel 6.2. Minimise the generation of wastes and environmental impacts 6.3. Ensure the safe collection of laboratory and hazardous waste for subsequent disposal 6.4. Care for and store equipment and reagents as required
7. Maintain laboratory records	7.1. Enter approved data into laboratory information management system (LIMS) 7.2. Maintain confidentiality and security of enterprise information and laboratory data 7.3. Maintain equipment and calibration logs in accordance with enterprise procedures

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Required skills include:

- using instruments for qualitative and/or quantitative analysis
- interpreting test methods and procedures
- sample preparation procedures
- performing calibration checks
- using instruments for qualitative and/or quantitative analysis
- maintaining and evaluating reagents
- troubleshooting basic equipment/method
- calculations to estimate uncertainty and produce results
- preparing calibration graphs and calculating results using appropriate units and precision
- applying theoretical knowledge to interpret gross features of data and make relevant conclusions such as identifying atypical results as out of normal range or an artefact
- tracing and sourcing obvious causes of an artefact
- recording and communicating results in accordance with enterprise procedures
- maintaining security, integrity, traceability of samples, sub-samples, test data, results and documentation

Required knowledge

Required knowledge includes:

- principles and concepts underpinning the test/procedure
- purpose of tests
- metrology techniques underpinning test/procedure including uncertainty
- principles and concepts related to equipment/instrument operation and testing
- function of key components of the equipment/instrument
- effects on the test of modifying equipment/instrument variables
- enterprise and/or legal traceability requirements
- relevant health, safety and environment requirements

Evidence Guide

EVIDENCE GUIDE	
The Evidence Guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	Assessors should ensure that candidates can: • interpret test methods/procedures accurately • prepare and test samples using procedures appropriate to the nature of sample • perform calibration checks (if required) • safely operate test equipment/instruments to enterprise standards and/or manufacturer's specification • prepare calibration graphs and calculate results using appropriate units and precision • apply basic theoretical knowledge to interpret gross features of data and make relevant conclusions • identify atypical results as out of normal range or an artefact • trace and source obvious causes of an artefact • communicate problems to a supervisor or outside service technician • record and communicate results in accordance with enterprise procedures • maintain security, integrity, traceability of samples, sub-samples, test data/results and documentation.
Context of and specific resources for assessment	This unit of competency is to be assessed in the workplace or simulated workplace environment. This unit of competency may be assessed with: • <i>MSL924001A Process and interpret data.</i> Resources may include: • standard laboratory equipped with test equipment, instruments, standards and materials • enterprise procedures and standard methods.
Method of assessment	The following assessment methods are suggested: • review of test data/results obtained by the candidate over a period of time to check accuracy, consistency and timeliness of results

EVIDENCE GUIDE

	• review of test records and workplace documentation completed by the candidate • observation of candidate conducting a range of food tests and procedures and sample preparation • feedback from peers and supervisors • oral or written questioning of food technology concepts and principles, test methods and enterprise procedures. In all cases, practical assessment should be supported by questions to assess underpinning knowledge and those aspects of competency which are difficult to assess directly. Where applicable, reasonable adjustment must be made to work environments and training situations to accommodate ethnicity, age, gender, demographics and disability. Access must be provided to appropriate learning and/or assessment support when required. The language, literacy and numeracy demands of assessment should not be greater than those required to undertake the unit of competency in a work like environment.
This competency in practice	Industry representatives have provided the case study below to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. Food processing A technician was required to conduct an analysis of the level of sorbic acid in samples of processed cheese. She/he set up and calibrated the distillation unit while the samples were prepared. The controls and samples were distilled and placed in the spectrometer at 260 nm. Readings were carefully recorded for each sample and control flask. The control sample readings at the beginning and end of the testing period were compared for any variance. The technician worked quickly and excluded light from the reactants as they were light sensitive. Analytical data was presented to the supervisor for checking and signing-off for release of the product batch prior to the results being recorded on a daily run chart for viewing by production personnel.

Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Codes of practice

Where reference is made to industry codes of practice, and/or Australian/international standards, it is expected the latest version will be used

Standards, codes, procedures and/or enterprise requirements

Standards, codes, procedures and/or enterprise requirements may include:

- Australian and international standards such as:
 - AS 1766.0-1995 Food microbiology - General introduction and list of methods
 - AS ISO 1000-1998 The international system of units (SI) and its application
 - AS ISO 17025-2005 General requirements for the competence of testing and calibration laboratories
 - AS/NZS 2243 Set:2006 Safety in laboratories set
 - AS/NZS ISO 9000 Set:2008 Quality management systems set
 - ISO/TS 19036 Set:2006 Microbiology of food and animal feeding stuffs - Guidelines for the estimation of measurement uncertainty for quantitative determinations
- Australia New Zealand Food Standards (ANZFS) Code
- Australian code of good manufacturing practice for medicinal products (GMP)
- Australian Quarantine and Inspection Service (AQIS) Export Control (Orders) Regulations 1982
- Australian Quarantine and Inspection Service (AQIS) Import Guidelines
- calibration and maintenance schedules
- data quality procedures
- enterprise recording and reporting procedures

RANGE STATEMENT	
	• equipment startup, operation and shutdown procedures • gene technology regulations • industry standards, such as Royal Australian Chemical Institute (RACI) or American Association of Cereal Chemists (AACI) methods for colour, moisture, total ash, fats and proteins, nitrogen, fibre, micro-organisms and viscosity • material safety data sheets (MSDS) • material, production and product specifications (including maximum residue levels) • national measurement regulations and guidelines • principles of good laboratory practice (GLP) • production and laboratory schedules • quality manuals, equipment and procedures manuals • SOPs and in-house methods • Therapeutic Goods Regulations 1009
Sample preparation processes	Sample preparation processes may include: • grinding • milling • preparation of discs • dissolving • ashing • refluxing • extracting • filtration • evaporation • flocculation • precipitation and centrifugation • culturing of selected micro-organisms • digestion • degassing • temperature equilibration
Principles and concepts underpinning the test/procedure	Principles and concepts underpinning the test/procedure may include: • ions, atoms, molecules, bonding, affinities and related properties

RANGE STATEMENT	
	• chemical reactions (acid/base and compleximetric) • structure and properties of proteins, lipids, carbohydrates, vitamins and minerals • food additives, flavourings and essences • nutrient value of major food groups • interaction of water with food components • microbiology, including incubation characteristics, selective media, growth stages of bacterial cultures and reference organisms • microbiology of organisms with public health significance • chemical and microbial changes in food • food preservation techniques • fermentation process • packaging and controlled atmosphere • elastic properties of materials and hardness • cohesive/adhesive forces, fluid flow and viscosity • changes of state, energy content and enthalpy change • electromagnetic spectrum and absorption, emission and refraction of light • quality control program for raw materials, process control and finished product inspection • genetically modified foods
Food tests and procedures	Food tests and procedures may include: • visual and sensory tests: • appearance, taste, texture, colour and odour of foods • melting point, boiling point and freezing point • sediments and scorched particles • foreign matter • damage to packaging and compatibility of packaging • dispersability • chemical analysis: • pH, conductivity and moisture content • solids, fats, proteins and carbohydrates

RANGE STATEMENT	
	• ash analysis and salt analysis • titratable acids, iodine values and peroxide values • enzyme activity • specific ions and active ingredients • microbiological tests and procedures: • isolation, detection, classification to genera and some species or micro-organisms • enumeration and nomenclature of desirable/non-desirable micro-organisms • propagation and maintenance of yeast, bacteria and cultures used in food processing • measurement of spoilage and contamination • sterility, hygiene and sanitation checks • optical/spectrometric tests: • ultraviolet-visible (UV-VIS) spectrophotometry • refractive index • optical rotation • physical/mechanical tests: • mass, volume, density, specific gravity and particle size • foreign matter • rheology, viscosity and gel strength • 'wetability' and 'whipability' • homogenisation • browning (sugar content) • elasticity, hardness, compressibility and strength • starch quality • thermal tests: • calorific values • stability of products • effectiveness of heat treatments
Tests	Tests may include methods for: • control of starting materials, in-process materials and finished products • health monitoring

RANGE STATEMENT	
	• basic troubleshooting of production processes
Hazards	Hazards may include: • microbiological organisms and agents associated with soil, air, water, plants, animal tissue and fluids • chemicals, such as acids, heavy metals, pesticides and hydrocarbons • aerosols from broken centrifuge tubes and pipetting • sharps and broken glassware • flammable liquids and gases • cryogenics, such as dry ice and liquid nitrogen • fluids under pressure, such as steam and industrial gases • sources of ignition • high temperature ashing processes • disturbance or interruption of services
Hazard control measures	Hazard control measures may include: • 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 enterprise procedures • using personal protective clothing and equipment, such as gloves, safety glasses, coveralls, gown, body suits and respirators • using containment facilities (PCII, PCIII and PCIV physical containment laboratories), containment equipment (biohazard containers, laminar flow cabinets, Class I, II and III biohazard cabinets) and containment procedures • following established manual handling

RANGE STATEMENT	
	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
Records	Records may include: - test and calibration results - equipment use, maintenance and servicing history - faulty or unsafe equipment
Occupational health and safety (OHS) and environmental management requirements	OHS and environmental management requirements: - all operations must comply with enterprise OHS and environmental management requirements, which may be imposed through state/territory or federal legislation - these requirements must not be compromised at any time - all operations assume the potentially hazardous nature of samples and require standard precautions to be applied - where relevant, users should access and apply current industry understanding of infection control issued by the National Health and Medical Research Council (NHMRC) and State and Territory Departments of Health

Unit Sector(s)

Unit sector	Testing
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Competency field

Competency field	
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Co-requisite units

Co-requisite units		