



Australian Government

Department of Education, Employment and Workplace Relations

MSATCM404A Undertake and interpret results of chemical analysis on metal samples

Revision Number: 1

MSATCM404A Undertake and interpret results of chemical analysis on metal samples

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor	This competency covers the selection of the appropriate chemical instrumentation test method and the interpretation of the test results in the context of a foundry. It also includes the conducting of optical emission spectroscopy (OES) testing, but not the conducting of any other tests.
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Application of the Unit

Application of the unit	This competency applies to technicians working in or advising foundries who are required to decide what test data is needed and then interpret the test results so they can make adjustments as necessary to the foundry process. It includes: • knowing what data is needed • selecting the test method(s) which will give that data • interpreting the test results • advising adjustments to the foundry process, materials, compositions based on the test results • actually undertaking optical emission spectroscopy OES (but no other) testing as required.
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Pre-requisite Units		

Pre-requisite Units		

Employability Skills Information

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

Not applicable.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Organise required test(s).	1.1. Identify information and test data required. 1.2. Select appropriate test(s) which will yield the required data. 1.3. Determine the capacity to undertake required test(s). 1.4. Confirm capacity to undertake test(s) with selected body. 1.5. Make required arrangements for testing to be carried out.
2. Undertake optical emission spectroscopy as required.	2.1. Prepare sample as required by test method. 2.2. Prepare instrument as required by procedures. 2.3. Test sample 2.4. Record and check test results 2.5. Repeat test results as required.
3. Interpret test results.	3.1. Check test results are within the expected range and take appropriate action for non-conforming results. 3.2. Perform any required calculations or data manipulations. 3.3. Determine implications of test results for process/product. 3.4. Develop actions to be taken based on test results.
4. Implement actions	4.1. Communicate required actions as required. 4.2. Follow through on communication to check implementation. 4.3. Check results of actions. 4.4. Follow up as required.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required skills:

- identify relevant spectra.
- communicate both with other technicians and also with shop floor operatives about technical matters
- Write technical reports and production specifications
- understand and interpret numeric data as well as manipulate test data in order to obtain the required information
- calculate concentrations and dilutions

The mathematics relevant to the manipulation and interpretation of test data is also required. A knowledge of the impact of chemical composition on the foundry process and product and what adjustments should be made, and how they can be made is also required.

Required knowledge:

Competence in this unit requires knowledge of the principles of operation, uses and limitations of:

- Optical Emission Spectroscopy (OES) (otherwise known as Atomic Emission Spectroscopy (AES))
- UV - Visible Spectrophotometry (UV Vis)
- Infrared Spectroscopy (IR)
- Gas Chromatography (GC)
- X-Ray Fluorescence (XRF)
- Flame Photometry
- Atomic Absorption Spectrometry (AAS)
- Scanning Electron Microscopy (SEM)
- Traditional Wet Analysis

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, the Range Statement and the Assessment Guidelines for the Training Package.

Overview of assessment

This competency requires evidence of competent operation of OES which may be obtained either in a workplace or other suitable laboratory facility. The materials being tested should be relevant to the foundry industry.

This competency also requires evidence of competency in the selection of appropriate test methods for various scenarios and the interpretation of test results. The scenarios and test results should be relevant to the foundry industry and may be drawn directly from the workplace or may be simulated case studies.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

It is essential that competence is demonstrated in the ability to:

- select appropriate test methods
- obtain repeatable OES results
- interpret test results for a foundry.

Consistent performance should be demonstrated. In particular look to see that:

- several scenarios requiring the selection of different test instruments have been completed successfully
- reproducible test results can be obtained from OES testing across different samples requiring different sample preparation/test conditions.

Relationship to other units

This unit may be assessed concurrently with other relevant units.

Assessment method and context

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the Elements, Performance Criteria and skills and knowledge. A holistic approach should be taken to the assessment.

Competence in this unit may be assessed:

- in a foundry
- in another suitable laboratory facility, using simulation for non OES evidence
- by use of a suitable simulation and/or a range of case studies/scenarios
- by a combination of these techniques.

In all cases it is expected that practical assessment will be combined with targeted questioning to assess the underpinning knowledge and

EVIDENCE GUIDE	
Resource implications	theoretical assessment will be combined with appropriate practical/simulation or similar assessment. This section should be read in conjunction with the range of variables for this unit of competency. Resources required include suitable access to an operating plant or equipment that allows for appropriate and realistic simulation. A bank of case studies/scenarios and questions will also be required to the extent that they form part of the assessment method. Questioning may take place either in the workplace, or in an adjacent, quiet facility such as an office or lunchroom. No other special resources are required.

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/standards	Where reference is made to industry codes of practice, and/or Australian/international standards, it is expected the latest version will be used.
Context	This competency applies to metallurgical technicians working in a foundry who are responsible for determining the chemical composition of materials, products and work in progress and making recommendations as to what needs to be done to produce the required product. The technician may undertake some sampling and testing themselves, and will also specify the sample requirements to be taken by an operator. The technician will be responsible for outsourcing required tests where the foundry does not have the test instrument or capability. The technician will be responsible to interpret the test results regardless of where the test is done and determine what needs to be done to make the required product.
Procedures	All operations are performed in accordance with procedures. Procedures include all relevant workplace procedures, work instructions, temporary instructions and relevant industry and government codes and standards. These may include: • ISO standards • ANZS • NATA requirements • Other relevant standards.
Tools and equipment	This unit of competency includes use of equipment and tools such as: • routine laboratory equipment such as glassware • sampling equipment used in foundries • emission spectroscopy equipment.
Test data	Test data includes: • composition and other quantitative data • component identification and other qualitative data.
Appropriate test(s)	Appropriate tests include: • Optical Emission Spectroscopy (OES)

RANGE STATEMENT	
	• UV - Visible Spectrophotometry (UV Vis) • Infrared Spectroscopy (IR) • Gas Chromatography (GC) • X-Ray Fluorescence (XRF) • Flame Photometry • Atomic Absorption Spectrometry (AAS) • Scanning Electron Microscopy (SEM).
Capacity	Capacity to undertake tests include: • possession of the appropriate test instrumentation • possession of the appropriate trained people with the available time • NATA registration if relevant • cost, turn around time and other relevant commercial factors • required infrastructure to undertake the test(s). Capacity applies both to in house and out sourced test facilities.
Body	Selected body to undertake the test includes: • university • TAFE college • commercial analytical firm • NATA approved facility • in house facility and personnel.
Required arrangements	Required arrangements include: • obtaining, labelling and transporting sample • contractual/work order or other requirements.
Prepare sample	Prepare sample includes: • taking representative sub samples • sample dissolution • sample dilution • readying the sample for the test.
Prepare instrument	Prepare instrument includes: • calibrating or checking calibration as appropriate • checking the adequacy of the supply of consumables • curve generation • setting machine conditions • checking machine function.
Actions	Actions to be taken include: • adjusting process conditions and set points

RANGE STATEMENT

	- specifying additives and combinations of additives - adjusting processing times.
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Unit Sector(s)

Unit Sector	Metallurgy
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Competency field

Competency Field	
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Co-requisite units

Co-requisite Units		