



Australian Government

MEM48009 Undertake and interpret results of chemical analysis on metal samples

Release: 1

MEM48009 Undertake and interpret results of chemical analysis on metal samples

Modification History

Release 1. Supersedes and is equivalent to MSATCM404A Undertake and interpret results of chemical analysis on metal samples

Application

This unit of competency defines the knowledge and skills required to select the appropriate chemical instrumentation test method and to interpret 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.

This unit 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.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Nil.

Competency Field

Metallurgy

Elements and Performance Criteria

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
1. Determine job requirements	1.1 Follow standard operating procedures (SOPs) 1.2 Comply with work health and safety (WHS) requirements at all times 1.3 Use appropriate personal protective equipment (PPE) in accordance with SOPs 1.4 Identify job requirements from work information
2. Organise required test(s)	2.1 Identify information and required test data

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
	2.2 Select appropriate test(s) which will yield the required data 2.3 Determine the capacity to undertake required test(s) 2.4 Confirm capacity to undertake test(s) with selected body 2.5 Arrange for testing to be carried out in accordance with SOPs
3. Undertake optical emission spectroscopy	3.1 Prepare sample by test method according to testing requirements 3.2 Prepare instrument in accordance with procedures using required tools and equipment 3.3 Test sample in accordance with test instructions 3.4 Record and check test results and repeat based on test outcomes
4. Interpret test results	4.1 Check test results are within the expected range and take appropriate action for non-conforming results 4.2 Perform any required calculations or test data manipulations 4.3 Determine implications of test results for process and/or product 4.4 Develop actions to be taken based on test results
5. Implement actions	5.1 Communicate required actions to relevant personnel 5.2 Follow through on communication to check implementation 5.3 Check results of actions and follow up based on requirements

Foundation Skills

This section describes those required skills (reading, writing, oral communication and numeracy) that are essential to workplace performance in this unit of competency.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

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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.

Procedures include one or more of the following:	- workplace procedures - work instructions - temporary instructions - relevant industry and government codes and standards including: - International Organization for Standardization (ISO) standards - Australian New Zealand Standards - National Association of Testing Authorities (NATA) requirements - other relevant standards.
Tools and equipment include one or more of the following:	- routine laboratory equipment including glassware - sampling equipment used in foundries - emission spectroscopy equipment.
Test data includes:	- composition and other quantitative data - component identification and other qualitative data.
Appropriate test includes:	- optical emission spectroscopy (OES) (otherwise known as atomic emission spectroscopy (AES)) Plus one or more of the following: - ultraviolet 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 to undertake tests includes:	- possession of the appropriate test instrumentation - possession of the appropriate trained people with the available time - NATA registration if relevant - cost, turnaround time and other relevant commercial factors - required infrastructure to undertake the test(s).
Selected body to undertake test includes one or more of the following:	- university - TAFE college - commercial analytical firm - NATA approved facility - in-house facility and personnel.
Required arrangements includes:	- obtaining, labelling and transporting sample - contractual - work order or other requirements.
Prepare sample includes one or more of the	- taking representative sub samples - sample dissolution

following:	• sample dilution • readying the sample for the test.
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 to be taken include:	• adjusting process conditions and set points • specifying additives and combinations of additives • adjusting processing times.

Unit Mapping Information

Release 1. Supersedes and is equivalent to MSATCM404A Undertake and interpret results of chemical analysis on metal samples

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2>

Assessment Requirements for MEM48009 Undertake and interpret results of chemical analysis on metal samples

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Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy the requirements of the elements and performance criteria on at least two occasions and include:

- Following work instructions, standard operating procedures and safe work practices
- Identifying relevant spectra
- Communicating both with other technicians and also with shop floor operatives about technical matters
- Writing technical reports and production specifications
- Understanding and interpreting numeric data as well as manipulating test data in order to obtain the required information
- Calculating concentrations and dilutions
- Applying mathematics relevant to the manipulation and interpretation of test data
- Applying 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
- Implementing, checking results of actions and following up, as required

Knowledge Evidence

Evidence required to demonstrate the required knowledge for this unit must be relevant to and satisfy the requirements of the elements and performance criteria and include knowledge of:

- Safe work practices and procedures and use of Personal Protective Equipment (PPE)
- 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

Assessment Conditions

- Assessors must:
 - have vocational competency in undertaking and interpreting results of chemical analysis on metal samples at least to the level being assessed with relevant industry knowledge and experience
 - satisfy the assessor requirements in the Standards for Registered Training Organisations 2015 or its replacement and comply with the National Vocational Education and Training Regulator Act 2011, its replacement or equivalent legislation covering VET regulation in a non-referring State as the case requires
- Where possible assessment must occur in operational workplace situations. Where this is not possible or where personal safety or environmental damage are limiting factors, assessment must occur in a sufficiently rigorous simulated environment that reflects realistic operational workplace conditions that cover all aspects of workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills.
- Conditions for assessment must include suitable access to an operating plant or equipment that allows for appropriate and realistic simulation and documentation including relevant workplace procedures, industry codes and standards.
- 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.

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