



# **Specific Accreditation Criteria**

## **Materials**

**Characterisation of Materials by X-Ray  
Fluorescence, Laser Induced Breakdown and  
Atomic Emission Techniques**

**June 2023**

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## **Table of Contents**

General .....	4
Quantitative testing.....	4
Qualitative testing.....	5
References.....	6
Amendment table .....	6

# **Characterisation of Materials by X-Ray Fluorescence, Laser Induced Breakdown and Atomic Emission Techniques**

This document provide interpretative criteria and recommendations for the application of ISO/IEC 17025 for both applicant and accredited facilities conducting characterisation of materials by X-ray fluorescence (XRF) and atomic emission techniques (Arc/Spark Optical Emission spectroscopy (OES) and Laser Induced Breakdown Spectrometry (LIBS)) covered by their scope of accreditation.

Applicant and accredited facilities must comply with all relevant documents in the NATA Accreditation Criteria (NAC) package for Materials (refer to NATA Procedures for Accreditation).

The clause numbers in this document follow those of ISO/IEC 17025, but since not all clauses require interpretation, the numbering may not be consecutive.

## **General**

The use of X-ray fluorescence (XRF) and atomic emission techniques (OES & LIBS) for characterising materials can be accredited either as a quantitative or qualitative (sorting or presence/absence) process, depending upon the equipment used. The nature of the corresponding accreditation criteria varies significantly between the testing technique and device capability.

Operation of equipment and interpretation of readings obtained necessitate the involvement of appropriately trained and experienced personnel who:

- have familiarity with the chemical composition of the various material types for which accreditation coverage is sought;
- have an understanding of the requirements and limitations of the method and equipment used, particularly recognising that some elements cannot be detected or quantified;
- recognise when materials are encountered which may not be able to be unambiguously determined, notwithstanding comparison with a Certified Reference Material.

## **Quantitative testing**

Advances in analytical capability have significantly improved for laboratory-based and hand-held (portable) equipment.

Using current technology, it is possible to analyse for carbon and other light elements in materials using laboratory and hand-held equipment.

Due to the variation in type, age and capability of equipment in current use, accreditation of analyses by specific equipment will be considered on a case-by-case basis.

There are extensive technical requirements for facilities accredited for quantitative techniques, including, but not limited to:

- an equipment calibration program;

- documented validation or verification data;
- measurement uncertainty; and
- access to sufficient Certified Reference Materials to cover the full analytical range for which accreditation may be granted.

Results of elemental analysis for such testing, where applicable, may be reported within the defined measurement uncertainty values.

It may also be possible to assign a 'compliance statement against a given material specification, where the method used is that nominated in the material specification.

Accreditation for quantitative analysis of materials is recognised within the scope of accreditation.

## **Qualitative testing**

Accreditation for qualitative testing is offered and usually, involves the use of hand-held (portable) equipment in the field. It is indicated within scopes of accreditation by the term 'Comparative indication of elemental content'.

Note: Setting a hand-held unit in a benchtop rig does not alter the fundamental 'portable' nature of the equipment.

For this type of testing, the material under test is often directly compared to stored spectral features of known reference materials and preferably with a side-by-side verification of Certified Reference Material of the required material.

A record of the displayed composition, representing the original data upon which any conclusion is based, shall be retained.

Analyses using hand-held or portable equipment may be applicable to certain materials but may not cover the entire range of elements or their content.

For the reasons outlined above, no positive conclusion can be drawn as to the identity of the material under test. Accordingly, the actual elemental determinations shall be reported.

The laboratory may include in the report the specification of a selected material for comparison purposes, and if required the material identified by the instrument from its database.

Reports shall not indicate compliance or noncompliance to any material specification.

A suitable disclaimer as to the capability of the instrument and indeterminate accuracy of the elemental analyses shall be included in reports. Further, the reports shall contain a statement that the inclusion of the specification and the material determined by the instrument are included for information. These are included to enable the client to determine whether the item/s under test are acceptable.

## References

This section lists publications referenced in this document. The year of publication is not included as it is expected that only current versions of the references shall be used.

### Further reading

- AS 2563      Iron ores - Wavelength dispersive X-ray fluorescence spectrometers - Determination of precision
- AS 2883      Analysis of metals - Procedures for the setting up, calibration and standardization of atomic emission spectrometers using arc/spark discharge

### NATA publications

NATA Accreditation Criteria (NAC) package for Materials

## Amendment table

The table below provides a summary of changes made to the document with this issue.

Section or Clause	Amendment
Whole document	Extensive revision to change the document type from guidance to criteria and to incorporate technological developments.  Clarification of current laboratory-based and hand held XRF & AES instrumentation capabilities