
**Microbeam analysis — Electron probe
microanalyser (EPMA) — Guidelines
for performing quality assurance
procedures**

*Analyse par microfaisceaux — Analyse par microsonde électronique
(microsonde de Castaing) — Lignes directrices pour la mise en œuvre
des procédures d'assurance qualité*

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Foreword

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Introduction

This document was developed to provide a general method for operators of electron probe microanalysers (EPMA) to perform the most complete and reliable instrument diagnostic routine possible in the smallest amount of operator time, instrument time and analysis time. Performing this procedure on their instruments at regularly scheduled intervals will allow the operator to track the quality of an instrument's elemental qualitative and quantitative performance, and alert the operator of the need for instrument service and calibration shortly after it fails to meet its operating specifications for measurement uncertainty. With equal application of this document to the diagnostics procedure of multiple instruments in a single laboratory, or even multiple instruments managed by different operators in separate laboratories, analysis results can be normalized between instruments using the performance comparison, facilitating analytical reproducibility.

The chief product of an analytical laboratory quality assurance (QA) program, ultimately, is confidence – confidence that the analysis of any specimen sent to any laboratory participating in the program will be consistent, correct within tolerance and interchangeable with equivalent analyses of related specimens performed by any other laboratory in the program. In order to maximize confidence, the QA tests and test materials chosen should evaluate the broadest possible range of instrument functionality. In the context of EPMA, this means testing not only the stability of the electron gun and the function of the photon counters, but also the functionality of every component of each wavelength spectrometer mounted to the system. This includes the numerous types of diffracting crystals that disperse the X-rays, the mechanical components that switch the spectrometer from one crystal to another, and the drive mechanisms that scan the crystal through a spectral region of interest. Since these spectrometer components can fail independently of the others, and many such failures will not be noticeable in all measurements, a complete QA test will include materials that generate X-ray lines that span the range of any diffracting crystal and methods to properly analyse them. It will therefore generate the maximum possible information on the instrument's functional integrity. From this information, instrument performance can be optimized, thereby obtaining maximum analytical confidence. The procedures and reference material attributes outlined in this document are designed to achieve these goals.

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