INTERNATIONAL STANDARD

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# Microbeam analysis — Electron probe microanalysis — Guidelines for qualitative point analysis by wavelength dispersive X-ray spectrometry

*Analyse par microfaisceaux — Analyse par microsonde électronique (Microsonde de Castaing) — Lignes directrices pour l'analyse qualitative ponctuelle par spectrométrie de rayons X à dispersion de longueur d'onde (WDX)*



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# Foreword

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The committee responsible for this document is ISO/TC 202, *Microbeam analysis*, Subcommittee SC 2, *Electron probe microanalysis*.

This second edition cancels and replaces the first edition (ISO 17470:2004), of which it constitutes a minor revision.



 

# Introduction

Electron probe microanalysis is used to qualitatively identify the elements present in a specimen on a micrometric scale. It is necessary to specify the measurement conditions and identification method in order to avoid reporting erroneous or inconsistent results.

# Microbeam analysis — Electron probe microanalysis — Guidelines for qualitative point analysis by wavelength dispersive X-ray spectrometry



## 1 Scope

This International Standard gives guidance for the identification of elements and the investigation of the presence of specific elements within a specific volume (on a $\mu m^3$ scale) contained in a specimen, by analysing X-ray spectra obtained using wavelength dispersive X-ray spectrometers on an electron probe microanalyser or on a scanning electron microscope.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 14594:2003, *Microbeam analysis — Electron probe microanalysis — Guidelines for the determination of experimental parameters for wavelength dispersive spectroscopy*

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

**3.1**
**higher order reflections**
peaks appearing at the diffracted angles corresponding to $n$ = 2, 3, 4…

Note 1 to entry: In WDS, X-rays are dispersed according to Bragg's law, $n\lambda = 2d\sin\theta$, where $\lambda$ is the X-ray wavelength, $d$ is the interplanar spacing of the diffraction crystal, $\theta$ is the diffraction angle, and $n$ is an integer. The higher order reflections are the peaks appearing at the diffracted angles corresponding to $n$ = 2, 3, 4…

**3.2**
**point analysis**
analysis in which the primary beam is fixed, thus irradiating a selected region of a sample surface

Note 1 to entry: The method where the primary beam rapidly scans over a very small region on the sample surface is also included. The maximum size of a static beam or a raster area should be chosen such that relative X-ray intensities do not change when enlarging the analysis area.

**3.3**
**Rowland circle**
<in a wavelength dispersive X-ray spectrometer> circle of focus along which the X-ray source, diffractor, and detector must all lie in order to satisfy the Bragg condition and obtain constructive interference

**3.4**
**X-ray line table**
table of X-ray lines used for qualitative analysis by EPMA

Note 1 to entry: The X-ray line table for qualitative analysis by EPMA lists the wavelengths of K-, L-, and, M-lines for the elements observed on each diffraction crystal. It can also list their relative intensities, the full width at half maximum (FWHM) of each peak, the interplanar spacings of the diffraction crystals, and the wavelengths of satellite peaks.