

Accuracy of X-ray fluorescence spectrometer in detecting porcelain



Summary of Content

X-ray fluorescence (XRF) spectrometry can accurately detect and quantify major elements in porcelain, typically achieving deviations below 15% for most oxides, with higher precision for abundant components like SiO_2 , CaO , and K_2O .

Principles of XRF for Porcelain Analysis

XRF spectrometry works by irradiating a sample with X-rays, which displace inner-shell electrons and cause the emission of characteristic fluorescent X-rays unique to each element. The energy of these X-rays allows qualitative identification, while the intensity correlates with elemental concentration, enabling quantitative analysis (Fraunhofer IBP; HORIBA; ScienceInfo). Porcelain, being primarily composed of silicates and aluminosilicates, contains elements such as Si, Al, K, Ca, and trace metals, all of which can be detected by XRF.

Accuracy and Precision

Energy-dispersive XRF (EDXRF) has been shown to provide good accuracy for major oxides in powdered ceramic-like materials, with deviations typically below 15% and relative standard deviations (RSD) ranging from 1% to 10% for major components. For highly abundant oxides like K_2O and CaO , deviations can be as low as 5%, indicating high reliability for bulk composition analysis (SCIRP study). Trace elements are more challenging due to lower signal intensity and potential matrix effects, which may reduce accuracy.

Factors Affecting Detection in Porcelain

Article Content

Handheld X-ray Fluorescence (XRF) Versus Wavelength Dispersive

Handheld X-ray Fluorescence (XRF) Versus Wavelength Dispersive XRF:
Characterization of Chinese Blue-and-White Porcelain

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Hier sollte eine Beschreibung angezeigt werden, diese Seite lässt dies jedoch nicht zu.

Portable XRF of Archaeological Artifacts: Current Research ...

Portable X-ray fluorescence (PXRF) serves as an effective, rapid and non-destructive, method for determining the

Accuracy and Precision of Energy Dispersive X-Ray Fluorescence

In this work the performance of a screening analytical method for Energy Dispersive X-Ray Fluorescence (EDXRF) analysis in terms

Accuracy vs. Precision in Handheld XRF: What's the Difference?

Accuracy and precision are essential for XRF analysis, but these terms are often misunderstood. In this blog post, we explain the

X-Ray Fluorescence Spectroscopy: Introduction, Latest ...

These developments have significantly improved XRF's accuracy, speed, and versatility, making it an indispensable

Recognition of Yuan blue and white porcelain produced in ...

Recognition of Yuan blue and white porcelain produced in Jingdezhen based on graph anomaly detection combining portable X-ray

Recognition of Yuan blue and white porcelain produced in Jingdezhen ...

Finally, we compare GRAM with state-of-the-art graph anomaly detection techniques and show that it achieves superior

Handheld XRF for Art and Archaeology

The analysis of porcelain using handheld and portable X-ray fluorescence spectrometers Anikó Bezur and Francesca Casadio 249

Scholars@Duke publication: Recognition of Yuan blue and white porcelain ...

Recognition of Yuan blue and white porcelain produced in Jingdezhen based on graph anomaly detection combining

X-ray fluorescence spectrometry for environmental analysis: Basic ...

XRF can offer rapid, non-destructive and multi-elemental analytical results with sensitivity in the range of 10–8 g

Age determination of Chinese porcelain by X-ray fluorescence and ...

In this paper, we report on the use of principal component analysis and partial least-squares regression (PLSR) for the

Using Nondestructive Portable X-ray Fluorescence Spectrometers on

The development of portable X-ray fluorescence (pXRF) instruments over the past decade, however, has allowed

PXRF Review_EGU_tracked changes

Portable X-ray fluorescence (PXRF) presents a promising alternative, offering rapid, in situ analysis with minimal sample preparation.

Microsoft Word

Portable X-ray fluorescence spectrometers, originally designed for the mining industry, are an example. These instruments are

X-ray fluorescence analysis

The measurement in helium atmosphere allows the determination of light elements (e.g., fluorine). A special software enables to

A Mini-Review on Chinese Ancient Porcelain Research: Application of ...

53 P. Zicheng and Y. Junyue, “ Determination of Chemical Composition of Hong Kong Ancient Porcelain by

X-ray fluorescence

Because the X-ray intensity follows an inverse-square law, the tolerances for this placement and for the flatness of the surface must

X-Ray Fluorescence Spectrometry: Current Status and ...

Additionally, the review addresses the capabilities of newly designed models of XRF spectrometers developed in

XRF analysis of ceramics | CRB GmbH

DIN 51418-2:2015-03 - X-ray spectrometry - X-ray emission and X-ray fluorescence analysis (XRF) - Part

A study of provenance and dating of ancient Chinese porcelain by x-ray ...

Abstract In order to extend the scope of employing major elements to study the evolution process of manufacturing

EXPRESS: Handheld X-ray Fluorescence (XRF) Versus

EXPRESS: Handheld X-ray Fluorescence (XRF) Versus Wavelength Dispersive XRF: Characterization of Chinese

X-ray Fluorescence Spectrometry

X-ray fluorescence spectrometry is well established and widely used for multi-elemental determination as a rapid, simple, and easy

X-ray fluorescence spectrometry for environmental analysis: Basic ...

1. Introduction X-ray fluorescence spectrometry (XRF) is a well-established analytical atomic technique for qualitative

Identifying Historic Ceramics: Applications of X-ray Fluorescence ...

This research tested a potential non-destructive method of ceramic identification using a portable X-ray fluorescence (pXRF)

Accuracy improvement by means of porosity assessment and

Energy Dispersive X-ray Spectrometry coupled with Scanning Electron Microscopy (SEM-EDS) and X-Ray

Handheld X-ray Fluorescence (XRF) Versus Wavelength Dispersive

Handheld XRF offers effective noninvasive analysis of Chinese porcelain, crucial for provenance studies. The study compared results

The analysis of porcelain using handheld and portable X-ray ...

Mentioning: 21 - The analysis of porcelain using handheld and portable X-ray fluorescence spectrometers - Bezur, Anikó, Casadio,

X-Ray Fluorescence Spectroscopy

X-ray fluorescence analysis has been applied to rare earth minerals and has the same sensitivity as X-ray emission and analysis

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