

Can X-ray fluorescence spectrometers be inaccurate



Overview

While it can be exceptionally accurate for certain applications—often achieving precision in the parts-per-million (ppm) range—its true accuracy is highly dependent on the instrument type, the calibration standard, the sample being analyzed, and the methodology used. The accuracy of an X-ray fluorescence (XRF) measurement is not a single, fixed value. Sample Homogeneity: XRF testing is more accurate when the sample is uniform. If the material has layers or is uneven, it could lead to less reliable results. These effects become relevant when an XRF analysis is performed directly on an investigated material. A typical example is XRF analyses of valuable and historical objects. X-ray fluorescence (XRF) is the emission of characteristic "secondary" (or fluorescent) X-rays from a material that has been excited by being bombarded with high-energy X-rays or gamma rays. When a material is illuminated with high-energy X-rays, its atoms can become excited and emit their own. The quality of X-ray spectroscopy analyzer is often expressed by the theoretical statistical error of X-ray intensity measurement. The sample preparation technology. One common pitfall occurs when using the "Precious Metals" mode on these devices, which can yield inaccurate results, falsely indicating the presence of platinum, gold, palladium, or iridium in your sample.



Article Content

Feb 03, 2026

X-Ray Fluorescence (XRF): Theory, Practice and

Discover how X-ray fluorescence (XRF) works, from its principles to real-world applications in elemental analysis. Plus, learn more about EDXRF and

Sep 27, 2025

XRF Analysis & Principle Explained | Non-Destructive

Learn how XRF works, the X-ray fluorescence principle, and why sample preparation is key to accurate elemental analysis. Discover advantages, step-by-step

Oct 14, 2025

X-ray Fluorescence Spectrometry: Principle,

The method of analyzing major and trace elements in rocks, minerals, and sediment using X-ray spectrometers is highly prevalent due to its cost

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Standard Guide to Fluorescence Instrument Calibration and

For fluorescence spectrometers with both excitation and emission monochromators, an alternative method may be used where one monochromator is scanned over the position of the other, using the

Mar 05, 2026

What is X-ray Fluorescence (XRF)

X-ray Fluorescence (XRF) is an analytical technique that uses the interaction of X-rays with a material to determine its elemental composition. XRF is suitable for

Jan 23, 2026

X-Ray Fluorescence Spectrometry: Current Status and

Abstract This review covers characteristics and potential applications of various versions of the X-ray fluorescence (XRF) spectrometry for analyzing

Jul 16, 2025

Fluorescence Spectrometers | Precision, Efficiency

Learn how fluorescence spectrometers analyze molecular composition using light emission and absorption, providing high precision and

Oct 18, 2025

X-Ray Fluorescence | XRF | Thermo Fisher Scientific

Today, X-ray fluorescence (XRF) technology is well known to provide accurate, nondestructive elemental analysis. Using XRF, researchers can achieve rapid material characterization and analysis

Sep 06, 2025

Sources of error in X-ray fluorescence spectrometer

The quality of X-ray spectroscopy analyzer is often expressed by the theoretical statistical error of X-ray intensity measurement. The stability and

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How to Reduce Fluorescence Measurement Errors

Errors related to the instruments used for fluorescence measurement, such as spectrometers or fluorimeters, can have a substantial impact on the accuracy of

Oct 08, 2025

Portable X-ray fluorescence (pXRF) as a powerful and trending ...

The work "Determination of Bromine in Regulated Foods with a Field-Portable X-Ray Fluorescence Analyser" by Anderson and colleagues also addresses the topic of optimal analysis

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

1. Introduction X-ray fluorescence spectrometry (XRF) is a well-established analytical atomic technique for qualitative and quantitative chemical analysis of environmental samples with

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X Ray Fluorescence Spectrometry

X-Ray Fluorescence Spectrometry For X-ray fluorescence spectrometry (XRF) technique an X-ray excitation source is used and, compared to SEM/EDS, it is more sensitive to higher atomic weight

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X-Ray Fluorescence Spectroscopy

X-ray fluorescence analysis (XRF) uses characteristic X-rays (called “fluorescence X-rays”) emitted under high-energy X-ray irradiation. XRF has some advantages over EPMA and EDS as follows. (1)

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Spectroscopy Accuracy | OES | Measurement Errors

What causes measurement errors within spectroscopy instruments? Read to find out plus learn ways to reduce the errors.

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AVOIDING XRF common assay mistakes

One common pitfall occurs when using the “Precious Metals” mode on these devices, which can yield inaccurate results, falsely indicating the presence of

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X-Ray Fluorescence Spectrometry: Current Status and

For example, modern technical developments enable more accurate and reliable experiments for determining fundamental atomic parameters.

Jan 11, 2026

How Accurate Is The Xrf Measurement? Unlock The True Potential Of

Accuracy, however, refers to how close a measurement is to the true, accepted value. An XRF analyzer can be very precise but consistently inaccurate if it is not calibrated correctly. Calibration is the single

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What factors were previously the most common sources of error in

Specifically, the primary challenges were the inherent sensitivity and operational stability of the instruments, which limited the accuracy and reliability of the results, particularly for trace elements.

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

X-ray fluorescence (XRF) analysis is a widely used multi-element analysis technique with numerous practical applications, especially for non-destructive procedures. Over time, steady improvements

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AVOIDING XRF common assay mistakes

In this article, we will address a critical issue – avoiding XRF (X-ray Fluorescence) assay mistakes when determining the composition of precious metals. These

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AXIOS-MAX: THEORY OF XRF

EDXRF spectrometers can be divided into spectrometers with 2D and 3D optics. Both types have a source and an energy dispersive detector, but the difference is found in the X-ray optical path.

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X-Ray Fluorescence (XRF)

X-Ray Fluorescence is an analytical technique that can be used to determine the chemical composition of a wide variety of sample types. Learn

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X-ray fluorescence

Energy-dispersive X-ray (EDX) spectrometers are different from wavelength dispersive X-ray (WDX) spectrometers in that they are smaller, simpler in design

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Uncertainty of Quantitative X-ray Fluorescence Micro-Analysis of ...

It was found that the relative uncertainty was typically about 5-10% or even higher in quantitative analyses of minor elements due to irregular shapes of surfaces. This must be considered

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Is XRF Testing Accurate?

The short answer: Yes, XRF is generally considered highly accurate, but several factors can affect the results. Sample Homogeneity: XRF testing is

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Portable x-ray fluorescence calibrations: Workflow and guidelines for ...

Raw pXRF spectra normalization and the correction of matrix effect are the most important parameters to enhance the accuracy of chemical concentration.

Jul 21, 2025

What XRF Can and Can't Analyze: A Guide for Beginners

Have you ever wondered what X-ray fluorescence (XRF) instruments can and can't analyze, or why it might be better suited for certain materials than

Feb 09, 2026

What is X-Ray Fluorescence Spectroscopy

XRF spectroscopy is widely used in a variety of industries, including mining, manufacturing, environmental monitoring, and art conservation. In this article, we

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