

# Comparison of different sample preparation techniques in the determination of Pb and Cd in a certified soil and plant material by means of Total Reflection X-ray Fluorescence Spectrometry (TXRF)

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The investigation of materials, whether of natural or anthropogenic origin, regarding their elemental composition is of great importance in many areas, e.g. university and industrial research, processing and pharmaceutical industry, or regulatory authorities.

In comparison to the Optical Emission Spectroscopy with Inductively Coupled Plasma (ICP-OES) as an established method for elemental analysis, Total Reflection X-ray Fluorescence Spectrometry (TXRF) is a promising and low cost alternative method of investigation, which has not yet reached standard status. The TXRF is generally characterized by low required sample amounts of a few micrograms or microliters, by the possibility to analyze both liquid and solid samples directly and by the measurements under air atmosphere. The detection limits for many elements are also in the lower ppb range, which makes the TXRF suitable for trace element analysis.<sup>[1]</sup>

Especially the possibility to analyze solid samples without wet chemical preparation is an advantage of this method. However, as the preparation of the suspensions is associated with certain challenges (e.g. inhomogeneity and sedimentation), further research should focus on the sample preparation.

In general, the environment of Clausthal-Zellerfeld (Germany), which has been shaped by centuries of mining, is an interesting research object. Even today, the soil is highly contaminated with heavy metals (Pb, Cd, As, among others).<sup>[2,3]</sup>

Here we are presenting the results of preparatory research for the analysis of real environmental samples from Clausthal-Zellerfeld with TXRF. Within the method validation a certified soil and plant reference material were analyzed regarding Pb and Cd contents. The performed techniques of sample preparation include the digestion with aqua regia, hydrofluoric acid and tetrafluoroboric acid, respectively, as well as the preparation of solid matter suspensions. Furthermore, the stability of the suspensions with respect to sedimentation and a related influence on the analyte content was investigated in a time-resolved manner.

## References:

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