Measuring Lead Content in Children's Toys: Comparing XRF with other Atomic Spectrometric Techniques

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The recall of toys and other children's products due to excessive lead content along with legislation such as Restriction of Hazardous Substances (RoHS, February 2003) and the Consumer Product Safety Improvement Act (CPSIA, August 2008) has resulted in increased interest in fast, reliable, quantitative methods that are fit for purpose for the determination of lead in toys and other consumer products. Flame atomic absorption spectrometry (FAAS) and inductively coupled plasma optical emission spectrometry (ICP-OES) are among the analytical techniques recommended by the Consumer Product Safety Commission for quantifying lead in paint. X-ray fluorescence (XRF) provides an alternative to these chemical methods.

Two XRF techniques, high definition x-ray spectroscopy (HDS) and handheld XRF, were compared with FAAS and ICP-OES. The sample preparation, analysis time, possible interferences, repeatability, and limit of detection (LOD) were among the parameters studied, as these must be considered when selecting an analytical method. HDS showed acceptable analytical performance, i.e., accuracy, repeatability, etc. compared to FAAS for the measurement of painted toys, but with a rapid and more economical sample analysis rate.