Rapid Quantitative Analysis of Solids by X-ray Fluorescence Spectroscopy
Using Sample Fusion and the Standard Additions Method

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An automated sample fusion method that enables quantitative elemental analysis by X-ray fluorescence (XRF) spectroscopy using the standard additions method with readily-available solution standards is described. Total sample preparation time is under 20 minutes and requires little human intervention. Solid samples are spiked with solution standards containing known concentrations of the elements of interest, fused with molten lithium borate in an electric furnace, and poured into hot platinum molds to create homogenous glass disks for XRF analysis. Sample fusion minimizes adverse effects associated with particle size, mineralogy, and matrix to yield better precision and accuracy than what can be obtained via sample pelletization. This quantitative XRF approach was developed to replace existing inductively coupled plasma (ICP) methods for which acid digestion is too difficult, slow, or labor-intensive, giving it relevance to a wide range of industrial applications.