INVESTIGATION OF THE INFLUENCE OF PARTICLE SIZE ON THE QUANTITATIVE ANALYSIS OF GLASSES BY ENERGY-DISPERSIVE MICRO X-RAY FLUORESCENCE SPECTROMETRY

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Micro X-Ray Fluorescence analyses were undertaken on individual glass particles of different compositions for selected particle sizes between 50 µm to ≥ 1mm. These experimental tests revealed a complex behaviour of the fluorescence spectra influenced by the glass matrix, topology, particle volume, energy range and poly-capillary properties, which cannot be corrected by simple approaches. Net fluorescence intensities and reproducibility measured with two different poly-capillaries (40 and 60 µm) were evaluated for six element lines between 1 and 10 keV in comparison to the same standard glasses provided as ideal specimens (i.e. flat, polished surface and of "infinite" thickness). A standardless quantification using the fundamental parameter model gave a reasonable accuracy for particle sizes ≥ 1mm (ca. 15% RSD for main elements) without further sample preparation. The feasibility of Principal Components Analysis for a fast identification of compositional types using the measurement data of individual particles was demonstrated.