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 polycapillary properties, which cannot be corrected by simple approaches. Net fluorescence intensities and reproducibility measured with two different polycapillaries (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.