# O-24 A new strategy for the quantification of light elements (F-Fe) in aluminosilicates via a Low-Z TXRF spectrometer

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Aluminosilicates are the most abundant minerals on the earth and are widely studied and exploited for both research and industrial purposes. The interest of scientists and companies is also focused on the development of new synthetic materials with an aluminosilicate matrix (geopolymers, zeolites, concretes, ceramics, composites, etc.) which can be used in several fields from food processing to space exploration. Together with mineralogical and physical investigations, chemical analysis of aluminosilicates is a crucial step in their study and characterization. Due to their abundance, sample procurement is not a problem and elemental analysis is usually performed by ICP-AES, ICP-MS, after complete mineralization of the sample, or by EDXRF and WDXRF, using 1-5 g of material. However, in some fields of research (i.e. ceramic archaeometry, material synthesis, catalysis, sorption studies, clays extraction from sediments and soils, etc.) only a very few amount of sample is usually available, and a method which could allow a reliable chemical analysis and preserve the sample as much as possible is required. A method for the elemental analysis of clays using TXRF was already developed[1] but light elements like Na and Mg could not be quantified due to the limitations of commercially available spectrometers for the analysis of light elements. However, the quantification of these two elements is very important for an exhaustive chemical characterization of aluminosilicates.

For this reason, in the present work, a new strategy for the analysis of light elements in aluminosilicates is presented. The study was carried out using a Low-Z TXRF spectrometer[2] equipped with a Cr source (30 kV, 10 mA), an Atominstitut TXRF Vacuum Chamber (1 mbar), a W/C multilayer monochromator and a SDD with an ultrathin $Si_3N_4$ window[3]. A set of six different aluminosilicate-rock reference materials was used for calibration and other three reference materials were used for validation. Samples were prepared as suspension using Ag as internal standard. In this way, all the elements from F to Ti were detected and quantified with good accuracy (80-120%). Moreover, Fe was also quantified using Lα lines. The same samples were also analyzed with a commercial TXRF (Mo source) and a WDXRF spectrometers. After the comparison of the results obtained with the three techniques, it can be concluded that the elemental concentrations determined with the Low-Z spectrometer are statistically similar to the ones obtained with the other two instruments (for the elements each of them can quantify) demonstrating the suitability of the method for the quantification of light and most important elements in samples with an aluminosilicate matrix.

**References**

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