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Introduction: Synchrotron radiation X-ray fluorescence (SR-XRF) is a method of choice to analyze fragile, unique meteoritic samples, requiring no sample preparation. It is a non-destructive, multielemental, quantitative method, easily coupled to diffraction and speciation for a detailed sample characterization. The composition of samples thicker than a few microns is however difficult to obtain due to the high attenuation of the characteristic X-rays resulting in non-detection of low-Z elements ($Z \leq 14$).

Methodology: We propose a new method of quantification by X-ray fluorescence of the low Z phases in minerals. Including these phases in the data processing allows us to improve the precision achieved on the quantification of *e.g.* volatile elements in chondrites [1-2]. Using fully polarized synchrotron beams for measuring mineral standards we have established a new relationship between the ratio of the Compton to Rayleigh scatterings and the average Z of these phases, relationship previously based on unpolarized X-rays [PhD, Berlin?]. In the present study, the non-detected effective Z is quantified by using the characteristic X-ray lines of the detected elements and the average Z of the low Z phase.

Results: We applied this method to the quantification of Cr, Mn, Fe, Ni, Cu and Zn concentrations in a fragment of the NWA 801 CR2 chondrite. The PyMCA X-ray fluorescence analysis software [4] was used for quantifying ASTIMEX mineral standards to calibrate our setup. We chose O and Si as the non-detected low Z elements, yielding the so-called "Oxycon" effective Z element. Doing so, we estimated concentrations of 200 ppm of Cu, 100 ppm of Zn and an overall concentration of 69% for Oxycon in our sample, much different from the concentrations before correction. The non-detected effective Z can be easily modified if later knowledge about the sample composition is obtained and the procedure can be repeated to obtain *e.g.* composition of carbonate or hydroxyl phases.

Our method helps quantifying undetected elements by X-ray fluorescence and improves the precision achieved on quantification of all other elements. The alternative to using our fast semi-quantitative method is to perform X-ray fluorescence tomography [5], the only elemental imaging method suited to study the bulk composition of grains a few hundred microns accross.

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