This paper describes our explorations into developing multi-element reference filters for quality assurance and characterization of X-ray Fluorescence (XRF) measurements. These reference filters have the potential to fill a gap in the currently available XRF quality assurance resources by providing known loadings in the range of interest for atmospheric aerosol measurements. The reference filters are prepared by aerosolizing a solution containing the elements of interest, drying and mixing the aerosols into a chamber, and then sampling from the chamber using the same sample collection instruments and substrate as used in aerosol sampling networks such as the Interagency Monitoring of Protected Visual Environments (IMPROVE) or Chemical Speciation Network (CSN). This method has successfully created reference filters for sulfur, chlorine, sodium, and lead. Two methods were applied to evaluate the accuracy of the elemental loadings of 28 elements measured using an Epsilon 5 EDXRF (PANalytical, The Netherlands). First, the ratios of the EDXRF measured elements-to-K and the measured elements-to-Pb on the filters were compared to the same ratios present in the certified solutions. K and Pb have been previously demonstrated to be accurately measured using EDXRF at CNL. Second, the elemental loadings on the filters were measured using collision cell ICP-MS and compared with the EDXRF results.

The ratios yielded similar results for the majority of the elements, meaning that the elemental ratios in the certified solutions are preserved on the produced filters. The EDXRF/ICP-MS ratios remained within 10% for the majority of the elements quantified by both analytical methods (see Fig.1). These multi-element filters will be analyzed at different laboratories in Europe, the US and New Zealand, using several other available techniques, i.e., EDXRF with standardless, PIXE, PIGE, AA.

![Fig.1. The median measured to expected ratios of EDXRF/ICP-MS, element/K and element/Pb](image-url)