Development of a purification method for analyses of highly siderophile elements in desilicified geological samples

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The highly siderophile elements (HSE, Ru, Rh, Pd, Re, Os, Ir, Pt, and Au) have been used as important tracers in various geological processes. Although several advanced analytical procedures have been employed for the analyses of HSE, problems remain regarding the procedures for digestion and purification. Among the digestion methods previously employed, decomposition with an oxidizing acid solution (inverse aqua regia) in Carius tubes (CT) has been widely used. However, because this method cannot extract all HSE from silicate phases, the need for a desilicification step using HF, before or after the Carius tube digestion, has been suggested [1-2]. When HF is used for sample digestion, stable fluoro complexes containing elements that lead to analytical interferences are produced. These complexes are difficult to separate from HSE using conventional ion chromatographic procedures. In this study, we optimized the purification procedure for analyses of HSE in decomposed silicate rock samples following the CT and desilicification stages. In this method, cation-exchange resin was used to remove the major cations from the sample solution, followed by three purification steps to minimize the interfering elements from Ru, Pd, Re, Ir and Pt. By this procedure, only negligible amounts of elements that would produce interference remained in the HSE solution. Using this method, the effectiveness of the desilicification step was evaluated for mafic and ultramafic reference materials. Our results indicate that the desilicification is required to better recover Re, Ru and possibly Pt from the samples.

[1] Ishikawa et al. (2014) Chemical Geology, **384**, 27-46. [2] Day et al. (2016) Geostandards and Geoanalytical Research, **40**, 49-65.