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Potassium isotopes analyses of biological samples using the MC-ICP-MS NEOMA

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Precise isotopic ratios of potassium using MC-ICP-MS was very challenging for a few decades due to argon interferences and the need of very high resolution. For about five years now, many groups have reported potassium isotopic ratios with the use of low-power plasma, the presence of a dummy bucket, the addition of a special high resolution slit or collision cells.

In this presentation, we will show the first results of potassium isotopes analyses on biological samples using the new NEOMA MC-ICP-MS (Thermofisher Scientific) instrument with three different configurations. The first was with the extra high-resolution (XHR option) and the Aridus II desolvator using samples prepared with a very fast one-step chemistry. The second configuration was with collision cell ON with also a fast one-step chemistry and the third one was with the collision cell ON and a classical two steps chemistry. The instrument was evaluated for reproducibility, sensitivity and matrix tolerance.

In the first configuration, the addition of Ca or Na at up to 15% relative to K ratio and variation of the molarity of HNO_3 from 0.1 to 0.5N lead to no variation of the ^{41}K value of the SRM-3141a standard. The sensitivity was about 35 to 40 volts for 1 ppm with a blank of about 20 mv for ^{39}K and an external reproducibility of $\leq$ 0.05‰ (2SD). The matrix tolerance of the NEOMA MC-ICP-MS was particularly good in this first configuration and better than all previously reported data. We also confirmed that sample and standard concentration should match in less than 10% to obtain accurate results. In the second and third configuration, the sensitivity was about 2300 volts for ^{39}K at 1 ppm in low resolution but the matrix tolerance was much degraded compared to the first configuration.

Two geological certified reference materials (BHVO-2, GA) were tested to check the reliability of the ion-exchange chromatography and we explored the potassium isotopic variability in biological samples by analyzing certified reference materials of organic origin (BCR383, human plasma, CE464, SRM1577c, TORT 3). All these results will be discussed in the light of the already reported $d^{41}K$ values.