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# Indirect gold trap – MC-ICP-MS coupling for Hg stable isotope analysis using a syringe injection interface.

J.E. Sonke, T. Zambardi, J-P. Toutain

Observatoire Midi-Pyrénées - Laboratoire des Mécanismes et Transferts en Géologie - UMR 5563 – CNRS/IRD/UPS Université de Toulouse III - Toulouse, France

Gold traps are part of standard instrumentation to quantitatively pre-concentrate gaseous elemental mercury, $Hg^0_{(g)}$, and are a pre-requisite for atmospheric $Hg^0_{(g)}$ analysis. High precision mercury stable isotope ratio analysis by on-line coupling of gold traps to multi collector inductively coupled plasma mass spectrometry (MC-ICP-MS) has up to now been problematic due to the transient nature of the signal. We present a new off-line technique, where amalgamated elemental $Hg^0$ is volatilized from the gold trap in an argon gas stream and temporarily stored in a large volume gas tight syringe. $Hg^0_{(g)}$ contained in the syringe is then injected on-line into an MC-ICP-MS interface using a syringe pump at a continuous flow rate and resulting in a steady state Hg signal. Different syringe injection schemes are discussed as well as matrix effects. The 2SD external precision on an in-house $Hg^0$ vapor standard was found to be 0.24 ‰ for $\delta^{202}$Hg. The method's applicability to atmospheric $Hg^0_{(g)}$ isotope analysis is illustrated for fumerole $Hg^0_{(g)}$ emissions at Vulcano Island (Italy) with $\delta^{202}$Hg of -1.74 ‰ relative to NIST SRM 3133.