The Right Tool for the I-129 Job: can Triple Quad ICPMS or Collision Cell MC-ICPMS (Proteus) Address Shortcomings of AMS and TIMS?

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Accurate detection of ^{129}I is of great interest in oceanography (N. Casacuberta *et al*., Goldschmidt 2017), nuclear waste and remediation monitoring, and spent fuel characterization. Isotopic abundances lower than ~10^{-6} in these applications continues to be challenged by spectral interferences and tailing of abundant isotopes. $^{129}I/^{127}I$ abundances are of interest down to 10^{-11} and chemical interferences abound. Thermal Ionization Mass Spectrometry (TIMS) can meet the abundance requirement for most samples, but can require heroic chemistry. Accelerator Mass Spectrometry (AMS) is typically applied in the isotopic abundance range ~10^{-10} down to ~10^{-15}. AMS is well suited to ^{129}I found in environmental samples with isotopic abundances as low as ~10^{-11}, but requires sample dilution with "dead" iodine for ^{129}I samples from contaminated sites (up to 10^{-4} abundance).

Collision cell ICPMS, both triple quadrupole and collision cell equipped MC-ICPMS instruments, potentially offer solutions to some of these challenges. Here we extend the ^{210}Pb abundance sensitivity characterizations of Proteus (Lewis *et al*, Goldschmidt 2017) to ^{129}I and compare achievable precision and accuracy with each method versus sample amount and isotopic composition.