Characterisation measurements of $^{13}C/^{12}C$ isotope amount ratios in glycine candidate reference materials by MC-ICPMS and EA-IRMS

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Natural variations in the stable isotope composition of carbon have long been used as an important tool in earth and environmental sciences. Although measurement of the isotopic composition of carbon on the relative basis is a robust and widely used approach, the knowledge of absolute carbon isotope ratios in isotopic reference materials is increasingly needed. Traceability to SI units achieved through absolute isotope ratio measurements makes possible the production of new isotopic reference materials without reliance on calibration against existing materials (certified on the VPDB scale), thereby avoiding extension of the traceability chain and the associated increase in uncertainty.

We will report a methodology for the determination of absolute $^{13}C/^{12}C$ isotope amount ratios in three glycine candidate reference materials based on the use of synthetic isotope mixtures for calibration. Synthetic isotope mixtures with accurately known and different $n(^{13}C)/n(^{12}C)$ isotope amount ratios were prepared by gravimetric weighing and mixing of two well-characterised glycine materials, each highly enriched in either the ^{12}C or ^{13}C isotope. Carbon isotope ratios in these mixtures and candidate glycine reference materials with natural isotopic composition were measured using both MC-ICPMS and EA-IRMS. The calculated calibration factors enabled the determination of $^{13}C/^{12}C$ isotope amount ratios in candidate glycine reference materials.

We will discuss the performance of both a conventional iteration procedure and a recently suggested analytical approach for calculating calibration factors, the main factors contributing to the measurement uncertainty budget, and how our re-determined $n(^{13}C)/n(^{12}C)$ isotope amount ratio of the VPDB scale zero value compares with results of previous studies.