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Sensitivity in Relation to Other Properties Required in Modern Isotope Ratio MS

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The request for sample size has strongly influenced the development of Isotope Ratio MS in the past decades resulting in a strong focus on the sensitivity of the isotope ratio MS itself.

More parameters need to be considered in isotope ratio analysis especially on small samples. Sample size always has to be related to the precision which can be reached or is mandatory to answer the respective scientific question. Hence, parameters like linearity and stability are getting very important. Here, in the combination of all three parameters basic isotope ratio MS differentiate themselves. System data will be shown to explain the different parameters.

In H/D analysis the H_3^+-Factor has a strong influence on the analytical performance. It combines to some extent stability and all types of linearity. The H_3^+-Factor has to be not only low but also very stable.

Every sample introduction technique has specific limitations at different levels. For example, the limit of GC application can be down to the sub nmol range of samples applied while the carbonate application on a GasBench is limited in the tenth of a μmol range.

In GC applications transfer rates, GC column performance, backgrounds and combustion quality define another type of sensitivity which may be called relative sensitivity. Especially background correction can contribute significantly to the performance at small signal intensities.

In multiple injection applications of gases from headspace like carbonates and water the basic isotope ratio MS performance together with the sample preparation and reaction conditions are very likely more important. Backgrounds are very low in these

applications and no conversion reaction in the interface is necessary.

Several applications as well as basic isotope ratio MS performance data will be shown.