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Oxygen stable isotope analysis with EA-IRMS at 1350˚C or 1150˚C - a comparison of methods

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The analysis of stable oxygen isotopes under pyrolytic conditions with EA-IRMS systems is a commonly applied technique. For this analysis commonly temperatures of 1350˚C or higher are applied to crack high-boiling sample material and convert the released oxygen to carbon monoxide. The high temperature above the melting point of quartz requires special reaction tubes and a special furnace which increases the price per analysis and decreases the lifetime of the instrumentation involved.

In the field of organic elemental analysis another technique is applied for the oxygen measurement successfully since many years. In this method the sample is combusted at only 1150˚C under pyrolytic conditions. The subsequent formation of carbon monoxide is done in a special quartz reaction tube with carbon black, which has a much larger surface compared to glassy carbon. Standard instrumentation can be used.

Both methods are suitable for the analysis of oxygen isotopes. However, they both have drawbacks, at the moment neither of the methods is able to analyse every sample matrix. The user has to choose the appropriate method for his application.

In this presentation we discuss the potential of both techniques, their limits and applications for isotope ratio mass spectrometry.