A high-temperature digestion apparatus for high-resolution clumped isotope analyses of siderite, magnesite and carbonate-bearing hydroxyapatite.

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Thanks to recent advances in analytical protocols it is now possible to routinely produce high resolution reconstructions of glacial-interglacial temperature changes from marine sediments by measuring the clumped isotope composition of small (100 μg) foraminifera samples [1]. However, our ability to produce high resolution Δ_{47}-based climate reconstructions is limited to carbonate minerals that can be readily digested at 70°C in on-line sample preparation devices (i.e, Kiel device). Here, we present a high-temperature apparatus (100-130 °C) that when coupled to a Kiel device can readily digest relatively phosphoric acid resistant minerals like siderite, magnesite and tooth enameloid. This device allows us to measure these minerals in micro-volume mode and to reduce the sample size requirements by more than one order of magnitude relative to traditional methods. As a proof of concept, we present high-resolution Δ_{47} measurements of Fe-carbonate phases from the well preserved Early Archean (~3.2 Ga) banded iron formations of the Moodies Group, Baberton Greenstone Belt, South Africa.

[1] Müller et al. (in press) *Rapid Comm. Mass. Spec.*