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Laboratory determination of Mg-calcite oxygen isotope fractionation at low temperatures (20-80˚C)

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The inorganic precipitation experiments from oversaturated solutions, in respect to Ca,Mg-carbonate polymorphs, lead to mixtures of Mg-calcites (3-14 mol % MgCO3) and amorphous carbonate (ACC). After 72 h the oxygen isotope fractionation between the solid carbonate phase (mixture of ACC and Mg-calcite) and water is constant. The oxygen isotope fractionation line between the solid and liquid, at low temperatures (between 20 and 80˚C), is almost parallel (in a 1000lnα vs 10ˆ6/Tˆ2 plot) to previously published data for calcite (O'Neil et al., 1969), but has significant lower values. This suggests that amorphous carbonate component may have lower oxygen isotope fractionation factors than published fractionation factors of calcite. Applying a stepwise dissolution technique and FTIR spectroscopy a calculation for the fractionation factor of the "end member" Mg-calcite is possible.