δ^{26}Mg fractionation during high temperature synthesis of dolomite

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Naturally occuring dolomite exhibets a large variability of δ^{26}Mg [1–3]. This variability may represent temporal variability of δ^{26}Mg of sea water over time, evolution of a the dolomitizing solution in space/time, and/or isotope effects related to temperature or kinetics. To constrain Mg isotope fractionation in high-temperature dolomites, we conducated a searies of hydrothermal batch experiments to dolomitize aragonite at diffrent tempratures and salinities using SO_4^{2-} and Fe free seawater. Experimental products were characterized using FTIR and mixtures of calcite+brucite; dolomite+brucite and dolomite were identified. Both the solution and precipitate were collected, Mg was sepurated using column chemistry and δ^{26}Mg values massured via a Neptuen MC-ICP-MS.

Initial results from experiments at 180ºC and 210ºC show a very weak temprature dependace of the fractionation factors at 0.7±0.1‰ and 0.6±0.1‰ respectivly. Based on field evidance from modern/recent dolomites from the Bahamas the fractionation factor at 25ºC is ~2‰, suggesting a <0.01‰/ºC temperature dependence for the fractionation of Mg isotopes during dolomitization. No significant effects of ionic strength were observed. These preliminery results suggest that the temperature-dependence of Mg isotope fractionation in dolomite is not large and that the Mg isotopic composition of the dolomitizing fluid is likely the most important control on the Mg isotopic composition of dolomite.

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