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What is the real depandncy of albite dissolution rate on deviation from equilibrium?

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One of the most significant environmental variables that affect albite dissolution rate is deviation from equilibrium (ΔGr). Most of the studies that describe the effect of ΔGr on albite dissolution rate were conducted under alkline pH (8.8-9.2), elevated temperatures (80-300°C) and for Amelia Courthouse (USA) albite. Comparison of the ΔGr function derived from those studies to the only ΔGr function under conditions of low temperature (25 °C), circum neutral pH and Evje (Norway) albite leads to different ΔGr functions. Yet, except for the study of Gruber et al. [1], rate laws for silicate minerals dissolution, which are based on experiments conducted under ambient conditions, are lacking.

Here we present new experimental results of two multi point batch experiments (MPBE) of albite dissolution in an isotopically spiked solution. The novel method that uses Si isotopes [2] enables detecting rates that otherwise can't be detected under ambient conditions. Both Amelia Courthouse albite and Evje albite dissolution rates were determined under slightly acidic pH, 25 °C, and a wide range of undersaturation conditions. The dependency of the dissolution rate on deviation from equilibrium was similar to previous studies. However, the value of $\Delta Gcrit$ was found to be significantly different for each one of the albite specimen, and consequently to two different ΔGr functions for each specimen. The new experimental results suggesting an effect of intrinsic properties of the albite specimen on the ΔGr function.

[1] Gruber, C., et al., *Resolving the gap between laboratory and field rates of dissolution*. Geochimica et Cosmochimica Acta, 2014. **147**: p. 90-106. [2] Gruber, C., et al., *A new approach for measuring dissolution rates of silicate minerals by using silicon isotopes*. Geochimica et Cosmochimica Acta, 2013. **104**: p. 261-280.