

# Calcite dissolution kinetics and mechanism depend on solution stoichiometry

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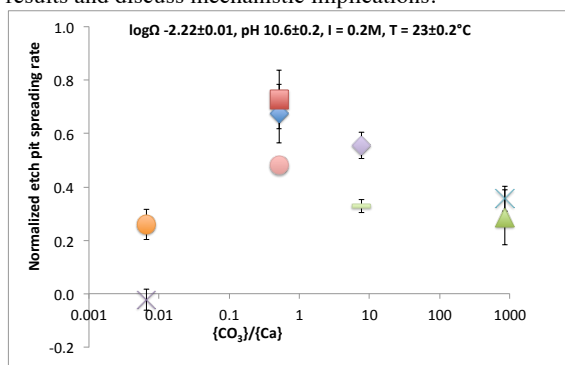
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Over the last decade, a range of independent experiments has shown that the rate at which calcite crystals grow depends on the ion activity ratio of calcium to carbonate, i.e. the solution stoichiometry [1]. Here, we report that calcite crystal dissolution also depends on the solution stoichiometry. We determined dissolution rates in bulk flow-through experiments at constant degree of undersaturation and pH at variable solution stoichiometry. We determined etch-pit spreading rates on the calcite {10-14} face at the same of conditions, using Atomic Force Microscopy (Fig. 1). We will present these results and discuss mechanistic implications.



**Figure 1:** Etch pit spreading rates normalized by etch pit spreading rates observed for the same crystals in 0.2 M NaCl matrix at  $\Omega = \{Ca^{2+}\}\{CO_3^{2-}\}/10^{-8.48} = 10^{-2.2 \pm 0.01}$ .

[1] e.g. Nehrke *et al.* (2007) *GCA* **71**, 2240--2249; Stack and Grantham (2010) *CGD* **10**, 1409-1413; Larsen *et al.* (2010) *GCA* **74**, 2099-2109; Wolthers *et al.* (2012) *GCA* **77**, 121-134; Bracco *et al.* (2012) *CGD* **12**, 3540-3548.