

## Variability in the dissolution rate of calcite: the role and chemistry and hydrodynamics

JEAN COLOMBANI<sup>1</sup>

<sup>1</sup> Université de Lyon, Université Claude Bernard Lyon 1,  
Institut Lumière Matière, campus de la Doua, F-69622  
Villeurbanne, France

The difficulty to get a reliable and reproducible dissolution rate of calcite has led to a huge number of experimental measurement of this quantity. Despite this intense activity, things are not clear yet. The most convincing source of disparity between the various measurements is the variability of the energetics of the investigated calcite surfaces: the most defects the surface holds, the faster the dissolution.

To get a comprehensive view of the situation, we have studied exhaustively the results available in the literature, taking into account the specificity of each experimental configuration. We have shown that two contributions to the dissolution rate variability have been neglected, and that they lead to an artificial increase of the dispersion of the results of one order of magnitude. First, calcite showing a mixed kinetics (both diffusion and reaction-controlled), the hydrodynamic contribution to the rate depends on the device. Secondly, the dissolution rate being measured for different ionic strengths, the chemical situation varies from one experiment to the other. Once these hydrodynamic and chemical contributions are removed from the dissolution rate, the dispersion between the available results appears to be much smaller than expected.

Obtaining thereby benchmark values of the dissolution rate of calcite will help: (i) in all studies where this quantity is needed (weathering, diagenesis, limestone degradation ...) (ii) to determine in more detail the influence of the surface morphology on this rate.

