Goldschmidt 2025 Abstract
https://doi.org/10.7185/gold2025.28122

Controls of grain microstructure on the reactive surface of carbonate powders

THÉO BRIOLET[1,2], OLIVIER SISSMANN[2], ELISABETH BEMER[2] AND JÉRÔME FORTIN[1]

[1]Laboratoire de Géologie, UMR 8538, CNRS, Ecole normale supérieure, PSL Research University
[2]IFP Energies Nouvelles

Carbonate rocks are complex to characterize comprehensively due to their complex microstructures. This study focuses on the estimation of reactive surface area, which is particularly difficult to assess. Carbonate rocks typically present a bimodal pore system including macropores and micropores. The specific surface area determined through BET analysis may not reflect the effective reactive surface as the contribution of microporosity remains unclear. This study proposes to investigate the relationship between grain structure and dissolution rates, through a series of column dissolution experiments performed on two almost pure calcite limestones ground to powders. Despite their significantly different specific surface areas, similar dissolution rates are measured for these two limestones. These seemingly opposite results are explained by the large fraction of intragranular micropores unaffected by dissolution during reactive fluid flow through powder samples. Approximating the reactive surface area by the specific surface area measured through BET analysis is therefore irrelevant in this particular case, where geometric surface area provides a better approximation of the reactive surface area but fails to account for surface roughness. We therefore propose an approach to estimate the surface roughness of the tested samples and their reactive surface area.