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Experimental investigation on the scaling of convective dissolution in porous media MARCO DE PAOLI, MOBIN ALIPOUR, ALFREDO SOLDATI, Institute of Fluid Mechanics and Heat Transfer, TU Wien — Porous media convection in Rayleigh-Bénard-type configuration is of paramount importance in many industrial and environmental applications. However, the fundamental behavior of the dissolution flux and its dependence on the system parameters are not yet well understood: Simulations and experiments give opposite indications. In particular, the results of two-dimensional Darcy simulations suggest that the dissolution rate during the convection-dominated regime is constant, whereas Hele-Shaw experiments show that it exhibits a Rayleigh-dependent behavior. With the aid of a novel experimental setup, in which the geometrical properties of the Hele-Shaw cell are varied independently, we obtain accurate measurements of solute fluxes and explain the Rayleigh-dependent character of the dissolution rate observed in previous numerical and experimental studies. Finally, we observe that non-Darcian effects (e.g. mechanical dispersion) may influence the dissolution rate in Hele-Shaw flows and possibly lead to the mismatch between experimental and numerical results.

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