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Fingering patterns induced by precipitation reactions A. DE WIT, F. HAUDIN, P. SHUKLA, F. BRAU, Université libre de Bruxelles (ULB), Nonlinear Physical Chemistry Unit, 1050 Brussels, Belgium — When reactants of a precipitation reaction are injected in a given porous medium, a fingering instability deforming the precipitation front can occur due to a change in permeability along the flow. We study the related precipitation patterns by combined experimental and theoretical work. Experiments are performed in confined geometries i.e. so-called Hele-Shaw cells consisting in two horizontal transparent plates separated by a thin gap containing a solution of one reactant B. The solution of the other reactant A is injected radially in the cell through a small hole. Upon displacement, a precipitation reaction between reactants A and B produce a solid phase C in the miscible reactive zone. We show that a wealth of different precipitation patterns (including spirals, flowers or filaments) can be observed depending on the flow rate and relative concentration of the two reactants. We discuss the relative effect of viscous fingering and of the cohesive properties of the precipitate in shaping the patterns. From a theoretical point of view, nonlinear simulations of the problem give insight into the similarities and differences between viscous fingering and precipitation-driven fingering.

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