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Gas driven displacement in a Hele-Shaw cell with chemical reaction ANDREW WHITE, THOMAS WARD, North Carolina State University — Injecting a less viscous fluid into a more viscous fluid produces instabilities in the form of fingering which grow radially from the less viscous injection point (Saffman & Taylor, Proc. R. Soc. Lon. A, 1958). For two non-reacting fluids in a radial Hele-Shaw cell the ability of the gas phase to penetrate the liquid phase is largely dependent on the gap height, liquid viscosity and gas pressure. In contrast combining two reactive fluids such as aqueous calcium hydroxide and carbon dioxide, which form a precipitate, presents a more complex but technically relevant system. As the two species react calcium carbonate precipitates and increases the aqueous phase visocosity. This change in viscosity may have a significant impact on how the gas phase penetrates the liquid phase. Experimental are performed in a radial Hele-Shaw cell with gap heights O(10-100) microns by loading a single drop of aqueous calcium hydroxide and injecting carbon dioxide into the drop. The calcium hydroxide concentration, carbon dioxide pressure and gap height are varied and images of the gas penetration are analyzed to determine residual film thickness and bursting times.

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