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Hydrodynamic Instabilities of Acid-Base Reaction Fronts: Active Role of a Color Indicator L.A. RIOLFO, C. ALMARCHA, P.M.J. TREVELYAN, NLPC, Universite Libre de Bruxelles, Belgium, C. EL HASI, A. ZALTS, UNGS, Argentina, A. D'ONOFRIO, GMP, Universidad de Buenos Aires, Argentina, A. DE WIT, NLPC, Universite Libre de Bruxelles, Belgium — Chemical reactions are able to trigger hydrodynamic flows by, for example changing the density of the solutions across the reactive interfaces. In this work we present an experimental and theoretical study of the buoyancy-driven hydrodynamic instabilities that can occur when two miscible reactive solutions of an acid-base system are put in contact in the gravity field. We compare situations where a hydrochloric acid aqueous solution is put on top of a sodium hydroxide aqueous solution with or without a color indicator (Bromocresol Green). We also analyze the situation where a hydrochloric acid is put on top of an aqueous solution of a color indicator without any base. We show that the patterns observed and the instabilities taking place strongly depend on the presence of a color indicator. Using a reaction-diffusion model for the concentrations of all species (including the color indicator) we analyze the different possible sources of destabilization of the acid-base front and explain the various instabilities observed in each experimental system.

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