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The mechanism for difference in effects of the change in viscosity by chemical reactions on viscous fingering depending on Damköhler number SHOHEI IWATA, YUICHRO NAGATSU, YUSUKE KONDO, KENJI MATSUDA, YOSHIHITO KATO, YUTAKA TADA, Nagoya Institute of Technology, Japan — In our previous study (Nagatsu et al., *J. Fluid Mech* 2007), we experimentally showed that an increase in the viscosity of the more-viscous liquid by a chemical reaction at a very high Damköhler number, Da, (defined as the ratio between a characteristic time of fluid motion and that of a chemical reaction) made viscous fingering pattern more dense. In present study, we investigated the effects of the increased viscosity caused by chemical reaction at a moderate Da on the viscous fingering in a radial Hele-Shaw cell. We observed that present reaction decreased the area occupied by the fingering pattern around the injection hole. As a result, the fingering pattern became less dense following the reaction. These results indicate that the effects of the increased viscosity by the reactions on viscous fingering pattern are different depending on Da. We discuss the mechanism for the difference based on visualization of reacting flow field by means of pH indicators.

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