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Strong sample solvent and viscous fingering effects on the dynamics of adsorbed solutes CHINAR RANA, Indian Institute of Technology Ropar, India, ANNE DE WIT, Université Libre de Bruxelles, Belgium, MICHEL MARTIN, PMMH-ESPCI, Paris, France, MANORANJAN MISHRA, Indian Institute of Technology Ropar, India — The pressure driven displacement flow in a porous medium with viscosity increasing in the direction of the flow leads to viscous fingering of the rear interface of finite samples. Sample solvent effects exist if the adsorption constant of solutes on the porous matrix depends on the solvent composition. A sample solvent stronger than the displacing fluid then leads to spatially variable retention of the solute initially dissolved in the sample. We investigate here the influence of these two effects, variable retention and viscosity contrast, on the dynamics of the solute. The continuity equation and Darcy's law coupled to convection-diffusion equations for the evolution of the sample and solute concentration are solved numerically to analyze the above phenomena. The sample viscosity and solute retention are assumed to depend exponentially on the concentration of a solute initially contained in the sample. The results demonstrate the development of two solute concentration zones, one of them being affected by the viscous fingering pattern. The effect of the fingering instability on the retained solute zone increases with an increase in the strength of the sample solvent. This, in turn, increases the spreading zone of the solute and delays the disengagement of the solute from the sample zone.

Manoranjan Mishra
Indian Institute of Technology Ropar, India

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