

Experimental Study of Contact Angle and Displacement Mechanics of Two- Phase Fluid Using Micro-Model

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Abstract

Although the solubility of non-aqueous-phase-liquid (NAPL) is low in water, decomposing NAPL is extremely difficult and portions of NAPL are toxic. Consequently, the accidental leakages of NAPL into groundwater due to improper storage have threatened the surrounding environment. The displacement mechanics of NAPL, water and air in the porous media influence the outcome and transport process of NAPL in subsurface, making this an extremely important environmental issue.

Conventional experimentation methods consider water or other contaminants fluid in porous media that always proceeds with sandy tank. However, the microscopic displacement process directly when water, contaminants and air are in a porous media simultaneously, has not been observed. Therefore, this study using transparent micro-model accompanied with digital image analysis attempts not only to observe fluids displacement in a porous media, but also to determine whether the contact angles are the same at drainage and imbibitions process. The displacement formulas are used to compare and analyze the displacement image of fluids in capillary pressure-saturation experiment.

Results of this study clearly demonstrate the various forms of displacement mechanics and its occurrence, and can also help to develop

a numerical model so that a more accurate capillary pressure-saturation curve can be estimated.

