

Noble gas push-drift-pull test considering natural degassing for site characterization in CCS field

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Environmental Impact evaluation Test (EIT) site located at Eumseong, Korea is specialized for Carbon Capture and Storage (CCS) experiment. In this study, artificial noble gas tracer was used for push-drift-pull test at EIT facility to understand the hydraulic properties of the target layer and the expected behavior of CO₂. Unlike traditional ion solute tracers, noble gases can show how multi-phase plume will move underground. Moreover, since noble gases are inert, there are no risks to take in terms of chemical hazard. During two sets of single well push-drift-pull tests, tracer solution with noble gases and salt was injected at 55~58 m depth below surface, left for 37 hours to move with ambient flow, and finally pulled back to the injection well. For the target layer, linear velocity of 1.29~1.66 m/day and effective porosity of 0.03~0.04 were calculated. Concentration loss was also found from the noble gas concentration of the tracer test samples. Understanding natural loss is important in predicting possible factors that will affect on sequestered CO₂. Degassing was one of the reduction factors and calculated to result in 15% of loss compared to injected tracer during the experiment. This study suggested that noble gas tracers are helpful in understanding the flow system of stored CO₂ at CCS field with considerations on natural degassing.

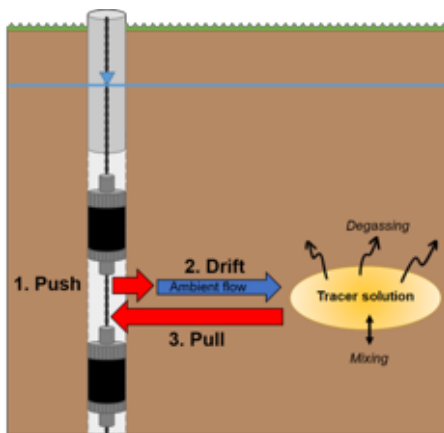


Figure 1: Conceptual figure of noble gas push-drift-pull test