Goldschmidt 2022 Abstract
https://doi.org/10.46427/gold2022.9440

A modified and rapid method for single well push-pull test using inert gas tracers

WON-TAK JOUN[1], SEUNG-WOOK HA[1], SEONGSUN LEE[1], HYUN-KWON DO[2], SEONG-CHUN JUN[3], YONGCHEOL KIM[4], YEOJIN JU[5], YEJI KIM[1] AND KANG-KUN LEE[1]

[1]Seoul National University
[2]University of Guelph
[3]GeoGreen21 Co., Ltd.
[4]Korea Institute of Geoscience and Mineral Resources
[5]Korea Atomic Energy Research Institute

Presenting Author: sablesang@snu.ac.kr

Inert gases can be used as a precursor because these are priory detected and make the breakthrough curve (BTC) before the CO_2 BTC is coming out. In addition, noble gases such as He, Ne, Ar, Kr, and Xe are useful for interpreting the CO_2 trapping mechanism by using physical partitioning equations at the diffusive flow dominant system. Several previous studies used very low concentrated inert gases that exist naturally in the environment and most of the researches have struggled at the field test for obtaining the inert gas data from the groundwater samples because the traditional method using copper tubes is strict to sample and needs expert experiences to prepare progress for analyzing it. Especially, because in the case of the push-pull test that the groundwater sampling at the beginning of the pulling stage is important to get the breakthrough curves of the mass concentration, sample methods using copper tubes are bounded to be difficult. In this study, a single well push-pull test was conducted using a new-approached method by collaborating existing methods in a relatively easier way than the traditional skill. The high concentration of gas species including SF_6, Kr, and CO_2 (g) were used as the tracers by dissolving them in the groundwater and the injecting location was around the intermediate depth aquifer (76 ~ 83 m, below ground surface) in the developed fractured zone. Data acquisition was simple at the field and the laboratory, and 10 to 15 results were analyzed within two or three days max and total 38 sample campaigns were conducted for a week. The open/closed system of this aquifer system was evaluated by using analysis based on physical diffusion dominant fraction of the noble gas clearly. In addition, it is expected that those obtained data can be utilized for applying on the analytical and numerical model research later.

Acknowledgments

1. National Research Foundation of Korea (NRF): 2021R1C1C2093498, 2020R1A6A3A01099865, and NRF-2021M2E1A1099413).

2. Korea Environment Industry & Technology Institute (KEITI): (No. 20210024800002/1485017890).