Goldschmidt 2023 Abstract
https://doi.org/10.7185/gold2023.13863

Natural 222Rn to trace the artificially injected CO2 plume in shallow groundwater system

JAEYEON KIM, SEUNG-WOOK HA, DR. WON-TAK JOUN, PHD., SEONG-SUN LEE AND KANG-KUN LEE

Seoul National University

Presenting Author: jaeyon3@snu.ac.kr

Monitoring the distribution and migration of CO2 plume in carbon capture and storage (CCS) project is important to detect potential CO2 leakage for efficient management. This study performed an artificial CO2-infused water injection experiment in shallow aquifer to evaluate the applicability of 222Rn in groundwater as a tracer. 222Rn in soil gas was generally used to identify the CO2 leakage in previous studies, however, 222Rn in groundwater was rarely used. In this study, the characteristics of 222Rn tracer were analysed focused on 1) the influence of mixing processes on the distribution of 222Rn induced by the injected CO2 infused water and 2) the influence of a carrier gas role by CO2 on the 222Rn concentrations. The results showed that the radon concentrations were mainly distributed by the horizontal and vertical mixing processes due to the water injection into shallow groundwater system. This was supported by the calculated mixing ratios of groundwater and injected water. In addition, the opposite change pattern of 222Rn concentrations compared to CO2 gas indicated no influence of CO2 as the carrier gas. Only one groundwater well (BS-9) had high positive relationship between 222Rn and TIC, suggesting the high applicability of 222Rn as the tracer. That is, this study revealed that the combined interpretation approach of the mixing and volatilization is necessary to trace the leakage of CO2, with a great potential of 222Rn in groundwater as a natural tracer for CCS project, especially performed in shallow aquifer system.

Acknowledgments: This work was supported by the National Research Foundation of Korea (NRF) grant funded by the Korea government (MSIT) (No. 2022R1A5A1085103). This work was also supported by the National Research Foundation of Korea (NRF) grant funded by the Korea government (NRF-2021R1I1A1A01041483).