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Geochemical Characteristics of Groundwater Observed Over 10 Years at a Radioactive Waste Disposal Facility

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The geochemical changes in groundwater at a radioactive waste disposal facility are crucial for evaluating the safety and long-term environmental impact of the facility. This study analyzes geochemical data accumulated over 10 years (2014-2024) at a specific radioactive waste disposal facility in South Korea, assessing variations in major ion concentrations, pH, redox potential, and electrical conductivity. The results indicate significant changes in the concentrations of major ions (Ca^{2+}, Mg^{2+}, Na^{+}, Cl^{-}, SO_4^{2-}) over time, which appear to be influenced by the geological characteristics of the disposal site and water-rock interactions.

In particular, changes in pH and redox potential are related to groundwater flow and organic matter decomposition, with distinct seasonal variations observed. Additionally, fluctuations in electrical conductivity (EC) are closely linked to rainfall and hydrological flow, suggesting that the chemical composition of groundwater may be influenced by external environmental factors such as precipitation and seawater intrusion.

This study contributes to the long-term assessment of groundwater stability in radioactive waste disposal facilities through comprehensive geochemical data analysis. The findings can be utilized for groundwater flow modeling and predicting radionuclide migration, ultimately serving as a fundamental resource for improving groundwater monitoring strategies and enhancing the safety of disposal facilities.