

Estimation of hydraulic conditions of groundwater using carbon isotope

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Groundwater flow is an indispensable information to estimate the material cycle in underground environment. Hydraulic simulation referring chemical index of groundwater enables to realize the evaluation of groundwater flow. Japan Atomic Energy Agency (JAEA) has been carried out the hydrochemical and hydraulic monitoring in sedimentary rocks and granite at Mizunami underground research laboratory (MIU) to evaluate an environmental influence around the large-scale underground facility. We studied the relationships between isotopic / chemical composition of groundwater and hydrogeological structure to infer the hydraulic condition.

The $\delta^{13}\text{C}$ value of groundwater increase with decreasing ^{14}C activity at depths between 200 - 400 m. The saturation index of minerals indicates that calcite may not dissolve in this domain. The $\delta^{13}\text{C}$ value of groundwater is probably changed by mixing of isotopically distinct groundwaters. ^{14}C activity ranges 4 to 31 pMC in relatively highly fractured domain at depths between 200 - 400 m, and ranges 2 to 16 pMC in sparsely fractured domain at the depth of 500 m of granite. It depends on difference of permeability of rock formation.

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