

Applications of Off-Axis Intergrated Cavity Output Spectroscopy (OA-ICOS) to analyze of d¹³C in Groundwater

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Carbon Isotope Analyzer (CCIA), an analyzer adopting the Off-Axis Integrated Cavity Output Spectroscopy (OA-ICOS) technology. In this study, the CCIA was tested for the analysis of d¹³C in groundwater. There are three procedures to analyze. Firstly, the gasification and capture part of CO₂ from water. Secondly, dilution and injection part. The third part is data interpretation. Standard error of the OA-ICOS through the flow through mode appeared to be ±0.5%. For the samples of Evian and Pyeongchang water, d¹³C values of IRMS are -12.3, -17.1‰ and OA-ICOS are -1.8, -6.4‰, respectively. Results of IRMS and OA-ICOS analysis show relatively consistent difference of approximately -10.6%. Accuracy of CCIA analysis compared with the IRMS results is not validated in this study. For this accuracy issue, three hypotheses were set up: (1) difference analysis method between IRMS and OA-ICOS, (2) relation of CO₂ gas in the atmosphere and that from DIC (Dissolved Inorganic Carbon) in groundwater, (3) insufficient number of tested samples. Further study is needed to validate the accuracy of CCIA.

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