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Evaluating Holding Time for Stable Pb Isotope Analyses in Groundwater Samples

Martins VTS¹, Babnski M¹, Ruis IR¹

¹University of São Paulo - Geoscience Institute

Tracing groundwater contamination is an important part of the assessment and management of water resources. Pb isotopes have been used as environmental indicators of water contamination and may help identify the contamination sources. A very important part of these studies success is the care during collection, preservation and storage of the samples, in order to avoid cross contamination and ensure the validity of the results. Some inorganic chemical parameters in water have an expiration date of hours, days or months, but there is no information available for Pb isotopes. In order to evaluate the holding time for Pb isotopes analyses in groundwater samples, samples collected from the same well were analyzed, after storage for three different periods (1 day, 1 month and seven years). All samples were collected by low flow method, in low-density linear polyethylene 500 mL bottles that had been previously cleaned by acid washing techniques. During field sampling, bottles were rinsed three times with sample water before collection. Filtration was done less than 10 hours after collection at the laboratory under a class-100 laminar flow hood, using an acid cleaned polysulfone filter holder with receiver connected to a vacuum line. Cellulose acetate membranes of 0,45 mm and 47 mm

diameter were used. The results showed that the Pb isotopic ratios do not vary with time. The $^{207}\text{Pb}/^{206}\text{Pb}$ ratio for the sample stored for 1 day is 0.866, which is the same ratio obtained for the samples stored for 1 month and seven years. The $^{208}\text{Pb}/^{206}\text{Pb}$ ratios present a small variation, between 2.101 and 2.104, which is lower than the standard deviation average for these samples. Lead concentrations for samples collected in October and December are between 0.203 and 0.261 $\mu\text{g/L}$, whereas samples collected in April pointed value between 0.467 and 0.516 $\mu\text{g/L}$. The sample collected in December 2004 was analyzed one year and four months later and then seven years later. These results showed that occurred an increment of less 23%, indicating that the holding time may influence the lead concentration, but does not interfere on the Pb stable isotopic ratios.

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