

Modification of ammonium diffusion method for $\delta^{15}\text{N}$ analysis and application for contaminated groundwater in Nepal Kathmandu Valley

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The objectives of this study are to improve analysis methods of ammonia isotope and to apply for pollution source analysis of the environmental water sample. The target analysis is the groundwater of Nepal Kathmandu Valley. In this area, the dependence rate on groundwater is more than half of the total water demand, and there are many spots of exceed the ammonia standard value.

Ammonia isotope analysis of this study is a modification of the ammonia diffusion method of Holmes et al (1998). We succeeded in shortening the ammonium diffusion time from 14 days (original method) to 5 days. Ammonium concentrations were detected in the range of 2.0~17.1mg/L (n=9) and 1.8~15.3mg/L (n=6) from shallow dug well and shallow tube well, respectively. $\delta^{15}\text{N-NH}_4$ was 2.1~23.3‰ (n=9) and 1.2~3.8‰ (n=6) from shallow dug well and shallow tube well, respectively. According to the previous studies, wastewater (human origin) has $\delta^{15}\text{N-NH}_4=24\sim 40\%$ (Ambio, 2004) and lake sediment (natural origin) has $\delta^{15}\text{N-NH}_4=-3.4\sim +2.1\%$ (Vreca&Muri, 2006). These results suggest that the main source of ammonium contamination is soil and mixture of soil and wastewater for shallow tube wells and dug wells, respectively.

Keywords: Nitrogen isotope in ammonia, Groundwater, Kathmandu Valley