

# Development of a sampling method for the simultaneous collection of NO and NO<sub>2</sub> in the air for isotopic analysis of emitted NO<sub>x</sub>

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Nitric oxide (NO) and nitrogen dioxide (NO<sub>2</sub>) are collectively referred to as nitrogen oxide (NO<sub>x</sub>). NO<sub>x</sub> is a primary pollutant of the atmosphere and is involved in urban environmental issues such as photochemical smog, acid rain, the production of tropospheric ozone, and human health. To understand the mechanisms of these issues, it is important to elucidate the sources of NO<sub>x</sub>. Nitrogen isotopic composition of NO<sub>x</sub> is a useful tool to estimate the sources and sinks. Although there are various methods for measuring the nitrogen isotopic composition of NO<sub>x</sub>, the NO<sub>x</sub> collection efficiency of each method has not been fully validated. Therefore, a simple and well-verified method for NO<sub>x</sub> collection efficiency is required.

Several methods have been reported to collect atmospheric NO<sub>x</sub>. In this study, we adopted the wet method reported by Fibiger et al. (2016). Atmospheric NO<sub>x</sub> can be efficiently collected at high flow rates using their method. On the other hand, there is the disadvantage of the large blank of nitrite/nitrate ions in the solution. We improved the method and developed a simpler, more efficient method with less NO<sub>x</sub> blanks. By using the developed method, the nitrogen isotopic composition of NO<sub>x</sub> can be measured with a precision within ±1‰, and the blank of nitrite/nitrate ions in the solution can be reduced to 1/10 compared to the original method. We present the details of the developed method and the nitrogen isotopic composition of NO<sub>x</sub> collected in Tsukuba and Shibuya.

## Reference

Fibiger, D. L., Hastings, M. G., Lew, A. F., and Peltier, R. E. Collection of NO and NO<sub>2</sub> for Isotopic Analysis of NO<sub>x</sub> Emissions, *Anal. Chem.* 2014, 86, 24, 12115–12121.

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