

AAS001-P11

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## Triple oxygen isotope analysis of N<sub>2</sub>O using microwave-discharge method

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Recently, oxygen isotope anomaly in N<sub>2</sub>O, which does not follow the relationship of  $d^{17}\text{O} = 0.5d^{18}\text{O}$ , was discovered in the lower stratosphere and the troposphere [Cliff et al., 1997,1999; Kaiser et al., 2003; Rockmann et al., 2001].  $d^{17}\text{O}$  of N<sub>2</sub>O has been measured by thermal decomposition of N<sub>2</sub>O to O<sub>2</sub> with a gold catalyst [Cliff et al., 1994; Kaiser et al., 2007; Komatsu et al., 2008]. However, this method requires more than 20 nmol of N<sub>2</sub>O and therefore it is not applicable to the limited amount (< 1 LSTP) of atmospheric samples. In this study, a new method using microwave discharge to decompose N<sub>2</sub>O will be developed for triple oxygen isotope analysis of trace N<sub>2</sub>O.

At first, N<sub>2</sub>O (< 200 nmol) was decomposed by microwave discharge in a closed system with adjusted conditions such as gas pressures, microwave power, and discharge time. Produced N<sub>2</sub>, O<sub>2</sub> and NO<sub>x</sub> (NO and NO<sub>2</sub>) were measured with GC-TCD and O<sub>2</sub> yield and N<sub>2</sub>/O<sub>2</sub> ratio were calculated. At second, N<sub>2</sub>O in the helium flow was decomposed by the microwave-discharge method and oxygen isotope ratios (33/32 and 34/32) were measured with continuous-flow isotope-ratio mass spectrometry.

In the first experiment, O<sub>2</sub> yield was up to 90% and the proportion of N<sub>2</sub>/O<sub>2</sub> was approximately equal to 2:1, which is expected from the stoichiometry of the decomposition reaction. However, no relationships were obtained between experimental results and tested discharge conditions. In the second experiment, decomposition of N<sub>2</sub>O in the helium flow was confirmed. We are currently optimizing experimental conditions for high O<sub>2</sub> yield and measuring the oxygen isotopic composition of the O<sub>2</sub> product.

Keywords: N<sub>2</sub>O, isotope, oxygen isotope composition, microwave discharge