

## Setting up of oxygen extraction system for stable isotope analysis of silicate minerals.

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The mass spectrometers at Niigata University (Finnigan MAT-251 and Thermo MAT-253) are capable of measuring stable isotope composition of carbon dioxide for ultra-small volume (<0.1 micro moles) and with high precision (<0.1 ‰). In this study, we developed a system for high precision analysis of oxygen isotope composition of small volume silicate minerals. The new sample preparation line was installed that comprises of three main parts. 1) the reaction chamber; 2) the gas purification line, and 3) O<sub>2</sub>-CO<sub>2</sub> converter.

The reaction chamber separate oxygen from silicate minerals by reacting with the fluorine released from CoF<sub>3</sub> at 700°C. After purification of the released oxygen with liquid nitrogen, the gas is passed through KBr trap to remove the excess fluorine. Pure oxygen gas is then allowed to react with graphite at 750°C, to form carbon dioxide, which is used to measure oxygen isotopes using mass spectrometer.

A technique has been developed in which CoF<sub>3</sub> is used as a reagent for quantitative liberation of oxygen from oxides and silicates. By doing several trial experiments, the background in the reaction line was reduced by preheating of KBr trap, the converter and respective filters. For the converter, it was found that good reproducibility can be obtained at 750 °C and 30 minutes of reaction time. Analysis and measurement of NBS-28 quartz standard reference material were performed, but in this study it was unable to get good reproducibility. The possible reasons and remedies are discussed in detail. The possible candidates that contaminate oxygen are water vapor that instantaneously react with CoF<sub>3</sub>, reaction of fluorine gas with adsorbed water inside the vacuum line or fractionation of oxygen during transportation inside the line. Further improvements in preparation procedure are being carried out.