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Development of analytical methods for stable and radiogenic isotope geochemistry of strontium using MC-ICPMS

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The study of naturally occurring isotopic fractionation of Sr has a potentially significant influence in geochemical research fields combined with traditional studies using radiogenic isotopes as a tracer, because information on isotopic fractionation may provide another constraint on a producing process of a product. In this study, we have developed a new method of precise isotopic analysis to investigate both of mass dependent isotopic fractionation and radiogenic isotope variations for Sr. In order to detect the small isotopic fractionation, the mass discrimination effect on Sr isotopes was externally corrected by Zr. Isobaric interferences and matrix elements were chemically eliminated by an extraction chromatography procedure using Sr Spec. resin. The $^{88}Sr/^{86}Sr$ and radiogenic $^{87}Sr/^{86}Sr$ data were expressed as the relative deviations from the same ratios for isotopic standard reference material (Sr NBS987) in terms of delta notations (δ) and epsilon notations (ε), respectively.

$\delta^{88}Sr = [(^{88}Sr/^{86}Sr)_{sample}/(^{88}Sr/^{86}Sr)_{standard} - 1]*1000$

$\varepsilon^{87}Sr = [(^{87}Sr/^{86}Sr)_{sample}/(^{87}Sr/^{86}Sr)_{standard} - 1]*10000$

Reproducibility of measurements was evaluated by repeated analysis of Sr NBS987 and a high purity reagent Sr solution (Kanto Chemicals). The resulting $\delta^{88}Sr$ was 0.29 +/- 0.06 (2SD, n=20), suggesting that the regent Sr (Kanto Chemicals) and/or Sr NBS987 were isotopically fractionated during formation processes of the source material in nature or manufacturing processes. The resulting $\varepsilon^{87}Sr$ was -23.0 +/- 0.7 (2SD, n=20), indicating that their sources were different from each other. In this presentation, Sr isotopic data for several geochemical samples will be shown.