Determination of stable chlorine isotopes by UV-LA-MC-ICP-MS and its application to halite and igneous rock samples -2-

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We developed a new rapid high-precision determination method of chlorine isotope ratios in AgCl pellet formed from seawater and igneous rock samples [1]. This method is applicable to solid, liquid, and gas samples when AgCl precipitation is available. Chlorine in liquid samples, such as seawater and pore water, are precipitated as AgCl by addition of $AgNO_3$. Solid samples, such as igneous rocks, chlorine is collected in deionized water using pyrohydrolysis followed by precipitation of AgCl from it.

The method is effective for solutions with high chlorine contents. Both the repeatability and laboratory bias of IAPSO standard seawater was $\delta^{37}Cl$ = 0.00 ±0.09‰ 2SD (2 standard deviations) (n=5) [1]. The result shows homogeneity of the AgCl pellet from IAPSO liquid. For low chlorine content solutions, however, repeatability of $\delta^{37}Cl$ value is inferior. The $\delta^{37}Cl$ values from igneous rock standards JB-1 and JB-3 varied ±0.4‰ 2SD from the reported averages [1]. We suggested that either chlorine isotope fractionation during AgCl precipitation or sample heterogeneity for the source(s) of large errors. If former is the case, isotope fractionation during precipitation is a common problem for any Cl isotope determination methods using AgCl precipitation, such as LA-MC-ICP-MS, IRMS, SIMS [e.g., 2, 3, 4, 5].

We currently conduct re-examining of the precipitation method in order to improve analytical repeatability using LA-MC-ICP-MS. We will present the latest progress in the conference.

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[2] Bonifacie, *et al.* (2007) CG 242, 187–201.
[3] Nakamura *et al.* (2011) 42nd Lunar and Planetary Science Conference, 1608, 2513.
[4] Sharp *et al.* (2013) GCA 107, 189–204
[5] Nakadi *et al.* (2015) JAAS 30, 1531–1540.