STABLE CHLORINE ISOTOPE STUDY OF MARTIAN SHERGOTTITES AND NAKHLITES; WHOLE ROCK AND ACID LEACHATES AND RESIDUES.

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Introduction: We have established a precise analytical technique for stable chlorine isotope measurements of tiny planetary materials by TIMS (Thermal Ionization Mass Spectrometry) [1], for which the results are basically consistent with the IRMS technique (gas source mass spectrometry) [2,3,4]. We present here results for Martian shergottites and nakhlites; whole rocks, HNO_3-leachates and residues, and discuss the chlorine isotope evolution of planetary Mars.

Experimental: Whole rocks of Zagami (shergottite, basalt), Nakhla (nakhlite, basalt) and MIL03346 (nakhlite, basalt) and 1N-HNO_3 leachates and residues of Zagami and MIL samples were examined for chlorine contents by ion chromatography and isotopic composition by TIMS in this work. The 1N-HNO_3 leaching was carried out at room temperature for 15-20 hrs. Bulk and residue samples were analyzed for chlorine isotopes after treatment by HF leaching, AgCl precipitation and Cs-form resin. Isotopic analyses of leachates were also carried out by a similar method without HF-treatment.

Results and Discussion: *Leaching effect*- The 2nd Zagami sample subjected to leaching experiments shows higher total Cl abundance (160 ppm) compared to the 1st sample (114 ppm) reported at 42th LPSC [1], but rather similar abundance to that of Dreibus et al. [5] (145 ppm). About 60% of total chlorine in the bulk sample was leached out in the 1N-HNO_3 fraction, indicating that major parts of chlorine exist in soluble phases (for example, chlorapatite) in Zagami. On the other hand, only 20% of bulk MIL chlorine (221 ppm) was leached out in the acid fraction.

Chlorine isotopic composition- Our Orgueil (CI) results show significantly smaller $\delta^{37}Cl_{SMOC}$ compared to that of Sharp et al. ($\delta^{37}Cl_{SMOC}$ =1.21‰) [4] but still within the range of $\delta^{37}Cl_S$ values reported by the New Mexico Univ. group [6]. Bulk Zagami, shergottite, shows $\delta^{37}Cl_{SMOC}$ almost the same as seawater. On the other hand, Zagami leachate and two bulk nakhlites (Nakhla and MIL03346) show relatively similar $\delta^{37}Cl_{SMOC}$ values (1.5±0.5‰). In Martian meteorites, the acid leachates were considered to be derived from more leachable components such as fluids, suggesting that they might represent Martian crustal components [7].

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