

GALLIUM ISOTOPES IN CAIS C. Kato¹, and F. Moynier¹ ¹Institut de Physique du Globe de Paris (kato@ipgp.fr)

Calcium-Aluminium rich Inclusions (CAIs) are assumed to be the first condensates of the early solar system [1]. Previous studies on the moderately volatile element Zinc in CAIs show a large isotopic fractionation and enrichment in light Zn isotopes suggest that the CAI interacted with isotopically light nebular gas after formation [2]. This is thought due to a volatile depleted CAI interacting with a Zn rich nebula gas [3]. Gallium is also a moderately volatile element, but the difference in condensation temperature may allow further understanding in the environment of CAI formation and the early solar system.

Samples were analyzed using an Aligent Technologies 7900 ICP-MS for REE concentration measurement and a Thermo-Fisher Neptune Plus MC-ICP-MS for isotope measurements. We developed an ion-exchange chromatography protocol to extract and purify 100% of the Ga. This leads to reliable $\delta^{71}\text{Ga}$ ($^{71}\text{Ga}/^{69}\text{Ga}$ permil deviation from a standard) analysis with a precision around 0.06‰ (2SE). We will present data for 3 CAIs from Allende, various terrestrial samples (OIBs, basalt, granite, MORBs), 5 carbonaceous chondrites, 4 ordinary chondrites, and 2 enstatite chondrites.

Terrestrial samples have a narrow range of isotopic composition with statistically similar values (average $\delta^{71}\text{Ga} = 0.01$ ‰, 2SE = 0.05, n = 14). The chondrite average (carbonaceous, ordinary, enstatite) $\delta^{71}\text{Ga} = -0.27$ ‰ (2SE = 0.14, n = 3) is isotopically lighter than the Earth. All 3 CAIs show a Type 2 REE pattern and all have an isotopically light value of $\delta^{71}\text{Ga} = -0.92 \sim -3.56$ ‰ with a Ga concentration of 13~16ppm.

There is a clear difference between the Ga isotope composition of CAIs, chondrites and the terrestrial samples. Previous elemental studies report an enrichment of Ga on the rim of the CAIs [4, 5]. The high Ga concentration in the CAIs compared to its host meteorite (6 ppm) coupled with its large enrichments in the light isotope suggest that after that the CAIs were formed, they interacted with an isotopically light Ga-rich nebular gas prior to incorporation in to the chondrite.

[1] Amelin Y. et al. 2002. *Science*, 297, 1678-1683 [2] Luck J. M. et al. 2005. *GCA*, 69, 5351-5363 [3] Kornacki & Wood. 1985. *GCA*, 49, 1219-1237 [4] Chou C. L. et al. 1976. *GCA*, 40, 85-94 [5] Bischoff et al. 1987 *LPSC*, 18, 81-82

SESSION 4

Volatiles in Protosolar Disk and Their Delivery to Terrestrial Planets

DAY 3 – Feb.19, 2016

8:30 am – 11:30 am