MODERATELY SIDEROPHILE ELEMENT ABUNDANCES IN ANGRITES.

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Introduction: Angrites are an enigmatic group of achondrites, that constitute the largest group of basalts not affiliated with the Moon, Mars or Vesta (HEDs). It has been proposed that angrites are associated with Mercury [1]. Chemically, angrites are exceptionally refractory element-enriched (e.g., Al, Ca) and volatile element-depleted (e.g., Na and K) achondrites [2]. Highly volatile siderophile and chalcophile elements (Zn, Ge and Se) may be less depleted than alkalis and Ga taken to imply a fractionation of plagiophile elements [2]. Chemical similarities between angrites and Group IVB iron meteorites led to a proposed link where Group IVBs may be the core of the APB [3]. An alternative approach to exploring this link is through application of metal-silicate partition coefficients to moderately siderophile element (MSE) abundances in the silicate portions of the APB [4]. This approach is limited by the dearth of MSE data for angrites (e.g., Mo, Ge).

The recent increase in angrite numbers (12) has greatly increased our knowledge of the compositional diversity of the angrite parent body (APB). In this study, we report new Ga, Ge Mo, Sb and W abundances for angrites by laser ablation ICP-MS in order to place constraints on core formation of APB.

Analytical Methodology: A 1 mm^2 raster (<50 μm depth) was performed on a representative area of a polished potted butt of D'Orbigny, UNM 1115, by laser ablation ICP-MS. A New Wave UP213 system was coupled to an Element™, operated in medium resolution (R=4000) to resolve molecular isobaric interferences, particularly $ArSi^+$ on $^{69}Ga^+$. The peaks ^{23}Na, ^{25}Mg, ^{27}Al, ^{29}Si, ^{44}Ca, ^{45}Sc, ^{48}Ti, ^{51}V, ^{52}Cr, ^{55}Mn, ^{56}Fe, ^{59}Co, ^{58}Ni, ^{69}Ga, ^{73}Ge, ^{74}Ge, ^{95}Mo, ^{97}Mo, ^{121}Sb, ^{123}Sb, ^{139}La, ^{144}Nd, ^{182}W and ^{193}Ir were monitored. Correct isotope ratios were obtained on Mo and Sb peaks, but ^{73}Ge showed an interference and was not used further. Elemental abundances were obtained using relative sensitivity factors obtained from reference values for MPI-DING glasses: ML3-B, T1, StHs 6/80 and ATHO, and values for NIST SRM 612, with the exception of Ir.

Results and Discussion: The abundances of Ga, Mo, Sb and W were readily recovered from the raster, while an upper limit was obtained for Ge (15 ppb). The Ga abundance (0.37 ppm) agreed well with the literature value [5] for bulk D'Orbigny (0.37 ppm), while Sb (55 ppb), W (360 ppb) and Ir (<5 ppb) were higher than literature values [5,6]. Discrepancies of Sb and W abundances between our data and literature values are due to sample heterogeneity. New data were obtained for Mo (250 ppb), with a Mo/Nd= 0.027. The $(Sb/Nd)_{CI}$= 0.016 for the APB is similar to that for the Earth (0.023±0.010) [7,8]. The $(W/Mo)_{CI}$ = 14 for the APB based on D'Orbigny is different from that of the EPB, implying that the two parent bodies (APB and EPB) may have had different core formation conditions.

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