VOLATILE AND OTHER TRACE ELEMENTS IN MARTIAN METEORITES; Ming-Sheng Wang, Jennifer Mokos, and Michael E. Lipschutz; Department of Chemistry, Purdue University, West Lafayette, IN 47907-1393

We summarize RNAA data for 15 trace elements - U, Au, Co, Sb, Ga, Rb, Ag, Se, Cs, Te, Zn, Cd, Bi, Tl and In (in order of putative volatility during nebular condensation and accretion) - in 11 of the 12 known martian meteorites. We have not yet measured Yamato 793605. Some shergottite data (Shergotty, Zagami, ALH A77005, EET A79001, LEW 88516) had been published previously [1-5]. Data for the six other martian meteorites are new: the nakhlites and Chassigny samples studied were previously analyzed by Dr. D. Mittlefehldt at NASA-JSC using INAA.

The RNAA data for the martian meteorite suite are depicted in Fig. 1. Not surprisingly the data ranges for most elements are large, $\geq$10x for all but Co, Zn and - surprisingly - In. There are a few systematic variations. Chassigny lies at extreme ends of the data distributions for 2/3 of the elements: at the low ends for U, Sb, Ga, Rb, Ag, Se and Bi, and the high ends for Co, Te and Zn. Shergotty and Zagami tend to contain higher levels of U, Au, Co, Sb, Ga and Rb than do other shergottites. It is interesting that non-Antarctic martian meteorites contain about the same amount of In, 20-30 ppb, while Antarctic ones are compositionally more variable. All martian meteorites contain comparable amounts of Zn, 49-113 ppm.

The pattern of C1-normalized elemental concentrations (Fig. 1) suggest highly oxidizing conditions early in the history of the martian meteorites' parent materials. All U data and at least some data for Ga, Rb and Cs lie above C1-levels. These four elements, and Zn and In are all present at levels $\geq$0.1 x C1. High Co/Au ratios suggest that Co-contents - like those of Sb, Ga, Rb, Ag, Cs, Zn and In - are elevated, again consistent with the idea that the meteorites' parent materials formed under highly oxidizing conditions. Perhaps Cd, Bi and Tl contents also reflect this. Low Au, Se, and Te concentrations suggest little admixture by strongly siderophilic or chalcophilic components.

Within the uncertainty limits, contents of only two elements (Ga and Se) vary with type of martian meteorite: for these, shergottites > nakhlites > Chassigny. The number of statistically significant, direct and inverse interelement correlations is surprisingly small and these largely involve elements of intermediate volatility (Ga-Zn). At the time of abstract-preparation, statistical analyses of the data are not yet complete. Results of these investigations will be reported at the Conference.

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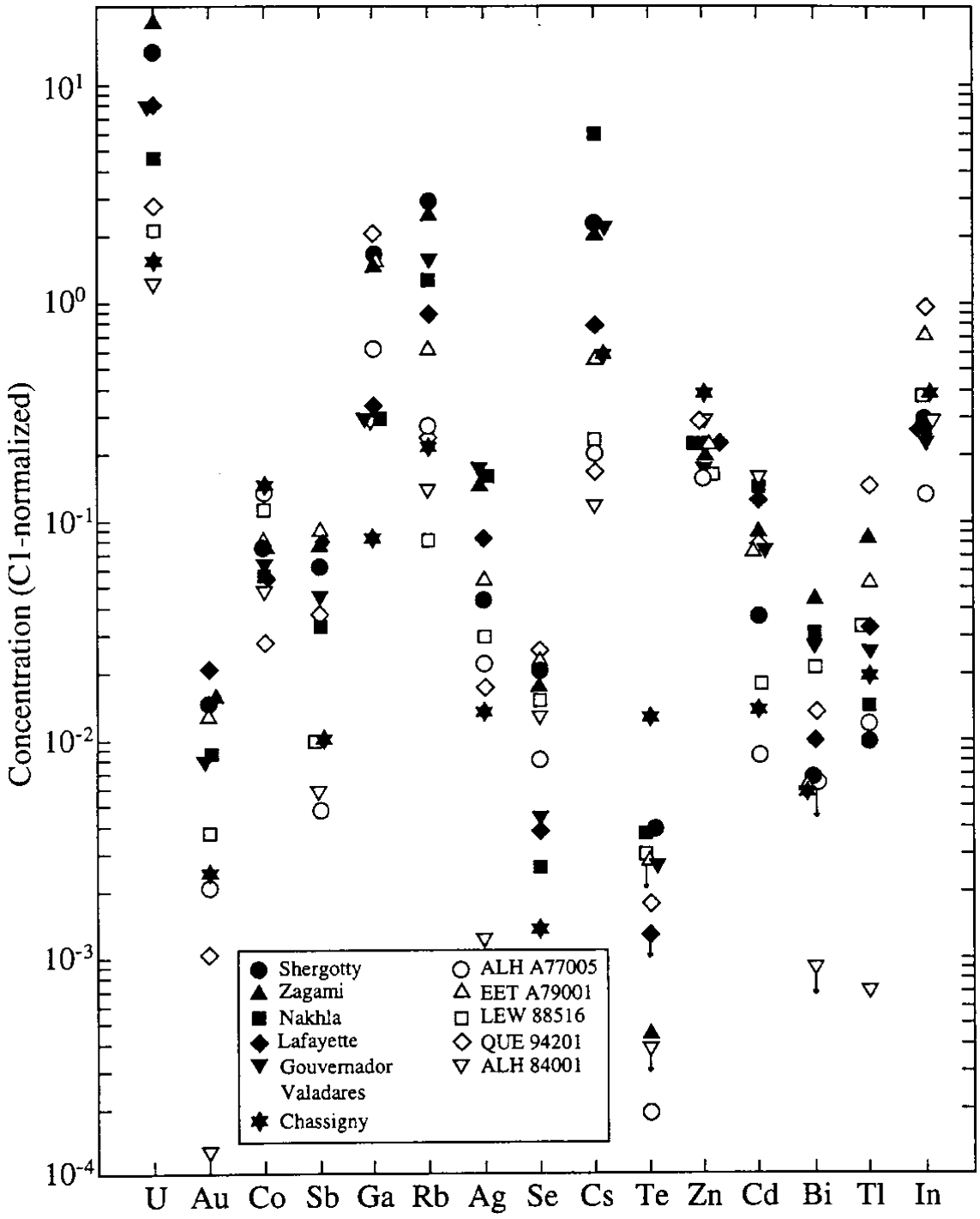

Fig 1. Trace element concentrations (C1-normalized) in martian meteorites, in order (left to right) of putative nebular volatility. Filled symbols denote non-Antarctic meteorites, open symbols represent Antarctic ones. The pattern suggests that parent materials of these martian meteorites formed under highly oxidizing conditions (see text).