ELEMENTAL AND OXYGEN ISOTOPIC COMPOSITION OF MARTIAN MAFIC REGOLITH BRECCIA NWA 7475.

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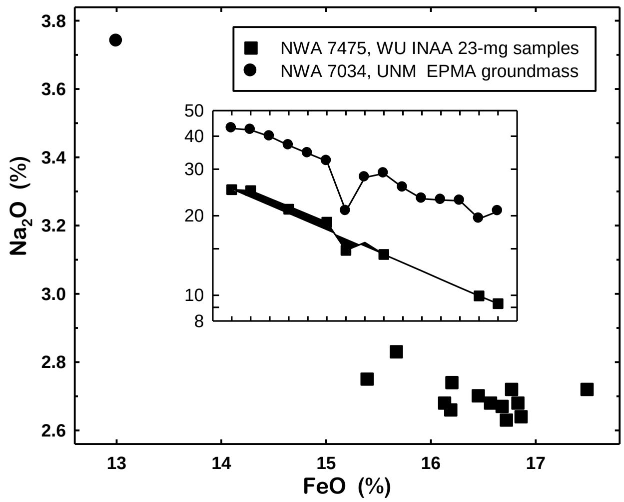
NWA 7475 is an 80.2-gram regolith breccia stone paired with NWA 7034 and NWA 7533 [1-3]. Oxygen isotope analyses by laser fluorination of acid-washed non-magnetic and magnetic fractions gave, respectively: $\delta^{17}O$ 2.89, $\delta^{18}O$ 4.83, $\Delta^{17}O$ 0.350; $\delta^{17}O$ 3.50, $\delta^{18}O$ 5.47, $\Delta^{17}O$ 0.622 (all per mil). These results agree well with those obtained for NWA 7034 [4], and are indicative of extreme oxygen isotope exchange disequilibrium among components making up the Martian crust represented by these meteorites.



Preliminary bulk compositional data by INAA for twelve ~23-mg subsamples from a 275-gram contiguous fragment of NWA 7475 demonstrate significant differences from the sample of NWA 7034 analyzed by [1]; NWA 7475 is substantially more mafic and poorer in Na and incompatible elements (see Figure). These differences may reflect real differences between the stones, but the data for our small subsamples do not suggest that NWA 7475 is itself very heterogeneous (at least on the scale of sampling). In fact, the compositional spread among subsamples is less than we typically see among lunar impact-breccia meteorites.

Other elements (in ppm ± SD): Sc 13.0 ± 0.7, Cr 1800 ± 170, Co 53 ± 2, Ni 490 ± 40, Zn 90 ± 10, Se <1, As <1, Br 1.5 ± 0.3 Sr 150 ± 30, Sb <0.1, Cs 0.6 ± 0.5, Ba 110 ± 10, La 8.0 ± 0.4, Eu 1.13 ± 0.08, Lu 0.307 ± 0.012, Th 5.4 ± 1.8, U 1.05 ± 0.6. Concentrations of Ir and Au (15 ± 3 and 5.4 ± 1.8 ppb) and also Ni are within the ranges for mature lunar soils, and confirm the conclusions of [3] of a significant impactor component in these Martian meteorites. The Ba concentration is at the low end of the range for lunar meteorites from Northwest Africa (30–6000 ppm, mean 460), implying minimal terrestrial contamination. The Br concentration is greater than that measured by us in 21 of 25 NWA lunar breccia meteorites, suggesting that much of the Br in NWA 7475 (like the elevated Cl in apatite) is of Martian origin.

References: [1] Agee C. et al. 2013. *Science* 339: 780–785. [2] Hewins R. et al. 2013. Abstract #2385, *LPS* XLIV. [3] Humayun M. et al. 2013. Abstract #1429, *LPS* XLIV. [4] Ziegler K. et al. 2013. Abstract #2639, *LPS* XLIV.