

**BULK OXYGEN-ISOTOPE COMPOSITIONS OF EQUILIBRATED ORDINARY CHONDRITE FALLS USING CO<sub>2</sub> LASER-BrF<sub>5</sub> FLUORINATION TECHNIQUE.**

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We measured O-isotopic compositions of equilibrated ordinary chondrites (EOCs) using the CO<sub>2</sub> laser-BrF<sub>5</sub> fluorination technique at Korea Polar Research Institute. Fifty one EOC falls from UCLA collections were selected for this study. About 30-50 mg from each chondrite was gently crushed using agate mortar and pestle. About 2 mm-size fragment each was used to make polished thick sections. We observed terrestrial weathering products in 5 EOCs. Their O-isotope compositions differ (higher in δ<sup>18</sup>O and lower in Δ<sup>17</sup>O) from those of the others, also indicating that terrestrial contamination. Thus we discuss only the 46 fresh EOCs: 10 H, 17 L, 4 L/LL and 15 LL chondrites.

Three or more samples, each about 2-mg of non-magnetic fractions washed with dilute acid were analyzed using the analytical procedures similar to those described in [1].

Results are generally similar to [2] but differ in details. The highlights of the observations follow: (1) our data define a much sharper mixing trend than those of [2]. Variation of δ<sup>18</sup>O at a given Δ<sup>17</sup>O is small in the low Δ<sup>17</sup>O end (H-group) and becomes larger in high Δ<sup>17</sup>O end (LL-group). It is plausible that the correlated changes in O-isotopic composition and degree of oxidation of OCs is related, possibly because the oxidizing agent and the high Δ<sup>17</sup>O materials were in the same water-bearing nebular component [3,4]. It seems possible that the spread in δ<sup>18</sup>O at constant Δ<sup>17</sup>O is related to the partial loss of this component during thermal metamorphism. If we ignore six type-4 LLs and two L/LLs with high δ<sup>18</sup>O (>5‰) the other 38 EOCs form a well defined linear array with a slope close to unity. The line intersects with CCAM line [5] at δ<sup>18</sup>O ≈ δ<sup>17</sup>O ≈ -50‰. This is further evidence that the O-isotopic composition of chondritic matter was largely controlled by mixing of two reservoirs that fall along the slope-1 line differing greatly in their Δ<sup>17</sup>O values. (2) Our L and LL data are marginally separated but our L/LL data scatter widely; we assume that the latter is a stochastic effect. (3) There are correlations between Δ<sup>17</sup>O values and some bulk volatiles and siderophiles [6]; e.g., positively with Ga and Zn, negatively with As, Au, Ir and Os. (4) A positive correlation between Co in kamacite and fayalite contents (fa) of OCs has been known [7]. The high-Co (>100 mg/g) and high-fa (>31 mol.%) LL members generally have higher Δ<sup>17</sup>O values. They have low contents of metallic iron and are the most oxidized LL chondrites.

**References:** [1] Kusakabe M. et al. 2004. *Journal of the Mass Spectrometry Society of Japan* 52:205-212. [2] Clayton R. N. et al. 1991. *Geochimica et Cosmochimica Acta* 55:2317-2337. [3] McSween H. Y. & Labotka T. C. 1993. *Geochimica et Cosmochimica Acta* 57:1105-1114. [4] Wasson J. W. 2000. *Reviews in Geophysics* 38:491-512. [5] Clayton R. N & Mayeda T. K. 1999. *Geochimica et Cosmochimica Acta* 63:2089-2104. [6] Kallemeyn G.W. et al. 1989. *Geochimica et Cosmochimica Acta* 53:2747-2767. [7] Rubin A. E. 1990. *Geochimica et Cosmochimica Acta* 54:1217-1232.