Amino acids composition and oxygen isotopes in the Shisr 033 CR chondrite

Conference or Workshop Item

AMINO ACIDS COMPOSITION AND OXYGEN ISOTOPES IN THE SHISR 033 CR CHONDRITE Z. Martins[1], R. C. Greenwood[2], I. A. Franchi[2], O. Botta[3], P. Ehrenfreund[1], B. A. Hofmann[4] [1]Astrobiology Lab, Leiden Institute of Chemistry, P.O. Box 9502, 2300 RA Leiden, The Netherlands E-mail: z.martins@chem.leidenuniv.nl [2]PSSRI, Open University, Milton Keynes, MK7 6AA, UK [3]International Space Science Institute, Hallerstrasse 6, CH-3012 Bern, Switzerland. [4]Natural History Museum, Bernastrasse 15, CH-3005 Bern, Switzerland

Shisr 033 is the first CR chondrite recovered in Oman. It consists of 65 fragments with a total mass of 1098 g collected from an area of a few square meters. The meteorite shows medium weathering of metal (W2) with omnipresent Fe-hydroxide staining. Compared with ^{14}C-dated ordinary chondrites from Oman the degree of weathering is consistent with a terrestrial age of 5-15 kyr. Many fine-grained phyllosilicate-rich inclusions containing pyrrhotite and framboidal magnetite are apparent. The second largest fragment (249.9 g) was selected and 23 g of interior material were obtained by splitting away surface material. After gentle crushing, 4.86 g of fines enriched in phyllosilicate-rich material was selected for amino acids analysis. Selected individual phyllosilicate-rich clasts were analyzed by pyrolysis. From the coarse material individual chondrules were selected for O isotope analysis.

The acid hydrolyzed hot water extracts of the fines enriched in phyllosilicate-rich material were analyzed for amino acids using hot water extraction, followed by acid hydrolysis, desalting and pre-column derivatization [1]. Amino acids separation was achieved by high-performance liquid chromatography (HPLC) and by gas chromatography-mass spectrometry (GC-MS). Amino acid abundances were determined by comparison of the chromatographic signals with those of known standards. Shisr 033 contains extraterrestrial amino acids, including α-aminoisobutyric acid (AIB); however, comparisons to the CM2 Murchison, the CI Orgueil, and the CR Renazzo show a distinct amino acid distribution for this meteorite. The D/L ratio determined for alanine indicates the presence of terrestrial contamination.

Oxygen isotopic analyses were performed on a bulk sample (B), a bulk sample leached with ethanolaminthioglycollate to remove iron hydroxides (B2), a sample of composite chondrules (H) and a hand-picked dark clast (D). Samples B, B2 and H fall onto the CR trend as defined by Clayton and Mayeda (1999) [2]. The uncleaned bulk sample is significantly heavier than the cleaned one, most likely indicating an influence by terrestrial Fe-hydroxides (calculated δ^{18}O around +8‰ in equilibrium with Oman desert rainwater). The dark clast (D) falls onto the CV-CO trend. Stepped combustion of a dark clast revealed a low organic carbon and high carbonate contents indicative of terrestrial contamination.

References: [1] O. Botta and Bada J. L. 2002. *Surveys in Geophysics* 23: 411-467. [2] R. N. Clayton and T. K. Mayeda. 1999. *Geochimica et Cosmochimica Acta 63*: 2089-2104.