AMINO ACID COMPOSITION OF PRIMITIVE CR2 CHONDRITES.

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Introduction: It is thought that the soluble organic material of CR2 chondrites is more primitive than in any other chondrite and, therefore, closer to the original material accreted by chondrites [1]. Our present work focuses on the distribution and isotopic composition of amino acids present in primitive CR chondrites in order to provide important clues about the mechanisms of formation of these compounds, the conditions of the early solar system and the effect of parent body processing.

Methods: The amino acid contents of the Antarctic CR2s MET 00426, QUE 99177, EET 92062 and GRA 06100 were analyzed using an established amino acid procedure [1,2]. In addition, compound-specific carbon isotopic measurements of individual α-amino acids present in the MET 00426 meteorite were achieved by gas chromatography-combustion-isotope ratio mass spectrometry (GC-C-IRMS). GC-C-IRMS measurements of the amino acid content of the QUE 99177, EET 92062 and GRA 06100 meteorites are currently being carried out.

Results: Our results show that the CR2 chondrites MET 00426 and QUE 99177 have amino acid abundances (185 and 80 ppm, respectively) and distributions that are similar to the ones previously detected in the CR2 EET 92042 and GRA 95229 [1]. The highly enriched $\delta^{13}C$ values (+4 to +32‰) of the α-amino acids present in the MET 00426, and the racemic amino acid enantiomeric ratios (D/L~1) for all the Antarctic CR2 chondrites, indicate that primitive indigenous organic matter is preserved in them.

Our data supports the hypothesis [1,2] that the relative abundances (glycine = 1) of α-AIB and β-alanine depend on the degree of aqueous alteration in the CR parent body. In particular, the least aqueous altered CR2 chondrites MET 00426 and QUE 99177 [3,4] have relative abundances of α-AIB that are higher than the mildly aqueous altered CR2s GRA 95229 and EET 92042, and much higher than the CR1 GRO 95577. On the other hand, the relative abundances of β-alanine are much lower (~0.1) in these four Antarctic CR2 chondrites than in the GRO 95577 meteorite (~0.9).

Conclusions: The high amino acid content observed in a variety of CR2 chondrites suggests that their soluble organic material is more primitive than any other chondrite. The analysis of the amino acid content of CR meteorites may help to reveal the processes that formed abundant prebiotic organic material in the early solar system. In particular, the relative amino acid abundances of α-AIB and β-alanine may be used to assess the degree of aqueous alteration.

References: [1] Martins Z. et al. 2007. *Meteoritics & Planetary Science* 42: 2125-2136. [2] Glavin et al. 2006 *Meteoritics & Planetary Science* 41: 889-902. [3] Abreu N. M. and Brearley A. J. 2005. Meteoritics & Planetary Science 40:A13 [4] Abreu N. M. and Brearley A. J. 2008. Abstract #1391. 39th Lunar and Planetary Science Conference.