RELATIONSHIP BETWEEN SOLUBLE MONOCARBOXYLIC ACIDS AND ALIPATIC SIDE CHAINS OF IOM IN CARBONACEOUS CHONDRITES.
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Organic materials in carbonaceous chondrites range from soluble organic compounds to a complex macromolecular network of Insoluble Organic Matter (IOM) [1,2]. Numerous studies have been carried out on soluble organic compounds in carbonaceous chondrites [3]. Recent development in analytical techniques permit analysis of aliphatic side chains in the IOM [1,4]. Upon degradation with RuO_4, monocarboxylic acids (MCAs) are produced from aliphatic side chains whose structures and isotopic ratios can be determined [4]. The aim of this work is to deduce the relationship between the aliphatic side chains in the meteorite IOM and soluble carboxylic acids by comparison of their chemical structures and isotopic variations. We studied different types of six meteorites [Orgueil (CI1); ALH85013 (C2), ALH84033 (CM1/2), Murchison (CM2), EET87770 (CR2) and MET00430 (CV3)], in order to establish a more statistically robust relationship.

Results and discussion: 15 to 50 MCAs were identified and quantified in both water soluble extracts and RuO_4 treated IOM samples. The molecular distributions, especially for the branched monoacids, are very similar between water soluble fractions and RuO_4 treated IOM samples in Murchison. Such structural similarity and inheritance between IOM and soluble acids suggest that these compounds have similar or the same origins, i.e., a common precursor may be responsible for their formation. There is also striking similarity in the distribution of MCAs released from RuO_4 treated samples, regardless of their petrographic classifications (e.g., CM1, CM2, CR2 and CV3). In contrast, the soluble acids from different meteorites show more variable distributions. There are fewer MCAs in soluble fractions than in RuO_4-treated IOM fractions in most samples, suggesting post synthetic processes are more likely to affect the soluble compounds than the IOM. Carbon isotope ratios of most monoacids range from 0 to -80 ‰ (vs. PDB), which are indistinguishable from terrestrial organic compounds. However, meteorite MCAs are highly enriched in deuterium, with δD values ranging from a few hundred to >+2000‰ (vs. VSMOW). There is also a good correlation between the isotope ratios from the water extractable and those released from IOM degradation. Our isotope data once again suggest a possible parent-daughter relationship between soluble and insoluble organic fraction in carbonaceous meteorites.

References: [1] Remusat L et al (2005) *GCA*, **69**, pp.4377-4386 . [2] Huang Y. et al. (2005) *GCA*, **69**, pp.1073-1084. [3] Pizzarello S. (2006) *Acc. Chem. Res.* **39**, 231-237. [4] Huang Y. et al., 2007. *Earth and Planatary Science Letters* 259: 517-525.