

**MONOCARBOXILIC ACIDS ANALYSE IN MURCHISON METEORITE USING SOLID PHASE MICROEXTRACTION (SPME)**

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**Introduction:** Low molecular weight monocarboxylic acids (MCAs) are the most abundant soluble organic compounds in the Murchison [1,2] and other CM carbonaceous chondrites [3,4]. However, there are concerns from the experimental procedures used to isolate MCAs for GC and GCMS analysis in the early studies on the Murchison. The procedure involved a water-CH<sub>2</sub>Cl<sub>2</sub> partitioning step to extract the MCAs, followed by solvent evaporation prior to GC and GCMS analyses. Because the low molecular weight acids are miscible with water and highly volatile, the procedure is likely to cause significant loss of MCAs and results in bias in molecular distributions. Later study using cryogenic distillation and ion chromatography [1,5] indeed demonstrated that a major loss in acetic acid in the earlier report must have occurred. In this study, we examined the monocarboxylic acids in Murchison meteorite using a new sample preparation and introduction technique for gas chromatograph recently developed for volatile, water-soluble organic compounds: solid phase micro-extraction (SPME).

**Results and Discussions:** Using SPME coupled with GC, GCMS, we found a much larger suite of more than 50 straight chain and branched monocarboxylic acids. The straight chain monoacids range from C<sub>1</sub> to C<sub>10</sub> and the branched monoacids were found in a complete structural diversity. Identifications were carried out by coinjection with authentic standards, by comparing mass spectra using computer library and published GC retention times [3,4] and interpretation of mass spectra. We used a 70 mm Carbowax<sup>TM</sup>/DVB StableFlex<sup>TM</sup> SPME fiber which was held by an SPME fiber assembly (Supelco). To obtain the optimum conditions for the extraction efficiency, and consequently better identification and quantification, we tested a series of experimental conditions for adsorption and desorption using an aqueous solution containing 6 C<sub>2</sub> to C<sub>6</sub> monocarboxylic acid standards (concentrations ~ 1mmol/L in water)[7,8]

**References:** [1] Yuen G. and Kvenvolden K. A. (1973) *Nature*, 246, 301-302. [2] Lawless J. G. and Yuen G. (1979) *Nature*, 282, 396-398. [3] Shimoyama et al. (1989) *Geochem. J.*, 23, 181-193. [4] Naraoka et al. (1999) *Origins of Life and Evolution of the Biosphere*, 29, 187-201. [5] Yuen G. et al. (1984) *Nature* 307, 252-254. [6] Lord H. and Pawliszyn (2000) *J. Of Chromatog. A*, 885, 153-193. [7] Dias R.F. and Freeman K. H. (1997) *Anal. Chem.* 69, 944-950.