



Thermochemolysis and the Search for Organic Material on Mars Onboard the MOMA Experiment

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Following the Sample Analysis at Mars (SAM) experiment onboard the Curiosity rover, the Mars Organic Molecule Analyzer (MOMA) experiment onboard the future ExoMars 2018 mission will continue to investigate the organic composition of the martian subsurface. MOMA will have the advantage of extracting the sample from as deep as 2 meters below the martian surface where the deleterious effects of radiation and oxidation on organic matter are minimized. To analyse the wide range of organic compounds (volatile and non-volatile compounds) potentially present in the martian soil, MOMA includes two operational modes: UV laser desorption / ionization ion trap mass spectrometry (LDI-ITMS) and pyrolysis gas chromatography ion trap mass spectrometry (pyr-GC-ITMS). In order to analyse refractory organic compounds and chirality, samples which undergo GC-ITMS analysis may be derivatized beforehand, consisting in the reaction of the sample components with specific chemical reagents (MTBSTFA [1], DMF-DMA [2] or TMAH [3]).

To prove the feasibility of the derivatization within the MOMA conditions we have adapted our laboratory procedure for the space conditions (temperature, time, pressure and size). Goal is optimize our detection limits and increase the range of the organic compounds that MOMA will be able to detect.

Results of this study, show that Thermochemolysis is one of the most promising technique onboard MOMA to detect organic material.

References : [1] Buch, A. et al. (2009) J Chrom. A, 43, 143-151. [2] Freissinet, C. et al. (2013) J Chrom. A, 1306, 731-740. [3] Geffroy-Rodier, C. et al. (2009) JAAP, 85, 454-459.