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How Mineral matrix influence the organic matter evolution when using Sample Analysis at Mars pyrolysis onboard Curiosity ?

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Abstract

The Sample Analysis at Mars (SAM) instrumental suite, aboard Curiosity rover, is searching for organic matter at the Mars surface. It is composed of three instruments including a pyrolysis-gas chromatograph-mass spectrometer (pyr-GC-MS) allowing the thermal release, separation, and identification of compounds from Mars soil samples. During analysis realized at John Klein and Rocknest sites, chlorinated compounds, such as chloromethane and dichloromethane, have been detected. These molecules can be formed during the sample pyrolysis by reaction between organic matter and perchlorates, a mineral type previously detected on Mars.

In order to help interpretation of in situ data obtained by SAM, we study the influence of minerals analogue to Mars surface material, including perchlorates, on organic matter under conditions simulating the SAM pyrolysis. This will help to determine minerals contributions to the compounds detected with SAM, and to identify mother molecules.

Our samples consist of pure minerals (*), organic molecules and organic molecules adsorbed on minerals. The evolution of the sample with the temperature is monitored by differential thermal analysis coupled to thermal gravimetry, and resulting products are identified by GC-MS.

We present here the first results of this study.

(*) Minerals that have been detected at Gale Crater, the site where Curiosity is working at Mars.

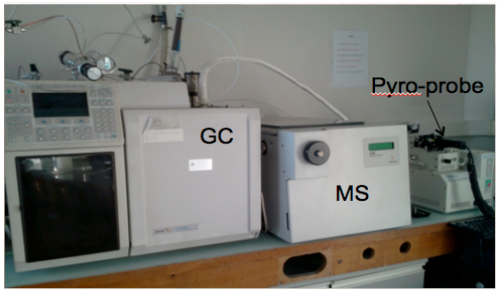

Figure 1: View of the setup available at LISA laboratory, used to simulate in the laboratory the EGA measurement mode of the SAM suite.

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