



Search for indices of prebiotic or biotic activity on Mars with the Sample Analysis at Mars experiment of the MSL mission

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In past times life might have occurred in Martian conditions milder than the present ones and left some remnants at the surface. Even if this did not happen, prebiotic molecules may have been preserved that might be similar to the ones that prevailed on Earth surface some 3.5 to 4 billion years ago. NASA's MSL09 rover will arrive at Mars in 2010 to explore its surface and subsurface. Aboard this rover the analytical laboratory Sample Analysis at Mars (SAM) developed by NASA/GSFC will analyze samples from atmosphere and soil. One of the SAM goals is to determine molecular abundances and isotopic ratios organics elemental analysis in the atmosphere and in the soil from its heating linked to prebiotic chemistry. SAM will also examine atmospheric noble gases linked to the history of the planet and structural gases that may be obtained when heating subsurface minerals. The search for prebiotic information will be performed by analyzing gases either sampled from atmosphere or obtained from soil processing physical heating or chemical reactions using gas chromatography (GC), mass spectrometry (QMS), and Infra-red spectroscopy (TLS) or combinations of these techniques present aboard SAM. We present here this analytical laboratory and especially the Gas Chromatograph instrument which is the French contribution to SAM. The GC is a stand-alone instrument especially dedicated to the study of organic molecules and we describe here its capabilities for the detection of organic complex molecules either in Mars atmosphere or in its soil. Moreover, a few words will be given on the possibility for the experiment to characterize minerals which could result from a biological activity, such as carbonates.