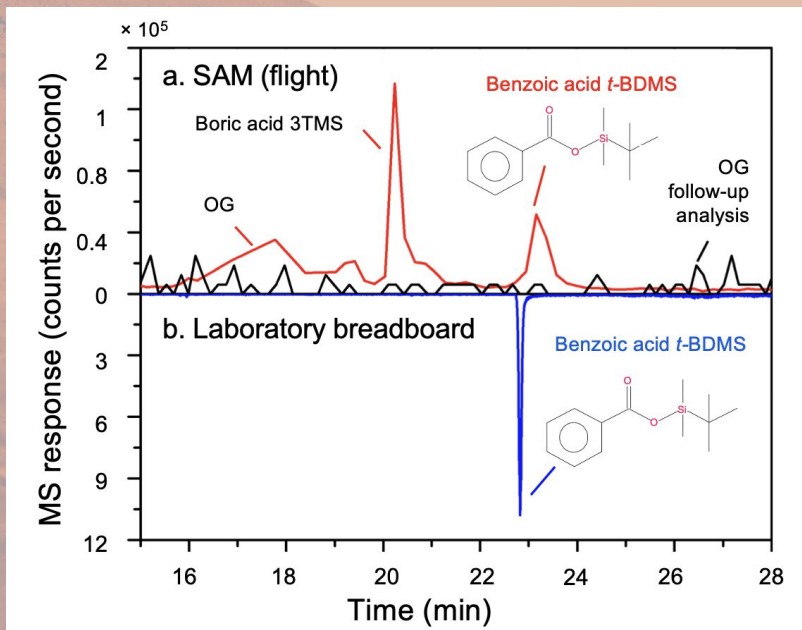




Background: The search for organic molecules on Mars, one of the main goals of the Sample At Mars (SAM) instrument on board the Curiosity rover, is crucial to determining whether life existed, or currently exists, on Mars. SAM uses “wet chemistry” techniques to help release and analyze organic compounds from rocks and sand that will then be sent to the instrument for chemical analysis.



Identification of benzoic acid derivatized with the SAM instrument (a) compared with the SAM-like analysis of benzoic acid derivatized measured in laboratory (b)

Experiments & Results: The first SAM wet chemistry experiment was performed on sand scooped from Gale crater's Bagnold Dunes. For the first time on another planetary body, a chemical derivatization experiment was conducted, leading to the detection of benzoic acid for the first time on Mars. Benzoic acid could be produced from ancient biological material, or from the oxidation of meteoritic organic matter delivered to Mars. In addition to this interesting result, this experiment allows for the optimization of the future wet chemistry experiments to be done on Mars, possibly leading to the detection of more direct biological indicators, such as amino acids.

Significance: The first derivatization experiment performed on Mars has expanded our understanding of the range of organics that could be present in Martian sands. The success of this experiment offers new methods for the search for chemical biosignatures on Mars and other potential habitable environments in our solar system.

Millan, M., Teinturier, S., Malespin, C.A. *et al.* Organic molecules revealed in Mars's Bagnold Dunes by Curiosity's derivatization experiment. *Nature Astronomy* (2021).