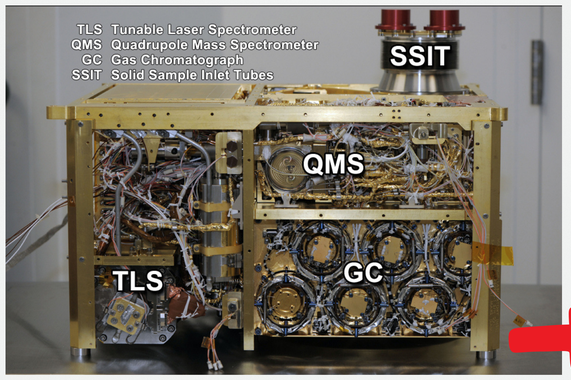
ASSESSING THE PERFORMANCE OF TMAH THERMOCHEMOLYSIS ON MARS MG-SULFATE ANALOG SAMPLES

P. C. Gant & A. J. Williams, Department of Geological Sciences, University of Florida

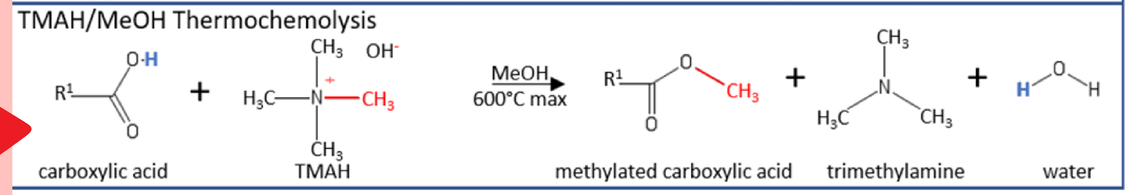
INTRO

Many sols ago on the Red Planet, NASA's Curiosity Rover encountered the Mg-Sulfate bearing unit in Gale crater, Mars. Here we find the Sample Analysis at Mars (SAM) instrument suite hard at work

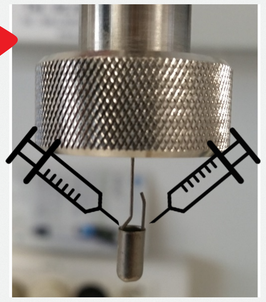


METHIODS

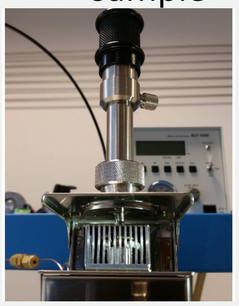
- Thermochemolysis Pyrolsis-GC-MS
- Flash pyrolysis at 550°C, 875°C, 975°C
- Flash TMAH thermochemolysis at 550°C
- SAM-like Ramp TMAH Thermochemolysis (35C/min ramp)
- Mg-Sulfate Analog Samples: Anhydrous $MgSO_4$ & Epsomite



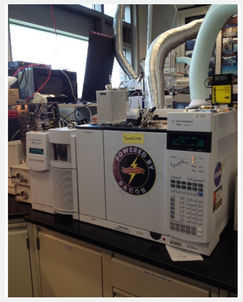
(1) Add powdered rock sample and reagent



(2) Pyrolyze sample

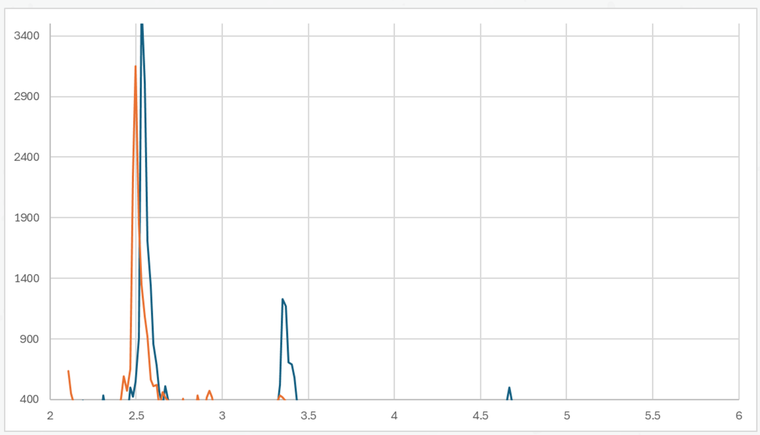


(3) Send to GC-MS:



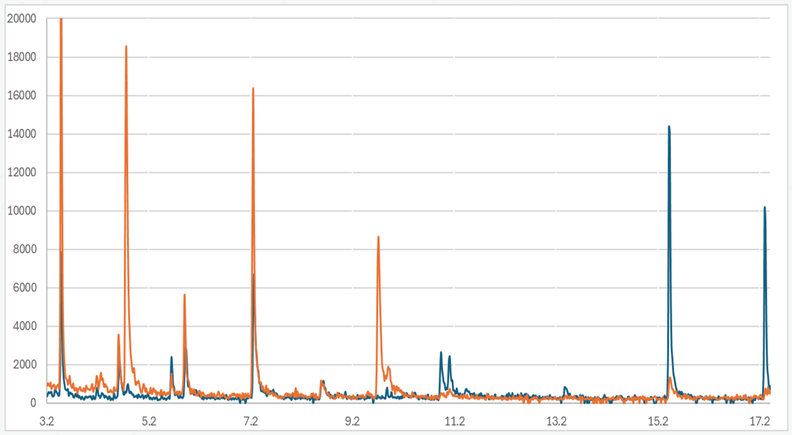
FLASH PYROLYSIS @ 550°C

M/Z 55



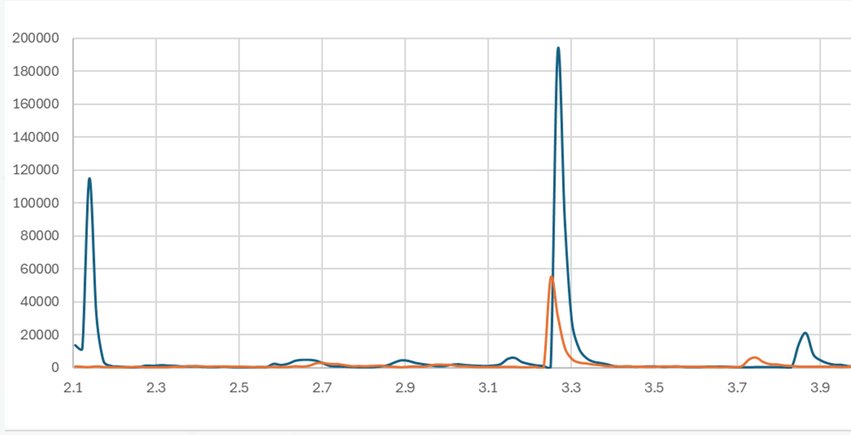
TMAH FLASH PYROLYSIS @ 550°C

M/Z 74



SAM LIKE RAMP (35°C/MIN)

M/Z 74



EPSOMITE

TIME (MINS)

ANYHYDROUS

RESULTS

- The pyrolysis only method did not liberate mnay organics from the Mg-Sulfate standards
- The TMAH Flash Pyrolysis did the best job of the three methods at liberating organics from the Mg-Sulfate standards
- The Sam-like ramp liberated very few organics from teh Mg-Sulfate standards

DISCUSSION

- Determine which method is best for liberating organics
- Able to identify organics in commerical sample, as well as byproducts of TMAH thermochemolysis
- Results will determine which Mg-sulfate mineralogy is most promising for future investigation
- Next steps: add a known amount of organics to sample and see if they can be identified within the sample

IMPACT

- The results from this experiment will provide valuable information to how Mg-sulfate minerals will behave under SAM-like conditions
- Will lead to confidence to the optimization of the second and final TMAH experiment.