THERMAL GRAVIMETRIC ANALYSIS WITH GAS CHROMATOGRAPHY AND MASS SPECTROMETRY (TGA-GC-MS) OF MATERIALS USED IN SPACE INDUSTRY.

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ABSTRACT FOR POSTER

TGA-GC-MS is an analytical technique for determination and identification of offgassed compounds and products of decomposition during temperature increase applied to a material.

Technique Overview

The technique heats a material in a TGA at specified temperature gradient. Purge gas (He, N2 or Air) delivers up to 15 samples of offgassed compounds collected at defined temperatures to the heated sample loops through the heated transfer line. Collected samples are injected in sequence into GC. GC separates a mixture of compounds present in a sample and deliver them sequentially in MS detector. MS breaks the molecules into charged fragments and records intensity of detected ions in a spectral plot called mass spectrum. Each compound has a unique mass spectrum collected in a library. The compounds are identified by matching a mass spectrum of unknown compound with the one from MS library.

TG-GC-MS is a powerful tool for space industry materials testing and development. In addition to mass loss during TGA analysis it shows the change in complex gas blends evolved from desorption and decomposition during temperature increase applied to a material. Since materials in space should be working at wide range of temperatures, the information of exact offgassing and decomposition substances expected at different temperatures gives a good addition to a simple TGA analysis.