Evaluation of Commercial Mass Spectrometers for NASA Applications

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An evaluation of commercially available small mass analyzers and mass spectrometer systems was performed during the summer of 2007 as a first step to identify MS candidates for various NASA harsh environment and extreme condition applications. The project is similar to a previous effort focused on identifying and testing miniature mass spectrometer systems which was presented at the 3rd HEMS Workshop. The 2007 MS Evaluation Project took place at the Hazard & Gas Detection Lab from Kennedy Space Center, in which vendors with products that met a minimum list of requirement including size, weight, mass range, gas species detection, detection limit, accuracy, resolving power, power consumption and software interface were invited to be part of the evaluation. The commercial MS instruments that accepted the invitation were evaluated under similar vacuum condition and same gas delivery system parameters. Gas concentration varying from ppm levels to 100%, flow rates from 250-1000 sccm depending on the test and constant inlet pressure were provided at each one of the 4 test stations set-up for the evaluation. A common set of operations and tests in both nitrogen and helium backgrounds was performed to determine detection limit, accuracy, drift, dynamic range, response time, recovery time and clear out time for each unit. Ten MS products were evaluated including products from Extorr, Inficon, Hiden Analytical , Pfiffer, MKS, SRS and VTI. Preliminary results are presented for each unit and compared to the target application specifications.