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GAS CHROMATOGRAPHY-ION MOBILITY SPECTROMETRY INSTRUMENT FOR ANALYZING
VOLATILE ORGANIC COMPOUNDS IN ENCLOSED ATMOSPHERE OF SPACECRAFTS

Abstract

Research findings revealed that online monitoring of air contaminants in spacecrafts is a prominent factor in Environmental Control and Life Support System (ECLSS). Over the years, Ion Mobility Spectrometry (IMS) which refers to the techniques and cutting-edge instruments for characterizing of analytes by their gas phase mobility has been gaining popularity and validity among scientific researchers for detecting Volatile Organic Compounds (VOCs) in manned space missions. This novel gas sensor with its high analytical speed, low detection limits, ease of use and ruggedness during transport has also become the dominant commercial technology in different industries. In spite of these paramount advantages, IMS has difficulty identifying matrix compounds. To overcome this problem a Gas Chromatograph (GC) can be used to introduce individual components of mixture into an IMS. The output signal of the hyphenated GC-IMS method is an extraordinary small, time-dependent current produced by mobile ions in atmospheric pressure. In the present paper an attempt is made to evaluate the capability of home-made GC-IMS as a novel and effective analytical technique for detection of VOCs. The GC-IMS instrument used in this research was designed and constructed in Material and Institute of Esfahan, Detector Department and can be used as an on-board Volatile Organic Analyzer (VOA) in space missions. The efficacy of the constructed device will be proved by offering experiments related to enclosed atmosphere.