

Chemical Characterization and Identification of Organosilicon Contaminants in ISS Potable Water

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ABSTRACT

2015 marked the 15th anniversary of continuous human presence on board the International Space Station. During the past year crew members from Expeditions 42-46, including two participating in a one-year mission, continued to rely on reclaimed water as their primary source of potable water. This paper presents and discusses results from chemical analyses performed on ISS water samples returned in 2015. Since the U.S. water processor assembly (WPA) became operational in 2008, there have been 5 instances of organic contaminants breaking through the treatment process. On each occasion, the breakthrough was signaled by an increase in the total organic carbon (TOC) concentration in the product water measured by the onboard TOC analyzer (TOCA). Although the most recent TOC rise in 2015 was not unexpected, it was the first time where dimethylsilanediol (DMSD) was not the primary compound responsible for the increase. Results from ground analysis of a product water sample collected in June of 2015 and returned on Soyuz 41 showed that DMSD only accounted for 10% of the measured TOC. After considerable laboratory investigation, the compound responsible for the majority of the TOC was identified as monomethylsilanetriol (MMST). MMST is a low-toxicity compound that is structurally similar to DMSD.

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