Abstract:

Maintaining a safe supply of potable water is of utmost importance when preparing for long-duration spaceflight missions, with the minimization of microbial growth being one major aspect. While biocides, such as ionic silver, historically have been used for microbial control in spaceflight, their effectiveness is sometimes limited due to surface reactions with the materials of the storage containers that reduce their concentrations below the effective range. For the Multi-Purpose Crew Vehicle, the primary wetted materials of the water storage system are stainless steel and a titanium alloy, and ionic silver has been chosen to serve as the biocide. As an attempt to understand what processes might reduce the known losses of silver, different treatment processes were attempted and samples of the wetted materials were tested, individually and together, to determine the relative loss of biocide under representative surface area-to-volume ratios. The results of testing presented here showed that the materials could be treated by a nitric acid rinse or a high-concentration silver spike to reduce the loss of silver and bacterial growth. It was also found that the minimum biocidal concentration could be maintained for over 28 days. These results have pointed to approaches that could be used to successfully maintain silver in spacecraft water systems for long-duration missions.