

Life Sciences as Related to Space (F)  
Advanced Life Support Technologies and Test Bed Facilities (F4.1)  
Consider for oral presentation.

## THE INFLUENCE OF FEED AUTOMATIZATION ON PH-FLUCTUATIONS IN URINE PROCESSING TRICKLING FILTERS

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With respect to crewed long-term space missions, closed-loop systems for resource management become increasingly important. Processing human wastes into plant-available nitrogen sources is a crucial part of ensuring food supply in space. This study describes a 90-day experiment in which trickling filters fitted with 6 L of lava rock (16–25 mm grain size), mussel shells as buffer material and a 28 L tank were fed with synthetic urine (SU) and observed with regard to their nitrogen conversion rates and pH stability. The filters were operated semi-continuously with a daily withdrawal of 500 mL processed SU and addition of 500 mL new SU. The processed urine was removed from the system with only one withdrawal for all filters. The addition was done at intervals that differed between the filters: the first filter triplet received 500 mL SU once a day, the second filter triplet received ten times 50 mL and the third filter triplet received 108 times 4.6 mL. Nitrogen conversion rates, measured as nitrate production/day, did not differ significantly between the filters. However, the pH fluctuations were reduced by the divided addition ( $\text{pH}_{\text{minmax}}$  [triplet 1]  $\geq 1$ ;  $\text{pH}_{\text{minmax}}$  [triplet 2]  $\leq 0.7$ ; for triplet 3 the measurement has not yet been completed;  $\text{pH}_{\text{meanmin}}$  [triplet 1]  $\sim \text{pH}_{\text{meanmin}}$  [triplet 2]  $\sim 3.8$ ;  $\text{pH}_{\text{meanmax}}$  [triplet 1]  $\sim 5$ ;  $\text{pH}_{\text{meanmax}}$  [triplet 2]  $\sim 4.5$ ). We hypothesize that pH fluctuations with lower maximum values reduce the precipitation in the tank induced by the mussel shells. The measurements are ongoing.