On-site treatment of used wash-water using biologically activated membrane bioreactors operated at different solids retention times

APPENDIX

Size fractionation of COD and biological oxygen demand

Concentrated influent was prepared in tap water to reach a final concentration of 10 g L^{-1} feces, 1.5 g L^{-1} soap and 20 ml L^{-1} urine. The solution was size fractionated by filtering at 100 μm and with subsequent centrifugation at 3,000 g for 5 minutes. The particulate fractions after filtering and centrifugation were resuspended in tap water with the addition of soap and urine. Biochemical oxygen demand (BOD) was measured using the oxitop system (WTW, Germany). Concentrated size fractionated influent was diluted to an end concentration of 750 mg COD L^{-1} using tap water. Additionally a positive control was prepared using sodium acetate (750 mg COD L^{-1}), with the addition of inorganic nutrients (43.2 mg L^{-1} K_2HPO_4, 2.13 mg L^{-1} KH_2PO_4, 66.67 mg L^{-1} $NaNO_3$, 1.6 mg L^{-1} NH_4Cl, 0.13 mg L^{-1} $FeCl_3$, 6.67 mg L^{-1} $CaCl_2$ and 4 mg L^{-1} $MgSO_4$) and the addition of trace elements according to Balch *et al*. (1979). All three fecal solutions and positive control were inoculated using 100 μl sludge collected from the high-SRT reactor. To control for potential inoculum growth, blank solutions were prepared using only tap water and inoculum. Triplicates were run for each influent solution, positive control and blank solution. The incubation temperature was 20 °C and test duration was 7 days. The maximum oxygen utilization rate (OUR) during the batch experiment was higher when the particle size was decreased (Figure A1).

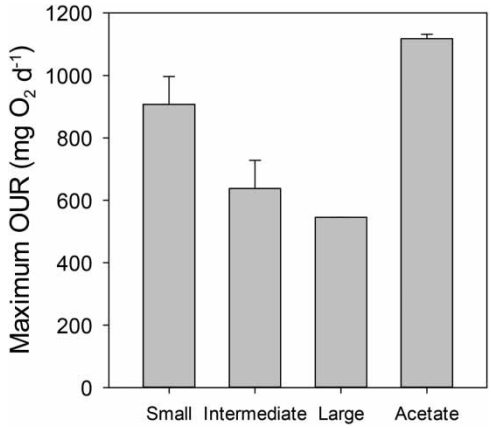

Figure A1 | Maximum oxygen utilization rate (OUR) in a batch experiment with small, intermediate and large size fraction of the influent solution, and with positive control with acetate as the only carbon source.

REFERENCE

Balch, W. E., Fox, G., Magrum, L., Woese, C. & Wolfe, R. 1979 Methanogens: reevaluation of a unique biological group. *Microbiological Reviews* **43**, 260.