
Comparative study on performance of yeast and bacterial membrane bioreactors for high salinity wastewater treatment

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Abstract: Two laboratory-scale membrane bioreactor systems were investigated to treat high saline wastewater containing 1,000 mg/L COD and 32 g/L NaCl, namely:

- the yeast membrane bioreactor (YMBR)
- bacterial membrane bioreactor (BMBR).

COD removal of both processes was above 90% at a hydraulic retention time (HRT) of 5 hours (volumetric loading of 5 kg COD/m³.d), sludge retention time (SRT) of 50 days (the MLSS of above 14 g/L and the F/M of 0.4 d⁻¹). Under these operating conditions, the YMBR could run at a ten-fold lower transmembrane pressure with significantly reduced membrane fouling rate compared to BMBR. This may be because of low production of adhesive extracellular polymers (ECP) and the secondary filtration layer formed from large yeast cells. ECP production of bacterial sludge was increased considerably at high salt concentrations (32 g/L and 45 g/L) and long SRTs. For the bacterial sludge, the increased salinity led to increase in ECP, whereas the ECP content of the yeast sludge was relatively small.

Keywords: extra-cellular polymers; high salinity; hollow fibre membrane; membrane bioreactor; membrane fouling; yeast.