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PII: S0960-8524(14)00639-7
DOI: http://dx.doi.org/10.1016/j.biortech.2014.04.099
Reference: BITE 13395

To appear in: *Bioresource Technology*

Received Date: 24 February 2014
Revised Date: 24 April 2014
Accepted Date: 25 April 2014

Please cite this article as: Sharghi, E.A., Bonakdarpour, B., Pakzadeh, M., Treatment of hypersaline produced water employing a moderately halophilic bacterial consortium in a membrane bioreactor: Effect of salt concentration on organic removal performance, mixed liquor characteristics and membrane fouling, *Bioresource Technology* (2014), doi: http://dx.doi.org/10.1016/j.biortech.2014.04.099

Treatment of hypersaline produced water employing a moderately halophilic bacterial consortium in a membrane bioreactor: Effect of salt concentration on organic removal performance, mixed liquor characteristics and membrane fouling

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Abstract

In this study the organic pollutant removal performance and the mixed liquor characteristics of a membrane bioreactor (MBR), employing a moderately halophilic bacterial consortium, for the treatment of hypersaline synthetic produced water containing 100-250 g L^{-1} NaCl were considered. The COD and oil and grease (O&G) removal efficiencies in the range 81.6-94.6% and 84.8-94.0% respectively and MBR effluent turbidity lower than 2 NTU were achieved. There was no pronounced membrane fouling at any salt concentration. O&G accumulation (less than 11% of the influent O&G) occurred in the mixed liquor at all salt concentrations, but biodegradation was identified as the major organic removal mechanism. With increasing salt concentration, initially increase in SVI and later formation of oil/biomass bodies took place but due to the presence of the membrane biomass washout did not occur. The mixed liquor was psuedoplastic and the apparent viscosity and flow behavior index generally increased with salt concentration.

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