

Application of a membrane bioreactor for treatment of crude oil contaminated wastewater with high salinity

Parviz Darvishi^۱, Dariush Mowla^۲

Department of Chemical Engineering, Yasouj University, Yasouj, Iran

parvizdarvishi@gmail.com

Abstract

In the present study, Performance of a membrane bioreactor (MBR) for treatment of crude oil-contaminated wastewater with high salinity in a continuous system was studied. For this purpose, a new microbial consortium of *Enterobacter cloacae* and *Pseudomonas* sp. (ERC PPI-۲) which was isolated from heavy crude oil-contaminated soil in the south of Iran, has been investigated under extreme environmental conditions. The isolated microorganisms had grown in adequate cultural environment during sequential periods, and their biodegradation rate and feeding effect have evaluated before entering the bioreactor. In the first set of experiments the effects of the main parameters such as temperature (۲۰-۷۰ °C), pH (۴.۰-۱۰.۰), salinity (۱-۱۲.۵% (w/v) of NaCl) and MLSS (۴۰۰۰-۱۰۲۰۰ mg/l) on the biodegradation rate of crude oil by the consortium ERC PPI-۲ were studied. The membrane bioreactor was used to treat the crude oil-contaminated wastewater with COD of ۱۸۰۰ - ۲۱۰۰ mg/l and high salinity (TDS=۴۰۰۰ mg/l). The obtained results showed that the membrane bioreactor has the ability to treat wastewater with high crude oil removal efficiency (۹۴%), low hydraulic retention time, and high MLSS concentration (۹۰۰۰-۱۰۲۰۰ mg/l). These results suggested that the existing membrane bioreactor has high performance in crude oil-contaminated wastewater treatment, considering its microorganisms, environmental conditions (pH=۷), temperature range (۲۰-۴۰ °C) and high salinity (close to sea's level).

Keywords: Membrane Bioreactor, *Enterobacter cloacae*, *Pseudomonas* sp., Crude oil, Wastewater, High salinity, Removal efficiency.