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# Identification of Membrane Foulants in Direct Contact Membrane Distillation for the Treatment of Reject Brine

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**Abstract :** Management of reverse osmosis (RO) brine has become a major area of research due to the environmental concerns associated with it. This study worked on studying the feasibility of the direct contact membrane distillation (DCMD) system in the treatment of this RO brine. The system displayed great potential in terms of its flux and salt rejection, where different operating conditions such as the feed temperature, feed salinity, feed and permeate flow rates were varied. The highest flux of 16.7 LMH was reported with a salt rejection of 99.5%. Although the DCMD has displayed potential of enhanced water recovery from highly saline solutions, one of the major drawbacks associated with the operation is the fouling of the membranes which impairs the system performance. An operational run of 77 hours for the treatment of RO brine of 56,500 ppm salinity was performed in order to investigate the impact of fouling of the membrane on the overall operation of the system over long time operations. Over this time period, the flux was observed to have reduced by four times its initial flux. The fouled membrane was characterized through different techniques for the identification of the organic and inorganic foulants that have deposited on the membrane surface. The Infrared Spectroscopy method (IR) was used to identify the organic foulants where SEM images displayed the surface characteristics of the membrane. As for the inorganic foulants, they were identified using X-ray Diffraction (XRD), Ion Chromatography (IC) and Energy Dispersive Spectroscopy (EDS). The major foulants found on the surface of the membrane were inorganic salts such as sodium chloride and calcium sulfate.

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