OIL REMOVAL IN WASTEWATER TREATMENT
PX ULTRAFILTRATION MEMBRANE

BACKGROUND

The removal of oils present in many industrial wastewater streams has become increasingly necessary in order to accommodate stringent discharge regulations and growing manufacturing costs. The utilization of ultrafiltration is an effective method for achieving this separation, allowing for safe discharge or re-use. The goal of this study was to investigate the performance of Synder's PX membrane in a representative feed stream and compare such performance to that of a leading competitor.

FEED SOLUTION, MEMBRANE, & OPERATING CONDITIONS

Synder's PX and an oily wastewater treatment membrane from a leading competitor were tested in flat sheet form. Testing was performed at 15 psi, at a crossflow rate of 0.5 gpm, and the system was run in total recirculation mode. Membranes were challenged with 1000ppm emulsified I-19 paraffinic vacuum pump oil, to which 500ppm sodium dodecyl sulfate was added an emulsifying agent. Flux performance was evaluated over time, and rejection was calculated via Abs_{531nm}.

Table 1: Operating Conditions and Membrane Specifications

Feed Solution	
Material	1,000ppm Emulsified I-19 Vacuum Pump Oil 500ppm SDS (as emulsifying agent)
Synder Membrane	
Type	PX Polyacrylonotrile-UF
Configuration	Flat Sheet
Competitor's Membrane	
Type	Polyacrylonitrile-UF
Configuration	Flat Sheet
UF Operating Parameters	
Pressure (PSI)	15
Cross Flow Rate (GPM)	0.5
Temperature (C)	25

RESULTS

Flat sheet membranes were tested in a feed stream comprised of emulsified oil, and performance was evaluated by monitoring flux Synder's PX membrane demonstrated superior clean water flux, and, by the 90-minute mark, both membranes reached an equivalent steady state flux of 61 GFD. Rejection, calculated using UV-Vis, was determined to be >99% for both membranes.

Table 2: Performance Results

Filtration Results	Synder PX	Leading Competitor
Rejection (%)	>99%	>99%
J_{water} (GFD)	176	102
J_{oil} (GFD)	61	61

CONCLUSION

In this study, Synder's PX membrane was evaluated for its oil retention and flux performance characteristics when challenged with a feed stream comprised of emulsified oil. The membrane of a leading competitor, designed for oily wastewater separation, was similarly evaluated. The results obtained indicate that PX is a membrane well-suited for oil removal in wastewater treatment applications, given by its competitive steady state flux and high retention characteristics, which were found to be comparable to that of the leading competitor.