

Membrane Separation of Oil in Water Emulsions

T. Mohammadi, M. Saadabadi and M. Kazemimoghadam

Research lab for Separation processes
Faculty of Chemical Engineering
Iran University of Science and Technology,
Narmak, Tehran, Iran

Abstract

Oily water emulsions are one of the main pollutants emitted into water by industry and domestic sewage. Also oily water in inland waterways and coastal zone has become one of the most serious issues of water pollution which needs to be resolved urgently.

The results obtained from an experimental study on separation of oil from oily waters are presented. The Film Tec FT30 membrane was employed and a synthetic emulsion using an Iranian crude oil was made.

The investigation was focused on the operating parameters that affect the permeate flux and fouling. The following parameters were taken into account: transmembrane pressure, cross flow velocity, temperature, oil concentration and salt concentration.

It was found that the flux increases with increasing the transmembrane pressure and also linearly increases with increasing temperature. Higher concentrations cause serious fouling on membrane surface, while higher velocities reduce concentration polarization.

The oil rejection efficiency decreases when pressure increases but in all cases it was found to be more than 99%. As a result, this membrane can be recommended for treatment of oily wastewater to produce almost pure water.

Key Words: Membrane; Oil in Water Emulsion; Separation; Operating Parameters

1. Introduction

Oily water emulsions are one of the main pollutants emitted into water by industry and domestic sewage. Also oily water in inland waterways and coastal zone has become one of the most serious issues of water pollution which needs to be resolved urgently [1-3].

So far, there exist several techniques for separation. Typical ones include chemical

demulsification, pH adjustment, gravity settling, centrifugal settling, filter coalescer, heating treatment, electrostatic coalescers and membrane techniques, etc [4-6]. There are some advantages and disadvantages to each of these demulsifications techniques.

Traditional techniques used in the separation of unwanted oil-in-water (O/W) emulsions, such as gravity settlement (API separator), flow throw