

Evaluation of microfiltration for the treatment of spent cutting-oil

JJ Schoeman* and O Novhe

University of Pretoria, Department of Chemical Engineering, Water Utilisation Division, Pretoria, South Africa

Abstract

A pilot plant using ceramic microfiltration membranes which could be regularly back-flushed with air for fouling control was evaluated for the treatment of spent cutting-oil. It was found that membrane fouling could be effectively controlled with regular air back-flushes (every 3 min for 1 s) and chemical cleaning using caustic soda. Permeate flux remained approximately constant and varied from 78 to 126 $\ell/\text{h}\cdot\text{m}^2$ for the first six runs and from 114 to 150 $\ell/\text{h}\cdot\text{m}^2$ for three more runs. An increase in feed temperature from ambient to 40°C and cleaning of the membrane with 1% caustic soda, increased permeate flux from 183 to 282 $\ell/\text{h}\cdot\text{m}^2$ and from 195 to 264 $\ell/\text{h}\cdot\text{m}^2$ in two more runs. Excellent COD (75.5 to 90.3%) and O&G (97.2 to 99.1%) removals were obtained. The permeate quality should be suitable for discharge to the municipal sewer system (O&G < 500 mg/ℓ) and the concentrated oil should be a useful energy source. Treatment of spent cutting-oil with microfiltration rather than landfilling should save valuable landfilling space.

Keywords: spent cutting-oil, microfiltration, permeate flux, fouling, COD removal, O&G removal