Analysis of membrane pore-blocking models applied to the MF of real oily wastewaters treatment using mullite and mullite–alumina ceramic membranes

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ABSTRACT

In microfiltration (MF) membrane processes the typical variation of the flux with time is that of initial rapid decrease followed by a long and gradual decline. The results of an experimental study regarding analysis of membrane pore-blocking models in separation of oil from oily wastewaters outlet of desalting unit of Seraje, Ghom, Iran gas wells are presented. Mullite and Mullite–Alumina (25, 50 and 75% alumina content) membranes were synthesized from kaolin clay and α-alumina powder as MF ceramic membranes. Hermia’s model was used to investigate the fouling mechanisms of membranes at different time intervals (0–2.5, 0–5, 5–20, 20–120 min), and (0–120 min). It can be found that Hermia’s model cannot be applied for prediction of permeation flux in any limited intervals of time since by increasing of time the filtration pore-blocking behavior changes and one model cannot predict pore-blocking behavior in all filtration time. In addition for (0–5 min) interval, maximum error of predicted permeation flux of cake filtration model is 2.96% but for (0–120 min) interval, minimum error of predicted permeation flux is 11.41%.

Keywords: Membrane fouling; Microfiltration; Ceramic membranes; Hermia’s model

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