Desalination and Water Treatment
www.deswater.com
9 (2009) 28–35
September
1944-3994 / 1944-3986
doi: 10.5004/dwt.2009.749

Influence of operating conditions on the retention of nickel in water by nanofiltration

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Received 15 September 2008; Accepted 23 June 2009

ABSTRACT

Discharge of heavy metals from metal processing industries is known to have adverse effects on the environment, high toxicity and tendency to accumulate in living organisms. Conventional treatment technologies (chemical precipitation, chemical oxidation or reduction, ion exchange, etc.) for removal of heavy metals from aqueous solution are not economical and generate huge quantity of toxic chemical sludge. Against this pollution, very strict standards were imposed for heavy metal content in water because of their high toxicity. The objective of this study was to investigate the retention heavy metals by nanofiltration. The first part of this study deals with the characterisation of the different types of nanofiltration membranes used (HL, NF200). In the second part the effects of feed pressure, ionic strength, concentration and pH on the retention of nickel ion were investigated. Results show that the rejection values changed according to the type of the NF membrane used. In addition, the experimental data were analysed using the Spiegler–Kedem model and the transport parameters, i.e., the reflection coefficient (σ) and solute permeability (P_s) have been determined.

Keywords: Nanofiltration; Nickel; Wastewater; Spiegler–Kedem model

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Presented at the Conference on Membranes in Drinking and Industrial Water Production, 20–24 October 2008, Toulouse, France.