

Ultrafiltration membrane cleaning with different chemical solutions after treating surface water

J.M. Arnal*, B. Garcia-Fayos, M. Sancho, G. Verdu

*Chemical and Nuclear Engineering Department, Polytechnic University of Valencia, Camino de Vera s/n, 46022 Valencia, Spain
Tel. +34 (96) 3879633; Fax +34 (96) 3877639; email: jarnala@iqn.upv.es*

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ABSTRACT

In recent years, application of pressure-driven membrane processes as ultrafiltration (UF) has expanded as an alternative promising technology to obtain drinking water for human consumption. Despite the strong potential of membranes, one of the common problems encountered in applications is membrane irreversible fouling. AQUAPOT project faces this common problem in the spiral-wound UF facilities that are located in Ecuador and Mozambique. Lack of chemicals and application of not optimized cleaning protocols have been revealed as the main causes that explain dramatic decrease in permeate flow observed in several installations. A simulation of this situation has been initiated in the Naquera Research Center (Valencia) with the aim of studying the main causes of irreversible membrane fouling due to long-term filtration of surface water. Physical, chemical (static and dynamic test) and physicochemical cleaning techniques have been studied to recover permeate flow of spiral-wound UF fouled membranes. This work describes the experimental procedure performed in chemical dynamic tests and the main results obtained for five different chemical solutions tested at two different temperatures (25 and 40°C). FTIR, SEM and EDX analysis of fouled and cleaned membranes have also been included so as to characterize the nature of membrane fouling in the gel layer and to evaluate cleaning efficiency of the chemical solutions and working conditions tested.

Keywords: AQUAPOT; Ultrafiltration; Chemical cleaning; Surface water; FTIR; SEM–EDX

* Corresponding author.