

COMPATIBILITY OF NONIONIC SURFACTANTS WITH MEMBRANE MATERIALS AND THEIR CLEANING PERFORMANCE

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ABSTRACT

Membranes applied in industrial processes, such as for the desalination of seawater as well as for dairy and beverage industry are subjected to fouling resulting in a decline of their performance. In order to regain the flux of the membranes, cleaning procedures are conducted, whereby inorganic scale is often removed with acids and organic matter with surfactants under alkaline conditions. Currently, either ionic surfactants or alkylphenol ethoxylates are utilised to clean membranes from organic matter. Other nonionic surfactants (i.e. fatty alcohol ethoxylates) are not applied, due to the assumption that they irreversibly adhere to the membrane surface and thereby clog the pores. At BASF we have studied the adsorption of a wide range of nonionic surfactants to membrane materials. It was shown, that the affinity of nonionic surfactants critically depends on their structure. Linear alkyl ethoxylates irreversibly adsorb to the membrane surfaces, whereas branched alkyl ethoxylates did not.

In a second step, we tested the cleaning performance of nonionic surfactants. Similar to the results for adsorption, a structure-performance relationship was discovered where several branched alkyl ethoxylates showing excellent cleaning results.

In a third step, combinations of nonionic surfactants, chelating agents and enzymes were tested in terms of cleaning efficiency. All tested combinations showed excellent cleaning performance on bacterial fouling layers.