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Ozonation and perozonation of humic acids in nanofiltration concentrates

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ABSTRACT

Nanofiltration is an attractive technology to treat surface water for the production of drinking water. Due to scaling and fouling of the membranes, the water recovery in nanofiltration is generally limited to about 80%. This paper is part of a project which elaborates the concept where the concentrates are treated, so they can return to the feed side of the membrane, without increased membrane fouling, in order to reduce the water loss. The efficacy of ozonation and perozonation to remove humic acids in the concentrate is evaluated in this paper. In particular, the degree of mineralization, the amount of hydrophobic components and the destruction of high molecular mass fractions are considered. Chemical oxygen demand (COD) decreases fast with increasing ozone concentrations but reaches an asymptotic value of 40% of the initial COD, which is too high for this case. There is a selective removal of hydrophobic COD and high molecular mass chains are decomposed efficiently. The process could not be improved by changing the pH or by simultaneous adding hydrogen peroxide to the solution.

Keywords: Nanofiltration; Concentrate treatment; Water conservation; Humic acid; Ozone; Hydrogen peroxide; Advanced oxidation

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