

Process intensification during treatment of NOM-laden raw upland waters: Control and impact of the pre-coagulation regime during ultra-filtration

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ABSTRACT

The use of upstream pre-coagulation coupled with downstream ultra-filtration (UF) has been applied to the clarification of natural organic matter (NOM) laden raw upland water. Such a combination yields a significant increase in possible loading rate and a decrease in the propensity for internal membrane fouling, allowing for an intensification of the process. In particular, the effect of controlling the pre-coagulation regime on the downstream UF has been investigated. It has been shown that zeta potential (ZP) can be used to detect changes in the coagulation process, and hence to determine appropriate dosage levels. This is important, as incomplete coagulation has a detrimental effect on UF membrane performance, particularly in terms of fouling caused by excess iron. Submerged hollow-fibre membrane units yield superior performance with pre-coagulation, and sufficient slow mixing of coagulant guarantees high permeate flow recovery after backwashing. Fouling by NOM can be remedied by conventional cleaning techniques. However, fouling due to excess iron can only be removed by heating the cleaning solution. The associated costs are thus twofold; that of excess coagulant and that of cleaning.

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