The evaluation of RO membrane performance with pretreatment membrane on municipal sewage treatment

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ABSTRACT

In this research, to investigate totally the phenomenon of concentration and dilution in microfiltration membrane (MF)- reverse osmosis membrane (RO) hybrid process, it was operated for sewage with the change of variables such as temperature and TMP (trans-membrane pressure). MF modules were used directly without pretreatment and then MF permeate was sent to RO module. For evaluation of membrane fouling at a point of time, continuous process was conducted at a fixed temperature and TMP. With physical cleaning by air-stripping, permeate flux of MF module was decreased by the lapse of time. After 11 h, permeate flux in RO was decreased drastically and it implied the cleaning period of RO module. The removal efficiency of chemical oxygen demand (COD), T-N, T-P, total dissolved solid (TDS) and turbidity in RO module was observed high values over 94% regardless of the variations of temperature and TMP. It suggests that this system is very suitable for the treatment of sewage and the treated water is satisfied on environment standard. Turbidity was removed sufficiently in microfiltration modules and pH values were maintained under 6.5–8.1 range. In RO module, degree of concentration (DC) of COD, T-N, T-P and TDS was shown high values. T-N, T-P and TDS were shown very high DC values because of low removal efficiency in microfiltration modules.

Keywords: Immersed microfiltration membranes; A spiral wound reverse osmosis membrane; Sewage; Emission water quality of permeate; Environment standard

1. Introduction

Antique documents for the water pollution related closely to humans were recorded in history of the ancient Roman era’s wastewater facilities. Actual sanitation had not been managed until the 1800s of industrial revolution. At that time, the industrial revolution led to the formation of slum and the abrupt outbreak of various diseases although it raised the living standard. Such situations let advanced nations (e.g. the United Kingdom) reflect to repair sewer and construct sewage disposal plant, additionally to legislate against the environmental pollution of the sewage [1]. Meanwhile, there are many causes of water pollution such as sewage, industrial wastewater, livestock wastewater, solid waste and so on. The treatment of wastewater is indispensable to preserve the ecosystem, whose processes are characterized by various effects during operation. The treatment of wastewater enables us to

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