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Cost model for chitin production alkali wastewater recovery by couple-membrane filtration

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ABSTRACT

A model which can be applied to explore the impact of variables of couple-membrane system on the capital costs and operating costs is presented, in industrial filtration and sodium hydroxide recovery of the alkali wastewater from chitin production plants, for investment and operating costs of stainless steel ultrafiltration membrane (SSF) and alkali tolerant nanofiltration membrane (NF). The permeate flux models of SSF and NF set previously for these raw alkali wastewaters were used to simulate the filtration process. According to previously industrial experiments and actual investment data supplied by membrane manufacturers, the cost models were developed. Data used in simulations had been selected from previously pilot studies. For a normal design capacities (100 m^3/day), the trend of operating costs increases depends greatly on the module number of SSF. The total cost is the sum of capital costs and operating costs. Among the costs compositions, the capital costs of SSF is about 62% while that of NF is only 27%, and the operating costs is less than 11% of the total cost. The capital and operating costs decrease as the capacity of plants increase. The total cost decreases linearly with the increase of membrane permeates flux.

Keywords: Cost model; Chitin wastewater; Ultrafiltration; Nanofiltration; Alkali recovery

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