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UF as Pretreatment of RO for Tertiary Treatment of Biologically Treated Distillery Spentwash

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Abstract : Distillery spentwash contains high chemical oxygen demand (COD), biological oxygen demand (BOD), color, total dissolved solids (TDS) and other contaminants even after biological treatment. The effluent can't be discharged as such in the surface water bodies or land without further treatment. Reverse osmosis (RO) treatment plants have been installed in many of the distilleries at tertiary level. But at most of the places these plants are not properly working due to high concentration of organic matter and other contaminants in biologically treated spentwash. To make the membrane treatment proven and reliable technology, proper pre-treatment is mandatory. In the present study, ultra-filtration (UF) as pre-treatment of RO at tertiary stage was performed. Operating parameters namely initial pH (pHo: 2–10), trans-membrane pressure (TMP: 4-20 bars) and temperature (T: 15- 43°C) used for conducting experiments with UF system. Experiments were optimized at different operating parameters in terms of COD, color, TDS and TOC removal by using response surface methodology (RSM) with central composite design. The results showed that removal of COD, color and TDS by 62%, 93.5% and 75.5%, with UF, respectively at optimized conditions with increased permeate flux from 17.5 l/m2/h (RO) to 38 l/m2/h (UF-RO). The performance of the RO system was greatly improved both in term of pollutant removal as well as water recovery.

Keywords : bio-digested distillery spentwash, reverse osmosis, response surface methodology, ultra-filtration
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