

Design and Evaluation of Ultrafiltration System for the Treatment of Rubber Gloves Industry Wastewater- Case Study at Lalan Rubber (Pvt.) Ltd in Seethawaka

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Abstract

Water is a limited natural resource that is crucial to the world's social and economic growth. For industries, water is an essential factor. Lalan Rubber (Pvt) Ltd, situated in the Seethawaka Export Processing Zone, requires a large volume of water for the manufacturing of latex-based gloves. The required water is supplied by the BOI (13,000m³/day), but this amount is not sufficient to increase the production. The reuse of wastewater is one of the alternative solutions to increase the production capacity. In this study, we attempted to reuse the wastewater produced from the second rinsing (Cholornation section) of rubber products after filtrations. The objectives of this study were to design and evaluate the ultrafiltration (UF) system, and to perform a cost-benefit analysis after installation of the plant. A feasibility test was performed before designing the plant. The flow rate and the particle size distribution of second rise water were measured and then the UF system was designed by using a software (DOW Water Application Value Engine, USA) and filter size tables. The installed UF system was evaluated for three months using selected wastewater properties (BOD₅, COD, TSS, pH, and turbidity). The cost and benefits were also determined. The results revealed that the UF system reduced BOD₅, COD, TSS, and turbidity to 76.08%, 66.16%, 98.4%, and 97.24%, respectively. The treated water parameters were in the satisfactory range for glove production. The cost-benefit analysis revealed that the cost of production of the UF plant was Rs. 2,445,000 and it can be recovered within 186 days consuming the treated wastewater. It can be concluded that UF systems can be used as a treatment system for wastewater generated from rubber industries while using the treated water for the production lines (chlorination section) as freshwater.

Keywords: Rubber gloves, Ultrafiltration, Wastewater, Wastewater treatment, Water quality

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