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CERAMIC MEMBRANE BASED MICROFILTRATION FOR TREATMENT OF HIGHLY CONTAMINATED TANNERY WASTEWATER

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Abstract

The feasibility of treating tannery wastewater having high organic loads was studied using ceramic membrane based microfiltration process. The common effluent treatment plant (CETP) of a centralized leather complex was selected for the study which accommodates about 450 tanneries in the city, processing hides from raw to finished products. Effluent sample was collected from different locations of the CETP, i.e. untreated composite effluent, effluent from primary clarifier and from equalisation tank. The effluent had varying chemical oxygen demand (COD) and biochemical oxygen demand (BOD) values of 18,480-1500 mg/L and 5720-880 mg/L, respectively and turbidity of 2480-604 NTU. Prior to microfiltration study composite effluent was subjected to biological pretreatment using activated sludge collected from the common effluent treatment plant. The dried biomass was characterized by Fourier transform infrared spectroscopy (FT-IR). Crossflow microfiltration (CMF) study was conducted using indigenously developed porous ceramic membranes by the Central Glass and Ceramic Research Institute from cost effective composition of α -alumina and clay. COD and sulphide removal efficiency was observed with time for the direct microfiltration and microfiltration of pretreated effluent. The combined process was found highly effective for COD and sulphide removal. Depending on the initial loadings, about 67-92% removal of COD and 98-99% reduction of sulphide was obtained in the combined process whereas, in the single stage process, the removal was 48-68% and 60-65%, respectively. Membrane fouling was investigated using the linearized forms of cake formation equations obtained by Wiesener and Aptel.

Key words: ceramic membrane, composite tannery effluent, crossflow microfiltration, permeate flux

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