



A study on enhancing physical cleaning effectiveness in microfiltration membrane system

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ABSTRACT

Fouling control is generally taken by selective pre-treatments, proper membrane operation conditions, and various membrane cleaning methods. The compactness and growth of cake layer on the membrane surface should be timely controlled by mechanical force or hydraulic action. In this work, the sequence of physical cleaning method was strategically introduced by changing cross-flow velocity (CFV), backwash intensity, and backwash waste discharge method from membrane housing. Intensive backwash flush was automatically applied when delta TMP obtained after backwash events was more than 2%. It provided higher pressure on the permeate side of the membrane compared to the normal backwashing, resulting in the reduction of sharp increase of TMP during several operation modes. In addition, the variation of CFV from 0 to 16 m/d based on the membrane fouling index caused turbulence on the membrane fiber, resulting in the discharge of particles accumulated on the membrane surface from membrane module. Finally, flushing mode followed by filtration was more effective in maintaining the TMP stable rather than discharging mode. Flushing effect could induce another shear force to the suspended solids in the bulk and remove cleaning wastes effectively from membrane housing. Large particulates and colloidal matters could be controlled by the proper sequence of physical cleaning based on the TMP monitoring. Furthermore, the strategic physical cleaning could sufficiently reduce not only TMP increase but also the damage of membrane, which is resulted from the more frequent and aggressive chemical cleanings.

Keywords: Cross-flow velocity; Flushing effect; Fouling; Intensive backwash flush; Physical cleaning

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