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Chemical Cleaning of Ultrafiltration Membranes for Polymer-Flooding

Wastewater Treatment: Efficiency and Molecular Mechanisms

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Abstract

In a polymer-flooding wastewater treatment process, physically irreversible fouling of ultrafiltration (UF) membranes is severe and inevitable. Particularly, anionic polyacrylamide (APAM) aggravated flux loss is a challenge in flux recovery. Chemical cleaning procedures for polyvinylidene fluoride (PVDF) UF membranes fouled by polymers (e.g., APAM) were designed by investigating their cleaning efficiency, synergistic effect and molecular interactions based on the molecular mechanisms of polymeric fouling. The cleaning efficiency and foulant–foulant intermolecular interactions indicated that the destruction of the hydrogen-bonded network, egg-box shaped gel network, and interpenetrating polymer network using sodium hypochlorite (NaClO), ethylenediaminetetraacetic acid (EDTA) and dodecyl trimethyl ammonium chloride (DTAC) solutions, respectively, led to significant flux recovery. The synergistic relationships between the two types of cleaning reagents were different in the mixed solutions and sequential procedures. In addition, oil

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