



Fouling and cleaning of gas-filled membrane for cyanide removal from acrylonitrile wastewater

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ABSTRACT

Gas-filled membrane absorption process is a safe, effective and economic method for acrylonitrile wastewater treatment. However, membrane fouling is a serious problem affecting proper operation of gas-filled membrane system. This study investigated the fouling characteristics in a 72 h continuously operating gas-filled membrane, and proposed an effective method to clean the membrane modules. In the gas-filled membrane system for acrylonitrile wastewater treatment, HCN transfer through gas-filled membrane stopped in two hours because of fouling. Cyanide removal rate achieved 82.0%. Permeation caused by hydrophilization occurred when gas-filled membrane absorption period was long enough, which led to operation failure of the whole treatment system. Inorganic fouling caused by Fe was found as the predominant reason. Four cleaning agents and three cleaning modes were applied for the fouled membrane to recovery mass transfer coefficient (K). The four-step cleaning (tap water-HCl-NaOH-EDTA) was recommended for the hydrophobic membrane system. The recovery of K value reached 95% for each cleaning cycle, which was confirmed in the pilot study as well. The results showed that it is feasible to reuse membrane modules during gas-filled membrane process for acrylonitrile wastewater treatment.

Keywords: Gas-filled membrane; Fouling; Cyanide; Acrylonitrile wastewater

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