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In this paper, we describe the process of adding tetraethoxysilanes (TEOS) into the polyvinylidene fluoride (PVDF) casting solution to prepare inorganic-organic hybrid membrane by casting and immersing into an HCl (pH = 1), NaOH (pH = 10) and water bath. All the obtained membranes were characterized by scanning electron microscope (SEM), ultrafiltration performance and mechanical property tests. The results showed TEOS could dramatically improve the mechanical properties (Tensile Strength and Youth Module) with the pure water flux and protein rejection stable. SEM photographs showed TEOS with different content could affect the microstructure of the hybrid, and different bath resulted to different microstructure. At last, the suitable bath and TEOS content was determined.

Keywords: PVDF; TEOS; Hybrid membrane

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Enhanced phenol removal by floating fungal populations in high concentration phenol-fed membrane bioreactor

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Abstract

Sludge bulking and washing out phenomenon were observed at high concentration of phenol wastewater in conventional activated sludge processes. Very little is known about the role of "bulking" floating population in aromatic degradation. In this study we hypothesized that phenol-driven floating populations may have ability to efficiently degrade phenol. To examine this hypothesis, we used membrane bioreactor (MBR) to catch floating bulking microorganisms, and then characterized their phenol degradation and community analysis. In MBRs, phenol was fed individually as a sole carbon source in non-toxic (100 mg/L) and toxic (1,000 mg/L) concentrations. DO, pH, VSS, phenol, and TOC were measured constantly. Phenol degradation by floating filamentous populations was evaluated using initial phenol degradation rate assays. For community structure and non-settle microorganism identification, bacterial and fungal ribosomal RNA genes were amplified, cloned and sequenced.

Initially the higher phenol concentration resulted in inhibitive effect on growth in the sludge microbes. However, after an acclimation period, floating aggregates were formed and the fed amount of phenol was completely degraded. Microscopic investigation showed that filamentous microorganisms were dominant in the floating aggregates. The following initial degradation assays revealed that the non-settling populations exhibited at least five time greater rate of phenol degradation than the settling sludge populations. The following 18S rDNA analysis revealed that dominant microorganisms in non-settling portions were fungal populations. The findings suggest that MBR is able to capture the floating fungal populations, resulting in an enhancement of phenol removal in the reactor.

Keywords: MBR; Phenol; Filamentous population; Community structure; Fungal ribosomal RNA gen

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Characteristics and application of multiple membrane process in plating wastewater reutilization

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Abstract

A multiple membrane process aimed at reutilization of plating combined wastewater after physical and chemical pretreatment in mechanical industry was developed for selective separation to reduce cost and mitigated the increasing heavy metal pollution. The process was divided into three stages: firstly, microfiltration (MF) and ultrafiltration (UF) was used to separate the possible organic and suspended mat-