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PREPARATION OF POLYACRYLONITRILE ULTRAFILTRATION MEMBRANE WITH ANTI-BIOFOULING AND ANTIBACTERIAL ACTIVITY BY CLICK CHEMISTRY

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Abstract

Ultrafiltration membranes with antibacterial and anti-fouling properties were prepared by click chemistry, through synthesizing tetrazole polyacrylonitrile with acrylonitrile as the raw material by click chemistry, where grafted Sulfonic acid groups were, and chelated silver ions were adopted to fabricate the polymer. Then the properties of these membranes, were characterized by using Fourier-transform infrared spectroscopy, nuclear magnetic resonance hydrogen spectroscopy, X-ray diffraction, scanning electron microscopy, and contact angle analysis, etc. Some notable results were obtained comparing to the PAN membrane, including a decrease of contact angle from 62.17° to 55.14°, reduction of the irreversible fouling index from 67% to 61.9%, and a decrease of the total fouling index was from 30.73% to 16.23% of the PAN-N membrane decreased. Further investigations show its anti-fouling performance was enhanced, with the total fouling index decreasing of 56.1%, and the irreversible fouling index of 8.97%. The chelated silver ion ultrafiltration membranes achieved antibacterial rates of 96.2% against *Staphylococcus aureus* and 96.1% against *Escherichia coli*, with inhibition zones of 1.9mm and 2.1mm, respectively.

Key words: antibacterial, anti-biofouling, hydrophilicity, polyacrylonitrile, sulfonic groups

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