표면개질 및 미개질 chlorinated poly (vinyl chloride) 막을 이용한 sludge Crossflow microfiltration

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Crossflow microfiltration of sludge using modified and unmodified chlorinated poly (vinyl chloride) membranes

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1. Introduction

The chlorinated poly(vinylchloride) (CPVC) membranes for the microfiltration process were prepared by using a combined processing of a solvent evaporation technique and the water vapor induced phase inversion. The surface pore size of the membrane prepared was strongly affected by the relative humidity (RH). The pore size of the CPVC membrane prepared at RH 70%, 25iÉ is about 0.7 *m*m. These membranes were very hydrophobic. Thus these membranes were subjected to the surface modification by the UV-assisted graft polymerization with the monomer N-vinyl-2-pyrrolidinone (NVP) to increase the surface wettability and decrease the adsorptive fouling. The grafting yields of the modified membranes were controlled by altering UV irradiation time and NVP monomer concentration. The changes of chemical structure band Jetween CPVC membrane and PNVP-CPVC membrane and the variation of the topologies of the modified CPVC

membranes were characterized by FT-IR, GPC, FE-SEM. As a result, the graft yield of the modified CPVC membrane was the maximum value at 5 min-UV exposure time and 20 vol.% NVP concentration. The filtration behaviors of all membranes were investigated with both the deionized water and sludge by the crossflow filtration measurement.

2. Experimental

After chlorinated poly(vinylchloride) (CPVC) membranes for the microfiltration process were prepared by using a combined processing of a solvent evaporation technique and the water vapor induced phase inversion, these membrane was modified by the UV-assisted graft polymerization with the monomer N-vinyl-2-pyrrolidinone (NVP). And then the grafting yields of the modified membranes were controlled by altering UV irradiation time and NVP monomer concentration. The changes of chemical structure band Jetween CPVC membrane and PNVP-CPVC membrane and the variation of the topologies of the modified CPVC membranes were characterized by FT-IR, GPC, FE-SEM.

The filtration behaviors of all membranes were investigated with both the deionized water and sludge by the crossflow filtration measurement.

3. Results and discussion

Preparation of the microporous CPVC membrane for the microfiltration was successfully conducted and its surface modification for increasing the surface hydrophilicity was carried out by grafting of the NVP monomer with an UV-assisted polymerization technique. The surface hydrophilicities of the modified CPVC membranes increased as the same of the graft yield.

The graft copolymerization of NVP onto the CPVC membrane surface was carried out as a function of UV exposure time and the monomer concentration. NVP was successfully grafted on the CPVC membrane surface as confirmed from FT-IR, GPC, FE-SEM and AFM. The

membrane of the 117.23 *mg*/cm2 graft yield was grafted about on 150 moles NVP monomer. Contact angles of the modified membranes had a tendency to decrease with an increase of the graft yield as compared with the unmodified CPVC membrane. With an increase of the DG, the pore size and the porosity of the modified membranes tended to decrease due to grafting of NVP on the surface and pore wall. RMS roughness and mean roughness increased with an increase the graft yield. The filtration performances of membranes were studied as for the graft yield. The modified membranes showed a decrease in a deionized water flux due to the narrowed and plugged pores in the dead-end filtration test. On the other hand, in the crossflow filtration test, the flux of the modified membrane was higher than the unmodified membrane and the transmembrane pressure (TMP) was gradually increasing. The reason is the increased hydrophilicity of the membrane surface. With increasing the circulation velocity in the crossflow filtration test, TMP was rapidly increased but a filtration flux was rarely changed.

4. References

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