

Influence of dope composition of polyethersulfone membrane blend with cellulose nanocrystal and carboxylated multi-walled carbon nanotube on humic acid rejection

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ABSTRACT

A full factorial experimental design was employed to investigate the dope composition of a membrane made of cellulose nanocrystal (CNC), multi-walled carbon nanotube (MWCNT), and polyethersulfone (PES) for its ability to reject humic acid (HA). Four factors were screened, including PES composition, polyvinylpyrrolidone content, CNC content, and carboxylated MWCNT content. The membranes were tested for HA rejection using a 10-ppm aqueous feed solution. The results indicated that the percentage of MWCNT had the most significant impact, contributing 72.31% to the overall contribution. The fabricated membranes exhibited high HA removal capacity of up to 90% for the membrane embedded with MWCNT. The model's predicted values agreed reasonably with the experimental data, indicating the model's validity. This study provides insights into the development of CNC/MWCNT/PES membranes for efficient HA rejection in water treatment applications.

KEYWORDS

Humic acid rejection; Cellulose nanocrystal; Multi-walled carbon nanotubes; Polyethersulfone membrane

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