HIGH PERFORMANCE DESALINATION MEMBRANE

Abstract

Reverse osmosis (RO) membranes are used in the field of desalination technology. Nowadays, more than 16 million m3/d of water is treated by this means. RO membranes can be classified by material as cellulose acetate, thin-film composite and ceramic membranes. Thin-film composites (TFC) are the most used membranes in global market.

Recent developments focus on additives for the active layer of TFC desalination membranes, which change the chemistry and structure of the interfacially polymerized film including increasing hydrophilicity and water flux, improving adsorption and diffusion of reactants, facilitating the polycondensation reaction and antifouling purposes

Technology Overview

The aim of this technology is the use of zwitterionic polymers as additives or coatings for the active layer of TFC desalination membranes in order to increase their performance. The zwitterionic properties of the used polymers cause an increase in membrane hydrophilicity and electrostatic repulsion between membrane surface and feed solution. These two properties will have a positive effect on membrane flux and salt rejection and will also eventually decrease membrane fouling and membrane defects due to chlorination.

Zwitterionic trialkoxysilane sulfobetaine monomers (SPPT) were used in the interfacial polymerization process for the preparation of thin film composite (TFC) membranes for reverse osmosis (RO) applications. Zwitterionic structures have attracted a great deal of interest in water treatment membrane preparation because of their high degree of hydrophilicity and antifouling properties.

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Technology Features And Specifications

Significant improvements up to 31% in the water flux without loss of salt rejection at seawater desalination conditions were observed in the modified membranes with low SPPT concentrations. Our invention aims do desalinate high salinity seawater at higher recovery rates than state of the art membranes. These are the most promising features of this invention:

- Higher water flux without loss of the salt rejection
- Decreasing membrane fouling and membrane defects
- Food industry for the processing of liquid items

Potential Applications

High performance desalination membranes can be utilized in several areas such as;

- Desalination and wastewater treatment industry
- Chemical industry
- Pharmaceutical industry
- Food industry for the processing of liquid items

Customer Benefits

- Improvements in the performance of TFC membranes will increase the feasibility of desalination technology for drinking water production.
- Longer membrane life time with a higher salt rejection.

Market Trends & Opportunities

Improvements of TFC membranes in general and especially for seawater desalination purposes have many contributions to economy, wealth and scientific knowledge. As part of water management strategy, global companies are increasingly employing membrane technologies to improve the output efficiency.

The market will grow because of the increase in projects in the municipal sectors of developing economies. The membrane market is dominated by Reverse osmosis membranes with the percentage of %77 in the global market. The market is expected to grow to $590.5 million in 2021 at a CAGR of 10.9%.