PROGRESS OF NANOFILTRATION MEMBRANES

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ABSTRACT

Over the past decades, nanofiltration membranes (NF) has emerged as a new membrane process and widened the application range of membranes in liquid-phase separations. NF has been introduced to indicate a specific boundary of membrane process located between in ultrafiltration (UF) and reverse osmosis (RO). RO membranes reject both small organic molecules and salts, while UF freely pass both of them. NF membranes, on the other hand, retain organic mo;ecules and certain multivalent salts, but pass most monovalent salts. NF membranes are believed to be porous with an average pore diameter of 1-2 nm. As a general rule, the nominal molecular weight cut-off value ranges from 200-1000. Salt rejection by NF membranes is mainly due to electrostatic interaction between the ions and the membrane, and neutral organic species are rejected because of size exclusion. Since NF membranes cannot retain monovalent salts, the osmotic pressure difference of NF is much less than for an RO membrane. Thus, NF membranes require lower operating pressures than RO.

By improving the membrane performance in high flux, low fouling and chemical resistance, NF application fields are rapidly growing in many areas, such as drinking and process water treatment by removing hardness and dissolved organic molecules from water. Wastewater treatment in chemical plants, textile and pulp industries is another big market for NF application. The solvent resistant membranes are likely to be very useful for the separation of products and the recovery of catalysts in the fine chemical, pharmaceutical and food industries.

In the forum a brief overview of NF and it’s application in aqueous and in non aqueous system will be presented and some NF membranes developed in KRICT, Membrane and Separation Research Center will be also introduced.