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Commentary

Mechanism of Nano Filtration Membrane and Its Applications

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DESCRIPTION

Nano Filtration (NF) membrane is a type of membrane filtration that is commonly used to emulsify and disinfect water. It is a technique that uses nano-meter-sized porous structure through which particles smaller than 10 nm wavelength transfer. Nano Filtration (NF) membrane have pore sizes ranging from 1 to 10 nm, which are smaller than those used in Micro Filtration (MF) and Ultra-Filtration (UF) but significantly larger than those used in Reverse Osmosis (RO). Polymer thin films are commonly used to create membranes. Polyethylene terephthalate and metallic materials are examples of commonly used materials. During development, pH, temperature, and time control permeability measurements, with pore densities ranging from 1 to 106 pores per cm^2.

Membranes made up of polyethylene terephthalate and other similar materials are known as "track-etch" membranes, after the method by which the pores on the membrane surface are established. The polymer thin film is "tracked" by infecting it with high-energy particles. This results in the porous structure, which are chemically developed into the membrane or "etched" into the membrane. Alumina membranes, for example, are manufactured by electrochemical reaction developing a thin layer of aluminum oxide from aluminum metal in an acidic environment.

Nano Filtration (NF) is a membrane separation technology that communicates many characteristics with Reverse Osmosis (RO). In contrast to RO, which rejects almost all dissolved solutes, NF rejects multivalent ions such as calcium while rejecting monovalent ions such as chloride. Nano Filtration (NF) membrane is a relatively new pressure-driven membrane filtration process. Because of the pore structure of the membrane and the trans-membrane pressure difference, both molecular diffusion and heat conduction emissions occur during transport through the membrane.

The nano filtration technique is mainly used to remove two-valued ions as well as larger monovalued ions such as heavy metal ions. This method can be assumed as a coarse Reversed Osmosis (RO) membrane. Because nano filtration utilizes very few perfect membranes, the feed pressure of an NF system is generally lower than that of a RO system. In addition, the fouling rate is lower when compared to Ro systems.

APPLICATIONS OF NANO FILTRATION (NF) MEMBRANE

Specialized heavy metal separation from gasification processes for water recycling. Reducing the salt concentration of slightly brackish water. NF membranes typically remove 50% of the NaCl and 90% (or more) of the $CaSO_4$. Because it provides higher flux rates and uses less energy than a reverse osmosis system, Nano filtration is sometimes used to recycle wastewater. The structure and operation of Nano filtration is similar to that of reverse osmosis membrane, with some differences. The main difference is that the reverse osmosis membrane is not as "tight" as the micro membrane. It operates at a lower sludge pressure and does not remove monovalent ions from water as effectively as the RO membrane.

A Reversed Osmosis (RO) membrane will typically remove 98-99% of monovalent ions such as chlorides or sodium, whereas a nano-filtration membrane will typically remove 50% to 90%, based on the material and manufacturing process of the membrane. Nano-filtration is frequently used to remove durability from water while removing the total dissolved solids content less affected than RO because of its ability to efficiently remove mono and trivalent ions. As a result, it has been called as the "softening membrane." Nano-filtration is frequently used to filtration system water that has low dissolved solids total levels, remove organic compounds, and soften water.

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