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Short communication

# General Outlook on Forward Osmosis (FO) Membrane: An Osmotic Process

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## DESCRIPTION

A Forward Osmosis (FO) membrane is an osmotic method that uses a semi-permeable membrane to separate water from dissolved solutes, which is similar to the Reverse Osmosis (RO) membrane. An osmotic pressure gradient drives this separation process, in which a high-concentration "draw" solution is employed to generate a net flow of water through the membrane into the draw solution, effectively separating the feed water from its solutes. Hydraulic pressure is used as the driving force for separation in the Reverse Osmosis (RO) membrane technology, which helps to overcome the osmotic pressure gradient. As a result, the energy required by the reverse osmosis membrane is greater than that of the energy required by the forward osmosis membrane. A feed solution, such as industrial effluent, flows from one side of the water membrane, while a drawn solution with higher Total Dissolved Salinity (TDS) flows from the other side in a Forward Osmosis (FO) system. The difference between the total dissolved salinity of two sides provides an osmotic pressure, which causes water to flow from the feed solution through the membrane into the draw solution while contaminants in the feed stream are retained.

Water is transported through the membrane by osmotic pressure, while all solutes are retained on the opposite side. The forward osmosis membrane process is a very effective filtration technology that ensures only pure water to be removed from the feed solution. It can be used for a variety of industrial water treatment applications, which includes waste water management, product concentration, and water recycling. It is also a technology that consumes less energy than other water treatment techniques that rely on hydraulic pressure as it is based on the natural energy of osmotic pressure. The major differentiation between a Reverse Osmosis (RO) and a Forward Osmosis (FO) membrane is the way how the water is carried through it. In reverse osmosis, water is driven across the membrane by hydraulic pressure, whereas natural osmotic pressure is used in forward osmosis to promote water flow across the membrane. The forward osmosis method is resistant to pollutants and mitigates polluting material compaction on the surface of the membrane as it operates at low hydraulic pressure. Forward Osmosis (FO) is a separation process that uses osmotic pressure variations caused by the differences in solute concentration of the feed and draw solutions.

## CONCLUSION

Depending on the nature of the draw solution and the feed water, we may see solute diffusion in both directions during the Forward Osmosis (FO) method where solutes from the draw solution may diffuse into the feed solution, and solutes from the feed solution may diffuse into the draw solution. Clearly, these phenomena have implications in the selection of certain draw solution for forward osmosis system. For example, in osmotic membrane bioreactors, a loss of draw solution may impact the feed solution due to contamination of the feed stream. The forward osmosis technique is known as osmosis, and also coined as "engineered osmosis" and "manipulated osmosis" in the case of few organisations according to their own terminology. Water can pass through the Forward Osmosis (FO) membrane, but other chemicals cannot. The rejection rate is the effectiveness with which it completes the latter task. The important characteristics of a successful forward osmosis membrane include a high rejection rate, robustness against membrane fouling, and the ability to endure high amounts of Chemical Oxygen Demand (COD) and Total Organic Carbon (TOC). The membrane is also keeps reverse flux to a minimum to allowing as little solute from the draw solution as possible to diffuse through the membrane into the feed solution.

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