Forward Osmosis (FO)

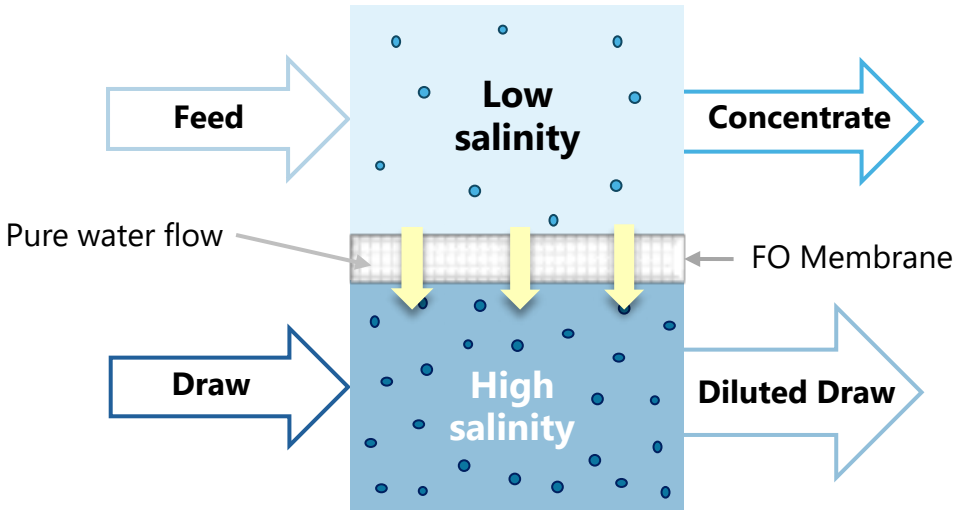
Process Description

FO is a membrane-based separation process that utilizes the natural osmotic pressure difference between two solutions. Water from a lower-salinity feed stream passes through a semi-permeable membrane into a higher-salinity draw solution to achieve osmotic equilibrium. The resulting diluted draw solution can then be processed to recover water, typically using a separate treatment step.

FO can also be applied in osmotic concentration (OC) applications, where water is transferred from a feed stream to a concentrated draw solution without subsequent water recovery.

FO offers several advantages, including the absence of hydraulic pressure requirements for water transport and a lower membrane fouling propensity than reverse osmosis membranes. These characteristics can reduce operational challenges and make FO an attractive option for volume reduction and brine management applications.

Process Schematic



Publications

- Industrial wastewater volume reduction through osmotic concentration: membrane module selection and process modeling (Link)
- Application of forward osmosis for reducing volume of produced/Process water from oil and gas operations (Link)
- Application of hollow fiber forward osmosis membranes for produced and process water volume reduction: an osmotic concentration process (Link)

Patent

Osmotic concentration of produced and process water using hollow fiber membrane (Link)

For further information, please contact us at email: GWSC@conocophillips.com