FTS H2O™
Fluid Technology Solutions

Concentrated Salt Brine Production From Desalination Plants

MEMBRANE SYSTEM SOLUTIONS FOR INDUSTRIAL APPLICATIONS | **ENHANCED DESALINATION PROCESS**

Application Background

In parts of the world where NaCl must be imported as a feedstock for chlor-alkali production, purifying and concentrating salt from desalination plant reject streams can be an economical source, if the right technology is available. FTS H2O is deploying the Osmotically Assisted RO (OARO) brine concentration process for this purpose. This membrane concentration technology works together with nanofiltration (NF) to achieve both high purity and high concentration NaCl brine.

FTS H2O has partnered with one of the largest public water utilities in the Middle East to demonstrate the combination of NF purification and OARO concentration of desalination reject, for chemical industry clients with strong demand for the brine.

Process Description

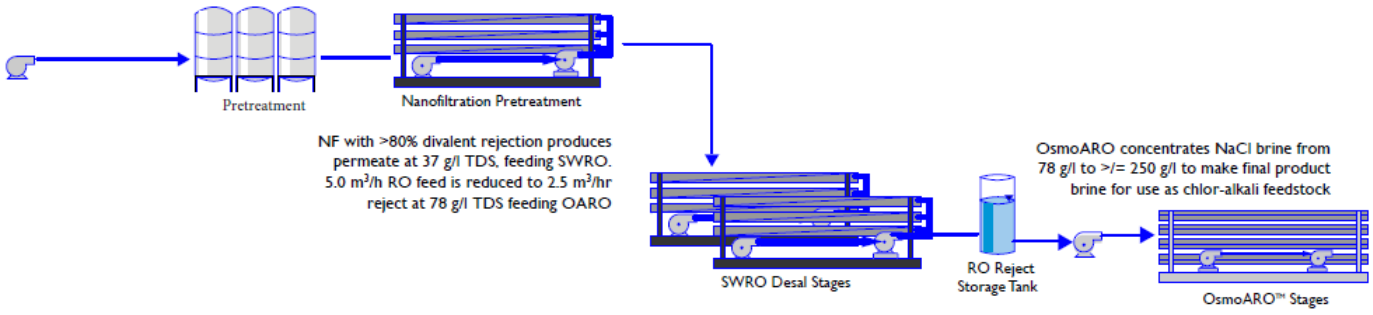
SWRO desalination reject at a concentration of 78,000 mg/L total dissolved solids (TDS) is concentrated by the OsmoARO™ pilot system to a final TDS level of 250,000 mg/l, which has never been done by a membrane system before. The brine can be used directly as a chlor-alkali feedstock.

The SWRO reject feed flow of 2.5 m^3/h is concentrated by three stages of OARO membranes, at an average pressure of 70 bar, and produces 0.35 m^3/h of concentrate and 2.15 m^3/h of permeate, equaling 76% water recovery. Energy consumption is >30% lower than comparable thermal processes.

Nanofiltration with 80% or higher divalent rejection is employed upstream of the SWRO in order to reject calcium, magnesium, and sulfate ions from the stream.

- OARO Feed Flow 2.5 m^3/h
- OARO Feed TDS 78,000 mg/L
- OARO Final Brine Flow 0.35 m^3/
- OARO Final Brine TDS >/= 250 g/L

The demonstration project is underway through mid-2021.



System Performance

The two stages of OsmoARO brine concentration have consistently produced a brine product of 250 g/l TDS or higher from the SWRO reject. Local testing by % concentration meter has correlated 1:1 with laboratory total dissolved solids testing. The chart below provides a snapshot of operating data for the pilot system.

Permeate from the OsmoARO returns to the SWRO desalination system for processing along with the SWRO feed.