Treatment Of Brackish Water Inland Desalination Brine

Tech ID: 33282 / UC Case 2023-972-0

FULL DESCRIPTION

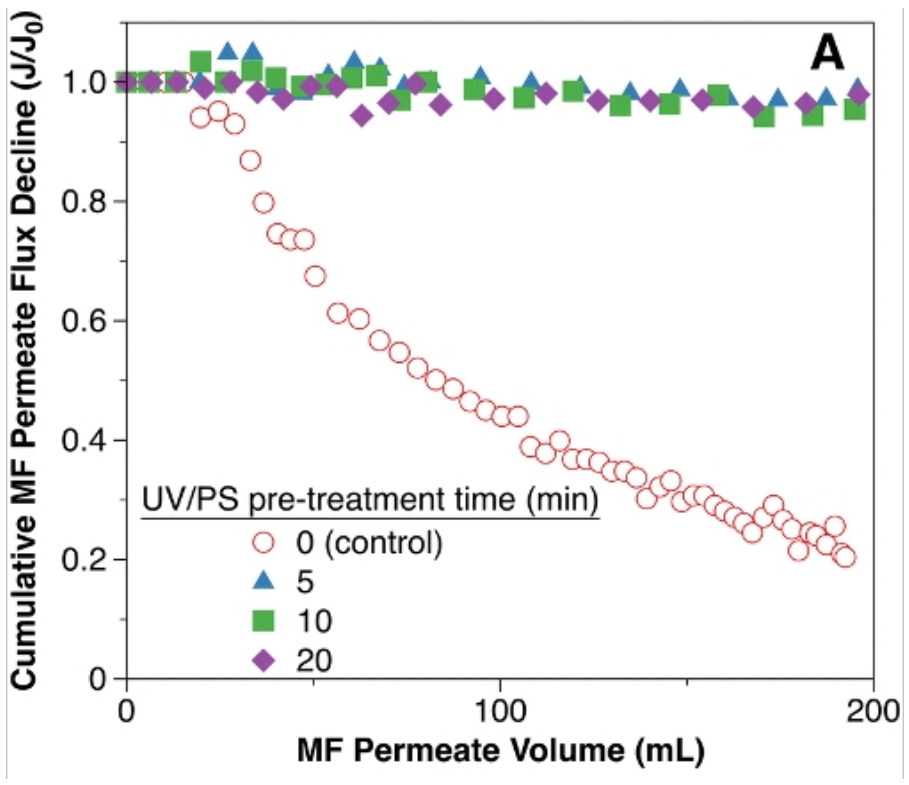
Background

Reverse osmosis (RO) membrane desalination of brackish groundwater is employed to generate freshwater. 15% to 60% of the feed water becomes the RO concentrate waste, known as brine. However, the management of a RO concentrate stream remains challenging due to high costs and adverse environmenal impacts, especially in inland regions. In order to minimize the inland brine management cost and the negative environmental effects, additional water recovery from brine is needed. The major limitation to achieving high water recovery from the brine is mineral scaling by sparingly soluble salts on the membrane surface.

Technology

Prof. Haizhou Liu and his team have developed an inland desalination brine treatment technology that uses:

- an ultraviolet-driven persulfate oxidation process (UV/PS) to degrade the anti-scalant;
- a chemical demineralization (CDM) step to remove the scaling components; and,
- a microfiltration (MF) to separate scaling minerals from the treated brine.



Normalized permeate flux decline as a function of cumulative normalized volume throughput. The brine without the UV/PS pre-treatment has a severe decline in permeate flux due to fouling.

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OTHER INFORMATION

KEYWORDS

desalination, brine, freshwater, photolysis, anti-scalant, mineral recovery

CATEGORIZED AS

- **Environment**
  - Remediation
- **Engineering**
  - Engineering

RELATED CASES

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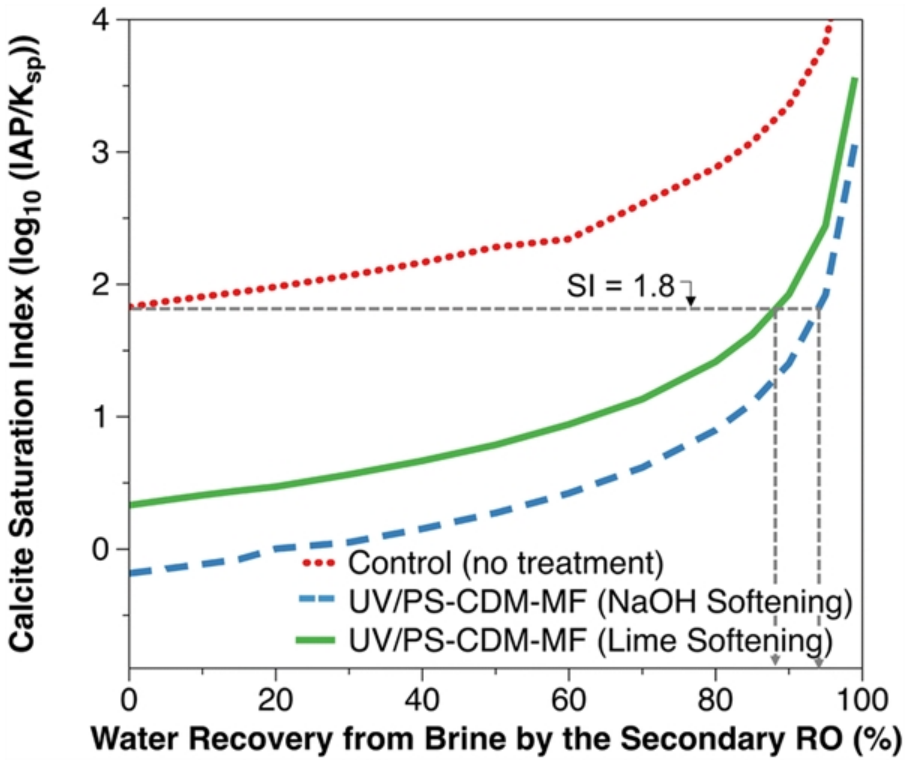

Calcite saturation index revealing the pre-treatment with anti-scalant significantly increases the freshwater recovery.

ADVANTAGES

The significant benefits of this technology are:

- Increase in freshwater yield.
- Less frequent membrane backwashing and replacement.
- Reduced operation cost.
- Reduced energy consumption.
- Addition of an anti-scalant to the UV/PS-CDM-MF treated brine prior to a second RO step significantly increases the freshwater recovery (~85%).

SUGGESTED USES

In water desalination for brine treatment to increase water recovery.

INVENTOR INFORMATION

- Please read recent news coverage of Prof. Haizhou Liu.
- Please visit Prof. Haizhou Liu's research group website to learn more about their research.
- Please see all inventions by Prof. Haizhou Liu and his team at UCR.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Published Application	20240239698	07/18/2024	2023-972

Additional Patent Pending

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