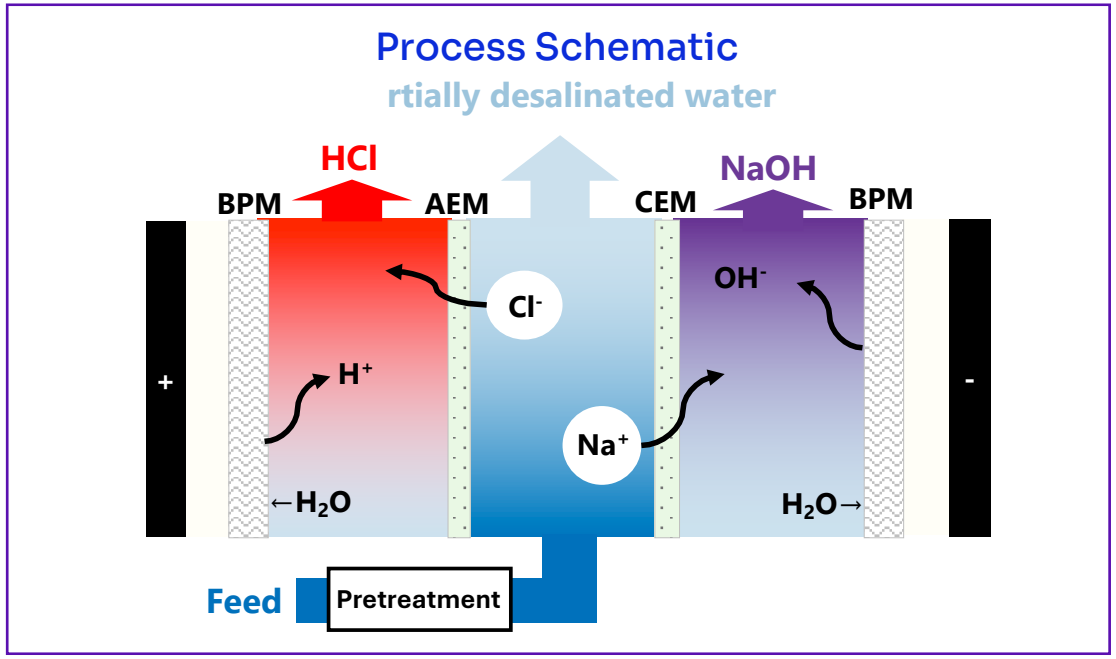
Bipolar Membrane Electrodialysis (BMED)

Process Description

BMED is an electrochemical separation process that combines bipolar membranes (BPMs), anion-exchange membranes (AEMs), and cation-exchange membranes (CEMs) to convert dissolved salts into their corresponding acids and bases while simultaneously desalting saline streams.

Under an applied electric field, water dissociates at the interface within the BPM, generating protons (H^+) and hydroxide ions (OH^-). The AEMs and CEMs selectively transport anions and cations, respectively, enabling controlled ion separation and recombination to produce acid and base streams without the addition of conventional chemical reagents.

BMED is typically applied for acid and base recovery, desalination brine treatment, pH adjustment, wastewater treatment, and chemical manufacturing. Fit-for-purpose pretreatment is required to mitigate fouling and ensure reliable operation. BMED simultaneously desalinates saline streams and generates value-added products, supporting circular economy via water recycling and resource recovery.



Publications

Bipolar membrane electrodialysis for simultaneous desalination and valorization of hypersaline produced water from oil and gas operations (TBD)

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