



Saltworks™

EDR 101

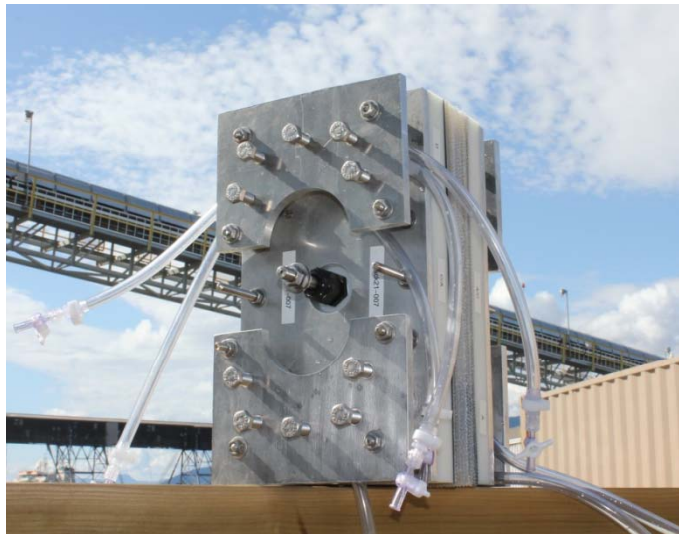
Electrodialysis Reversal I

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Outline

1. Introduction
2. Components of EDR
3. Operating Principle
4. Advantages/Disadvantages of EDR
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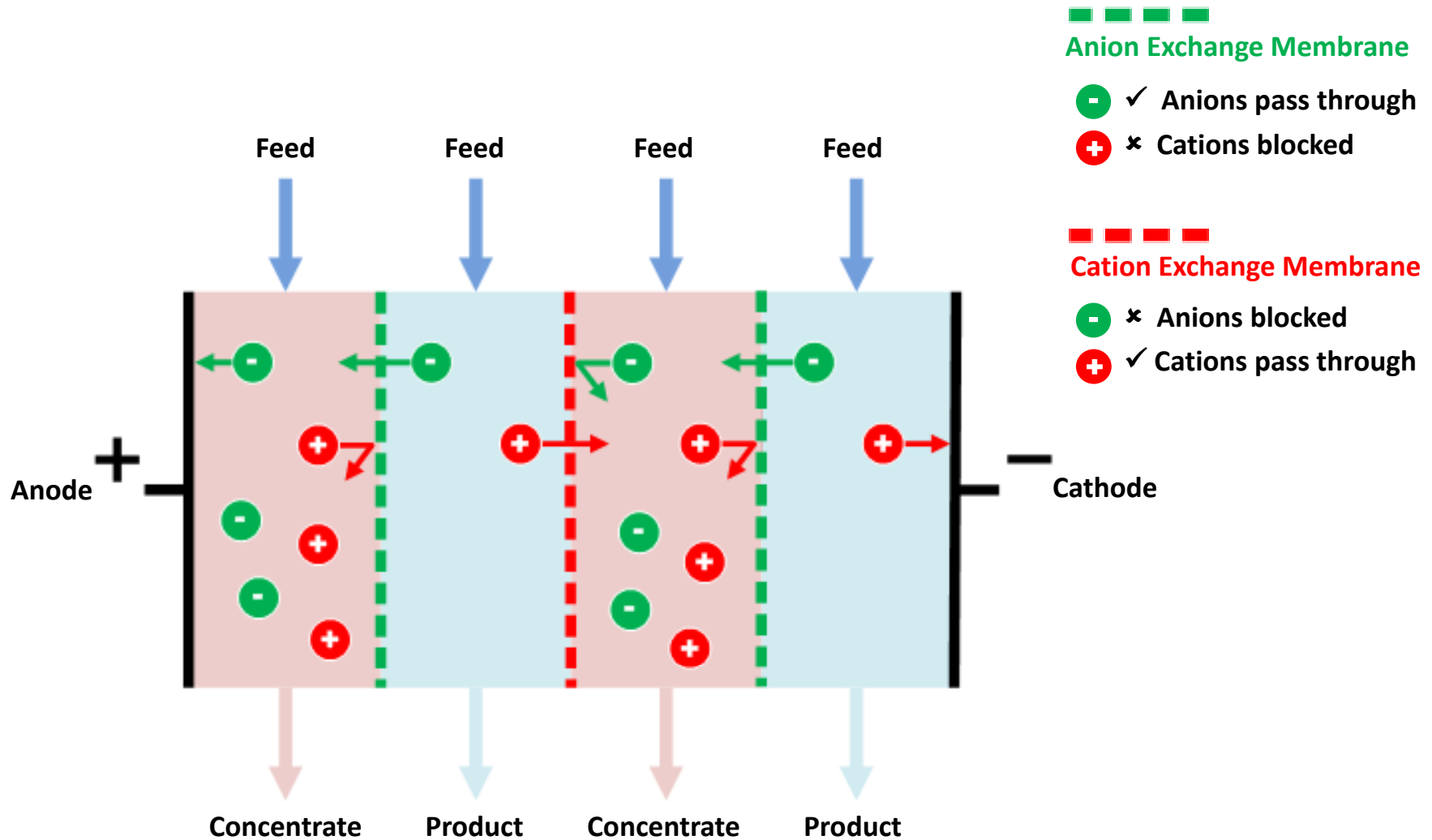


Saltworks' micro EDR stack (left) and full scale EDR stack (right)

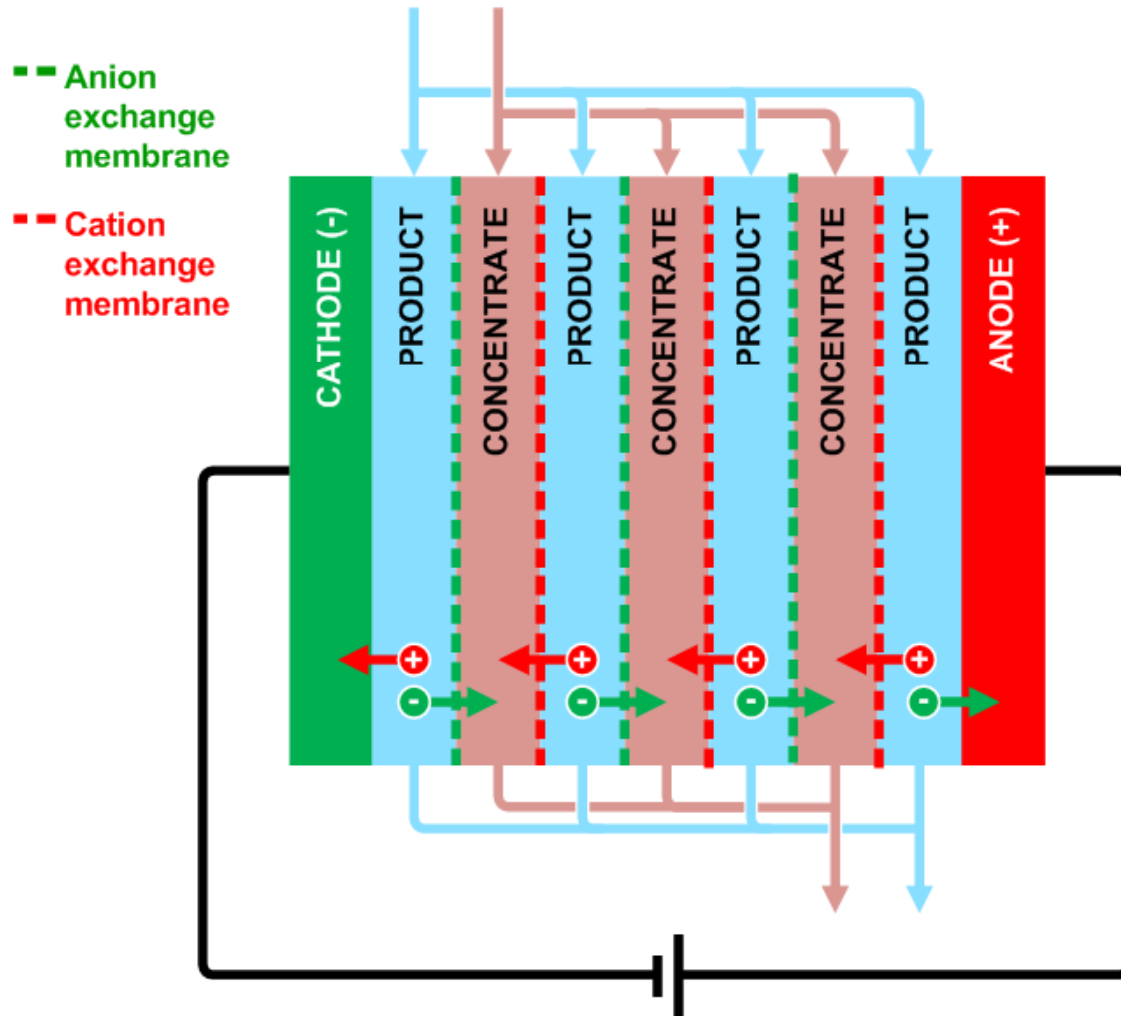
Introduction

- EDR = **E**lectro**d**ialysis **R**eversal
- Transport salt ions from one solution to another solution through **ion-exchange membranes** under the influence of an applied **electric potential current**
- Separation is due to **charge**, not pressure or size differences.

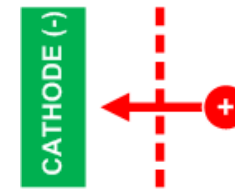
EDR Components



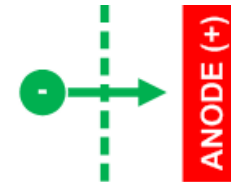
Operating Principle



- Water flows parallel to the membranes.
- Positive ions flux through cation exchange membranes towards negatively charged cathode.

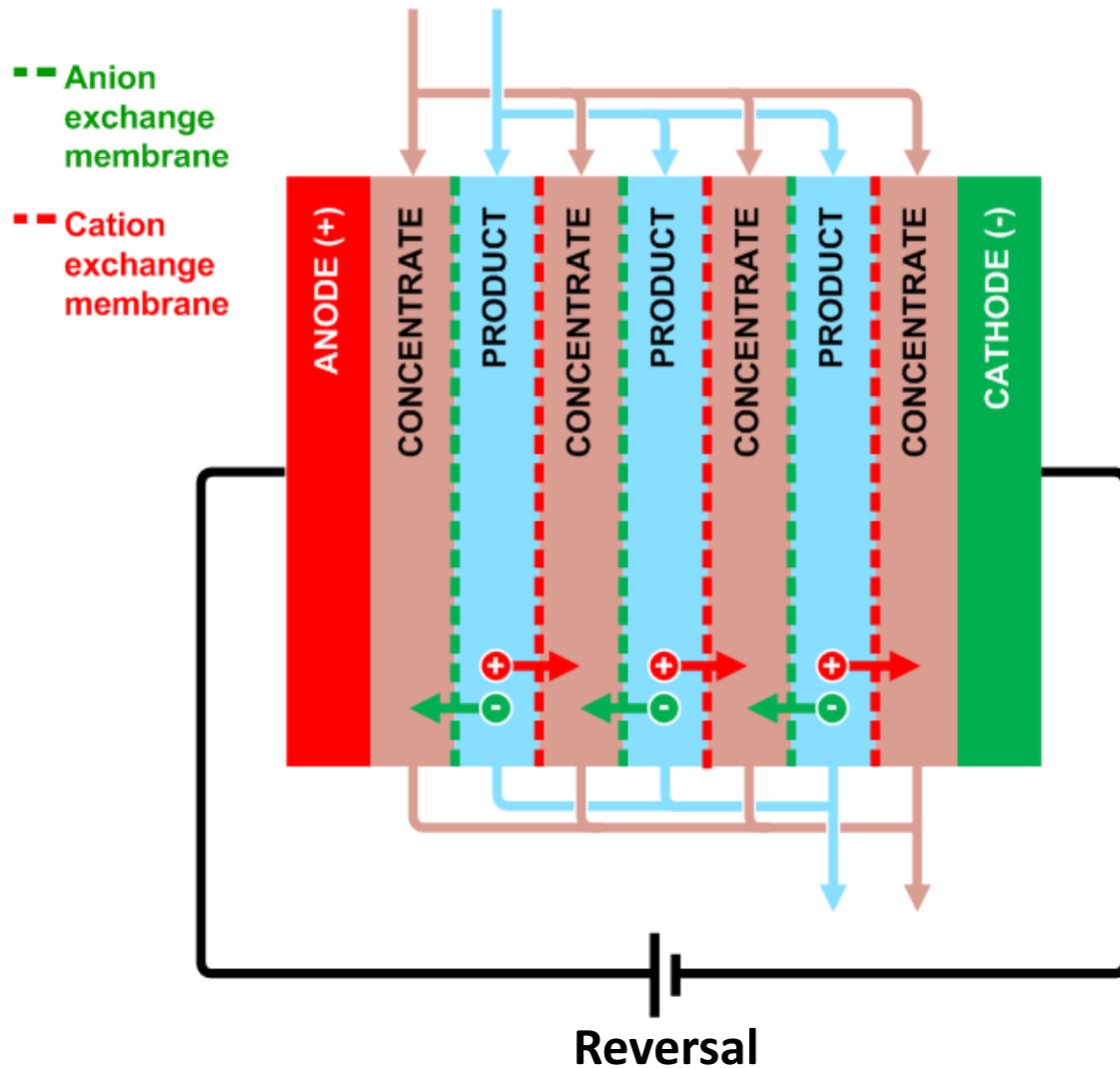


- Negative ions flux through anion exchange membranes towards positively charged anode.

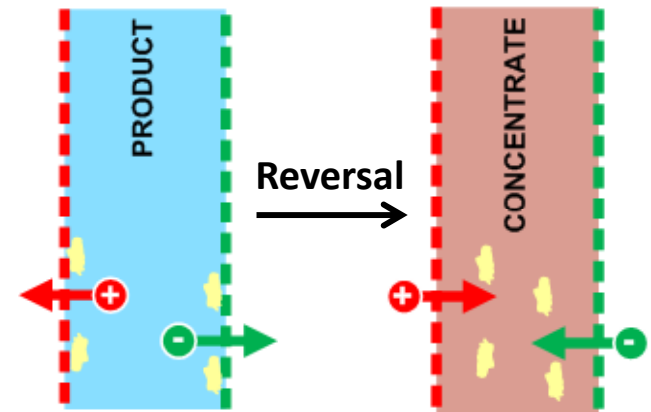


- Water does not flux through the membranes.
- Product stream becomes purer while concentrate stream becomes more concentrated with ions.

Operating Principle



- Polarity reverses periodically to prevent fouling on the membranes
- Product compartments and Concentrate compartments swap



Organic and inorganic fouling removed from membranes by reversed movement of ions

Advantages/Disadvantages of EDR

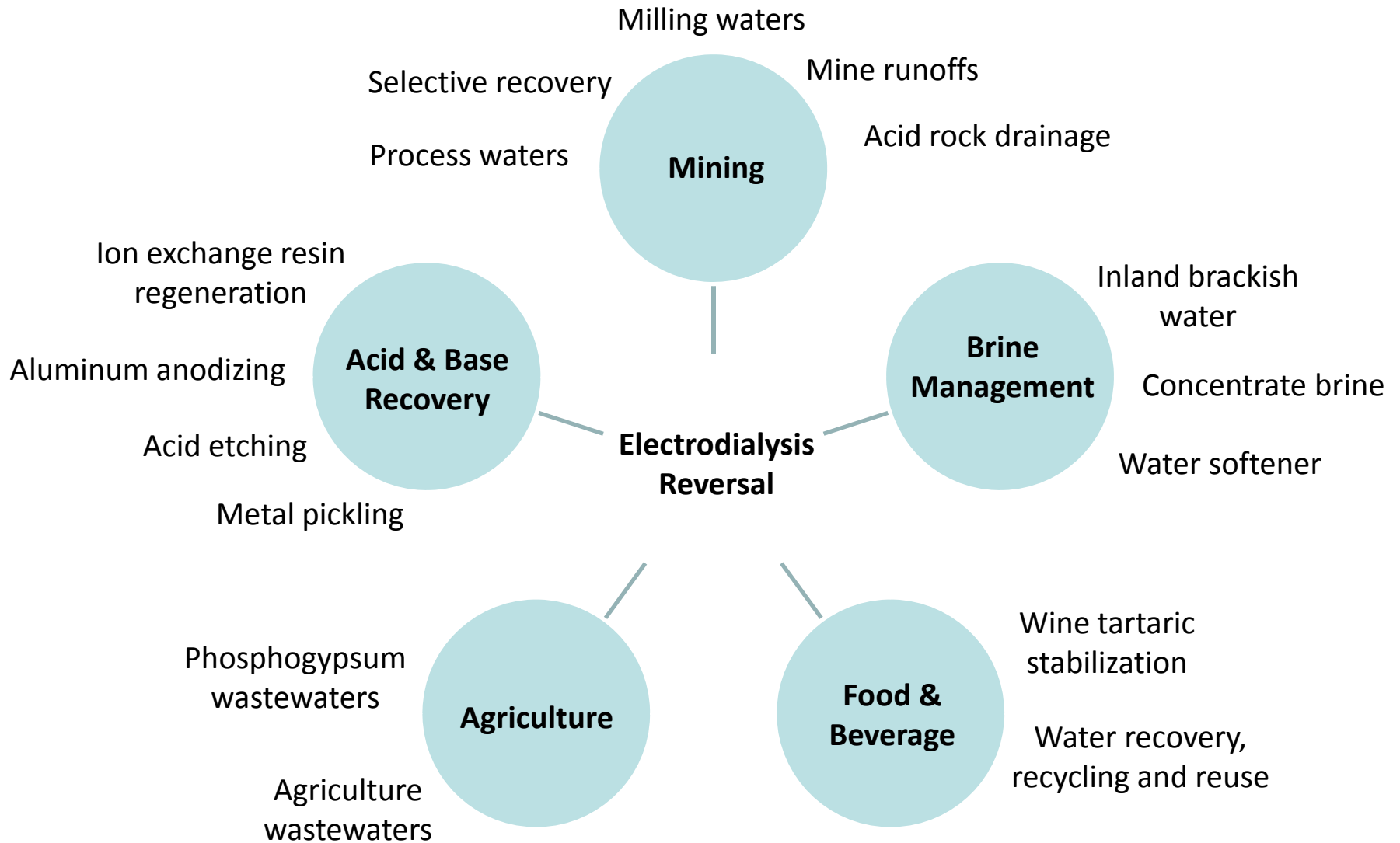
Advantages

- High recovery
- Higher brine concentration achievable as system is not limited by osmotic pressure
- Little to no feed pre-treatment required
- Built in chemical-free scaling and fouling prevention due to periodic reversal feature

Disadvantages

- Only removes ions; organics and colloids not removed
- Selection of membranes and stacks highly dependent on feed water chemistry

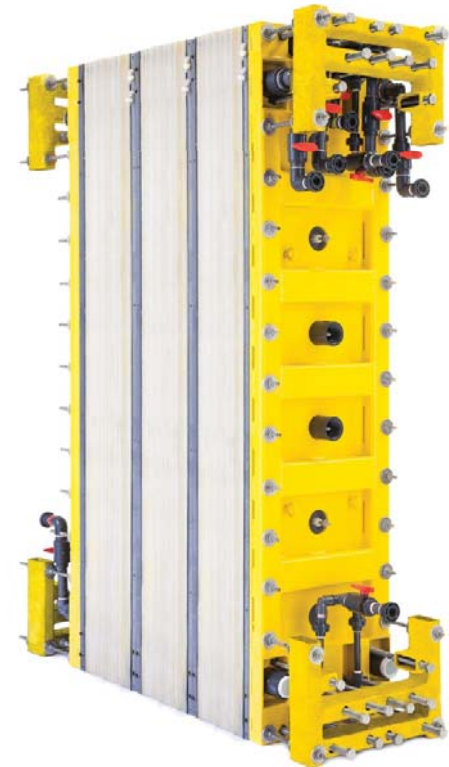
Applications



Applications

Saltworks offers five electro dialysis reversal products under the ElectroChem name:

Wastewater Desalter	Desalination, wastewater treatment, water purifier/remediation/reclamation
RO Brine Concentrator	Reverse osmosis brine concentrator
Salt Splitter	Calcium sulphate, gypsum, water softener, tailings, acid rock drainage
Produced Water Desalter	Polymer, enhanced oil recovery produced water
Acid Recycle System	Sulfuric/hydrochloric/hydrofluoric acids, battery acid, etching acid, aluminum anodizing acids



Saltworks' full scale skidded ElectroChem system (5-50 tonne/day)