

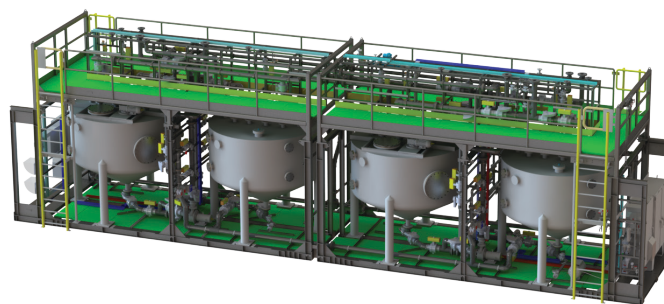
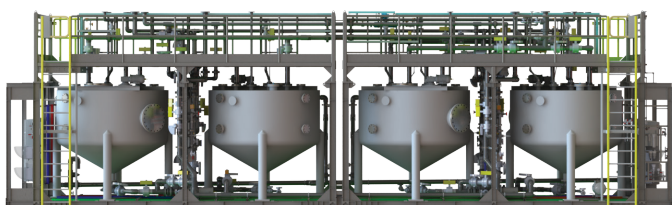
# BrineRefine

## Modular Chemical Reactors for Industrial Water + Lithium

- A versatile continuous stirred tank reactor (CSTR): compact, modular and expandable
- Single package with precision dosing and intelligent controls that communicates up- and downstream for total process optimization
- Pair with RO: chemical softening removes scaling ions, increasing downstream freshwater recovery
- Target ions of concern: avoid over-treatment by targeting troublesome ions for precipitation and filtration
- Remove impurities in lithium brines or precipitate refined, >99.9% purity lithium carbonate ( $\text{Li}_2\text{CO}_3$ )
- Combine with clarifiers, XtremeUF ultrafiltration, filter press, centrifuge, or use slurry discharge as project requires



2 x BrineRefine - 15. Fully Modular Plant



### Versatile Continuous Stirred Tank Reactor

Execute chemical reactions: stirred, staged, and with optional heating/cooling. Programmable logic controller (PLC) integrates with external process control.

### Modular, Scalable, Adaptable Packages

Repeatable blocks with all required equipment onboard: reactors, mixers, process and automation. Built-in chemical dosing automation adjusts to variability in process or chemistry.

### Built for Corrosive Applications

Engineered, plastic wetted parts: CPVC pipework, chemically resistant glass-reinforced fiber vessels, corrosion-resistant mixers.

### Cost-Effective Ion Targeting

Target ions of concern for precipitation and filtration, avoiding over-treatment; examples include fluorides, phosphates, sulfates, cyanide, hardness, metals, silica.

### Maximize RO Recovery

Remove scaling ions. Maximize membrane system recovery up to osmotic pressure limits. Partner with XtremeUF for RO-safe solids management.

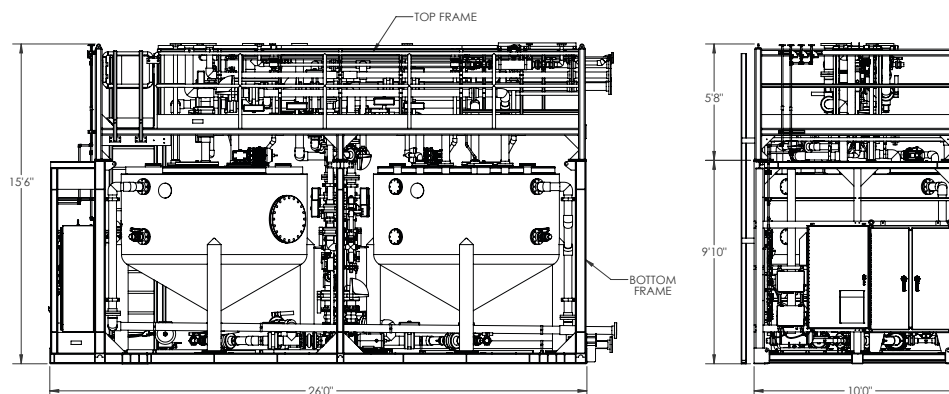
### Lithium Carbonate Reactor & Wash

Achieve battery-grade lithium carbonate production with built-in wash and water/carbonate recycling system.

## Specifications

<b>Inlet Water Spec</b>	Vast flexibility; contact Saltworks
<b>Chemicals</b>	Dependent on water chemistry; contact Saltworks
<b>Electrical Energy</b>	~2 kWh/m <sup>3</sup> (50 kW)
<b>Power</b>	Standard: 480 VAC, 3-phase, 60 Hz Options: matched to site needs
<b>Solids Management</b>	Filter press, centrifuge, or other

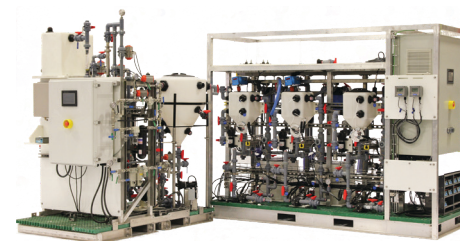
	<b>BrineRefine - 15</b> <i>Fully Modular Reactor Skids</i>	<b>BrineRefine - 48</b> <i>Site Installed Reactors + BOP Module</i>
<b>Design</b>	<ul style="list-style-type: none"> <li>Modularized</li> <li>2 x 7.5 m<sup>3</sup> = 15 m<sup>3</sup> reactors per frame</li> <li>Balance of plant and controls on-board reactor skids (one package)</li> </ul>	<ul style="list-style-type: none"> <li>Pump skids and control modules skid mounted. Separate modules</li> <li>2 x 24 m<sup>3</sup> = 48 m<sup>3</sup> reactors (site installed)</li> </ul>
Add units in series or parallel to meet capacity and reaction time needs. Increase capacity by adding N modules.		
<b>Nominal Flow Capacity</b> (@ 20 min reaction time)	N x 1,080 m <sup>3</sup> /day N x 198 GPM	N x 3,456 m <sup>3</sup> /day N x 634 GPM
<b>Reactor Size</b>	N x 15 m <sup>3</sup> per frame N x 4,000 gal	N x 24 m <sup>3</sup> per field installed reactor N x 6,400 gal



One BrineRefine - 15 module. Add modules to increase capacity or upgrade to a BrineRefine - 48

## Automation

- Programmable logic controller (PLC) control of reaction sequences
- Precision chemical dosing control
- Built-in flush and smart slurry management
- Auto start-up, capacity ramp, hibernate, shut down
- Maximizes uptime with minimized operator intervention
- Communicates with upstream and downstream process assets to maximize system performance
- Ability to bypass a reactor for maintenance while running
- Representative BrineRefine pilot and testing unit available



BrineRefine pilot and testing unit

## Delivery Models

Saltworks delivers complete industrial wastewater treatment or “concentrate, refine and convert” lithium refining packages, or works with engineering companies and other vendors to deliver a partnered project.