Causti-COR® System
Temperature and pH Tolerant Spiral Nanofiltration

Advanced Membrane Filtration for Caustic Recovery

Koch™ Separation Solutions
Separation Technologies for a Better Future™
Membrane Technology Designed Specifically for Caustic Recovery

Over 50 Years of Membrane Experience

(KSS) is a global leader in membrane filtration technologies with over 50 years of membrane experience and 20,000 system installations worldwide. We have applied our experience and expertise to develop our new Causti-COR® systems, designed specifically to recover, purify and reuse caustic from food, beverage and industrial applications. These systems lower spending on caustic, reduce energy consumption, and are environmentally friendly to help your company comply with increasing stringent regulatory requirements.

Causti-COR Systems

The KSS Causti-COR Nanofiltration Membrane Systems offer a cost effective, environmentally friendly way to recover the expensive caustic solutions used to clean process equipment. Causti-COR systems utilize our patented SelRO® membranes to recover up to 95% of caustic for reuse by removing low molecular weight organic and inorganic contaminants.

Benefits of recycling caustic

- Less spending on caustic and acid materials
- Reduction in effluent volume
- Reduced waste treatment costs
- Lower energy consumption

SelRO Membrane

The SelRO family of spiral wound elements utilize a proprietary membrane developed by KSS using a highly crosslinked polymeric chemistry. They demonstrate long membrane life while treating acids and bases with temperatures up to 160°F (70°C), and concentrations including:

- Sodium and potassium hydroxide (up to 20%)
- Sulfuric, nitric, hydrochloric, hydrofluoric and phosphoric acids or acid blends, up to 35%
- pH levels from 0-14

Estimated Annual Savings*

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Feed Flow</td>
<td>50 gpm (11.5 m³/hr)</td>
</tr>
<tr>
<td>Caustic Concentration</td>
<td>3%</td>
</tr>
<tr>
<td>Process Temperature</td>
<td>160°F (70°C)</td>
</tr>
<tr>
<td>Caustic Savings</td>
<td>2 thousand tons/year (1800 MT/yr)</td>
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<tr>
<td>Acid Savings</td>
<td>2 thousand tons/year (1800 MT/yr)</td>
</tr>
<tr>
<td>Heat Savings</td>
<td>16 billion BTU/year (17,000 GJ/yr)</td>
</tr>
<tr>
<td>Water Savings</td>
<td>23 million gallons/year (88,000 m³/yr)</td>
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</tbody>
</table>

* Average payback less than 12 months

Common Recovery Applications

- Pulp and paper
- Textile manufacturing
- Purification and mercerization
- Pharmaceutical
- Equipment cleaning
- Food processing
- Spent regeneration streams of resin columns and ion exchange operation
- Dairy, Food and Beverage
- Oil industry
Standard System Designs

Caustic Systems

The Causti-COR® system family offers six models, including 3 small, simple to operate batch systems for small and medium flow rates between 1 and 15 m³/hr (10,000 – 100,000 GPD) and 3 larger, continuously operated systems for medium and large feed flow rates between 4 and 32 m³/hr (25,000 – 200,000 GPD). Larger flow rates can be treated using custom-engineered systems.

<table>
<thead>
<tr>
<th>Models</th>
<th>Causti-COR 1</th>
<th>Causti-COR 2</th>
<th>Causti-COR 3</th>
<th>Causti-COR 4</th>
<th>Causti-COR 5</th>
<th>Causti-COR 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Mode</td>
<td>Batch</td>
<td>Batch</td>
<td>Batch</td>
<td>Continuous</td>
<td>Continuous</td>
<td>Continuous</td>
</tr>
<tr>
<td>Feed Low Range</td>
<td>6k-25k GPD (1-4 m³/hr)</td>
<td>13k-50k GPD (2-8 m³/hr)</td>
<td>25k-100k GPD (4-16 m³/hr)</td>
<td>25k-100k GPD (4-16 m³/hr)</td>
<td>37k-150k GPD (6-24 m³/hr)</td>
<td>50k-200k GPD (8-32 m³/hr)</td>
</tr>
<tr>
<td>Number of SelRO 8 inch elements (Max)</td>
<td>5</td>
<td>10</td>
<td>20</td>
<td>20</td>
<td>30</td>
<td>40</td>
</tr>
</tbody>
</table>

Batch

The Causti-COR system treat the contents of a batch tank. Purified caustic solution leaves the system, while concentrated impurities return to the feed tank for reprocessing. When the desired product recovery is achieved, the batch tank is drained and refilled with fresh feed.

Continuous

In this mode of operation, feed is directly pumped into a baseline pipe and recirculated through two stages of membranes. Clean permeate is produced at a steady flow rate and quality, while the process parameters are automatically controlled.
KSS ASSIST

KSS will partner with you throughout the life cycle of your membrane filtration system. Our experienced technical team will provide global service and support and will work directly with you to maximize process efficiency. KSS ASSIST™, our service and maintenance program, provides the tools to keep your system operation at the highest level, including:

• Membrane Process Optimization
• Plant Audits
• Data Collection, Analysis & Reporting
• Operator Training
• Telephone Support

Koch Separation Solutions

Koch Separation Solutions (KSS) is a global leader in membrane filtration technologies with over 50 years of membrane experience. With best-in-class domain expertise, technology and systems, KSS is uniquely positioned to help customers purify and recover valuable process streams and achieve sustainability goals.