EFFICIENT DISSOLVED GAS CONTROL FOR BEVERAGE PRODUCTION

DEOXYGENATION
CARBONATION
DECARBONATION
NITROGENATION
ALCOHOL ADJUSTMENT

Liqui-Cel®
MEMBRANE CONTACTORS

Liqui-Cel.com
THE NEW STANDARD IN DISSOLVED GAS CONTROL

Compact Design

Modular

In-line Instantaneous Operation

Minimal Energy & Water Use

Compatible For Retrofitting

Offers Mobility For Easy Transport

LET US HELP YOU MEET SUSTAINABILITY GOALS

Reduce Water Consumption

Low CO₂ Use
MEMBRANE TECHNOLOGY

Liqui-Cel® Membrane Contactors utilize a hydrophobic polypropylene membrane to remove dissolved gases from liquids. Water flows on one side of the membrane and a vacuum or strip gas is passed on the other side of the membrane. By controlling the pressures of gases in contact with the liquid, a highly efficient method for gas control can be achieved. Membrane contactors are widely accepted to control gas levels in liquids used in the soft drink and brewing industries.

Engineered for Efficiency
Liquid enters the contactor and flows on the outside of the hollow fiber membranes. The center baffle forces water to flow radially across the hollow fibers. High contact area and unique internal design leads to highly efficient gas control.

Minimal Energy Consumption
No need to heat water and cool it down
Smaller and fewer vacuum pumps

Low Pressure Drop
Operates in-line under pressure
Eliminate repressurization pumps to reduce costs

Hollow Fiber Membrane
APPLICATION AREA - SOFT DRINKS

CONTROL DISSOLVED GASES TO ENSURE QUALITY, FLAVOR, IMPROVE PROCESS YIELDS & INCREASE PRODUCTION SPEEDS

- Blending Water Deaeration
- Bulk Deaeration
- Syrup/Concentrate Degassing Before Blending
- Deaeration at Filling/Rinse Water
- Point of Use Gas Control

Deoxygenation/Carbonation
In packaging plants, water and syrup are mixed prior to being bottled or canned. Oxygen is removed from process water prior to blending and filling.

Carbon dioxide can also be added to liquids for precise control of the CO₂ levels prior to packaging.

Deoxygenation of Water Used to Brew Canned Coffee/Tea
Flavor is improved if the water is first deoxygenated prior to brewing and packaging coffee and teas. Oxygen negatively impacts the taste and the shelf life of these products.

Deoxygenation of Water Used to Reconstitute Fruit Juices
Water blended with concentrated fruit juice should also be oxygen free. Oxygen will shorten shelf life and oxidize flavor components.
APPLICATION AREAS - BREWING & WINE PROCESSING

**Bulk Deaeration & O₂ Removal from Dilution Water**
Low levels of dissolved oxygen are desirable to protect product quality and ensure consistency. Oxygen can break down the final product if it is not removed from the process water used in the blending process. DO removal from dilution water in High Gravity Brewing is another common application.

**O₂ Removal of Pushing Water & CO₂ Scrubbing Water**
In breweries, large volumes of beer is left in DE filters and piping. In order to collect the product, the brewery will pump water through the system to push out the beer. Low O₂ concentrations are important because the product will absorb any gases present in the pushing water. Scrub water should also be deoxygenated to prevent oxygen from contaminating CO₂.

**Deoxygenating Seal Water**
During separation, water comes into contact with centrifuge seal water. Removing oxygen reduces the risk of reabsorption.

**CO₂ Control of Beer**
Adjust carbonation level in beer. CO₂ volume can be precisely controlled prior to packaging. CO₂ reclaimed from the fermentation process is scrubbed to remove contaminants (phenols, alcohol and other organics).

**Nitrogenation of Beer**
N₂ in beer production impacts “mouthfeel” and is used with stout beers and ales for head control.

**Alcohol Adjustment**
Alcohol concentration can be adjusted for taste and to meet regulatory guidelines.
BIG SAVINGS IN OPERATING COSTS

$200,000 ANNUAL SAVINGS
by installing a blending system with Liqui-Cel®

- Combined savings in pump energy and water consumption was $13,000 a year compared to vacuum + tank technology
- Energy savings by operating at higher temperature in fill line and reduced pump electrical energy use
- Lower production downtime - Yield improvement in product volume produced

<table>
<thead>
<tr>
<th>Operating Expense</th>
<th>Savings</th>
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<tbody>
<tr>
<td>Pump Energy</td>
<td>$12,672</td>
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<tr>
<td>Water Use</td>
<td>$439</td>
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<tr>
<td>Thermal Energy</td>
<td>$11,800</td>
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<tr>
<td>Production Downtime</td>
<td>$17,000</td>
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<tr>
<td>Labor &amp; Maintenance</td>
<td>$10,000</td>
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<tr>
<td>Yield</td>
<td>$157,900</td>
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<tr>
<td><strong>Total Annual Cost Savings</strong></td>
<td><strong>$210,000</strong></td>
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INCREASE YOUR PRODUCTION EFFICIENCY

- Reduce Water Use
- Improve Yield
- Minimize Downtime & Maintenance
## ADVANTAGES OVER TRADITIONAL DEOX SYSTEMS

<table>
<thead>
<tr>
<th>Advantage</th>
<th>Description</th>
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<tbody>
<tr>
<td>In-line operation</td>
<td>Allows for single point CO₂ addition or O₂/CO₂ removal</td>
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<td>Low DO water for blending</td>
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<td>No foaming or flavor loss</td>
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<tr>
<td>No dispersion</td>
<td>Improves product stability and eliminates foam from undissolved CO₂ microbubbles</td>
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<tr>
<td>Modular, compact system</td>
<td>Small footprint, easily adapts to capacity changes</td>
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<tr>
<td>Precise gas control</td>
<td>Instantaneous gas saturation</td>
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<td>Better quality control</td>
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<td>Easily adjust dissolved gas levels with logic controllers</td>
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<tr>
<td>Low energy consumption – 7.5 HP needed to run O₂ level below 10 ppb (250 gpm, 40 F)</td>
<td>Reduce OPEX</td>
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<td>No need to heat up water, then cool it down</td>
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<td>Reduce or eliminate hold up time</td>
<td>Higher production capacity</td>
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<td>Compatible for retrofitting</td>
<td>Avoid expensive system upgrades</td>
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