

3M™ Liqui-Cel™ Membrane Contactors Used in the Soft Drink and Brewing Industries to Control Dissolved Gases

Gas control is an important concern in the beverage industry. Oxygen in the water can oxidize flavor components and shorten the shelf life of the product. Carbon dioxide can also have an impact on taste and pH of the product.

3M™ Liqui-Cel™ Membrane Contactors utilize a hydrophobic polypropylene membrane to remove dissolved gases from water. 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 water, a highly efficient method for gas control can be achieved. Some of the applications are listed below.

Soft Drinks/Coffee/Teas

Deoxygenation/Carbonation of blending water

- In packaging plants, water and syrup are mixed prior to being bottled or canned. In this application, oxygen is removed from blending water prior to blending.
- 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 and teas

- Flavor may be improved if the water is first deoxygenated prior to brewing and packaging coffee and teas. Oxygen may negatively impact the taste and the shelf life of these products.

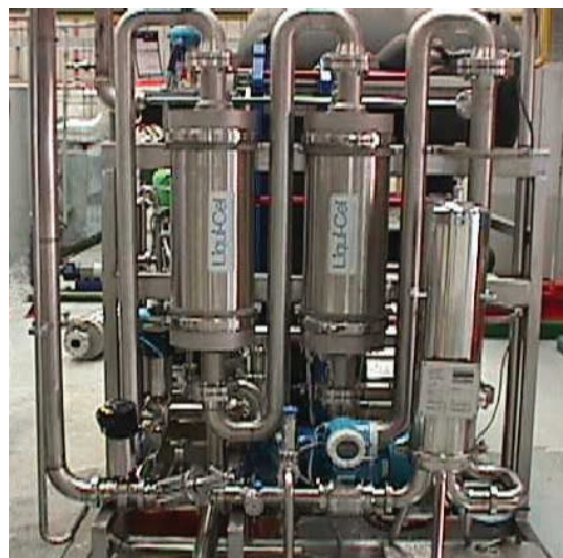
Deoxygenation of water used to reconstitute fruit juices

- Water blended with concentrated fruit juice may also require low oxygen levels. Oxygen could shorten shelf life and oxidize some of the flavor components.

Brewing

O₂ removal from blending water

- Oxygen can break down the final product if it is not removed from the water used in the blending process. For this reason, O₂ specifications are typically less than or equal to 10 ppb.



10 × 28-inch 3M™ Liqui-Cel™ Membrane Contactor Deoxygenation System

O₂ removal of pushing water

- In breweries, large volumes of product are left in Diatomaceous Earth (DE) filters and piping. In order to collect and use the product, the brewery will pump water through the system to “push out” the beer.
- The O₂ specification here is also less than or equal to 10 ppb. Low O₂ concentrations are important because the product will absorb any gases present in the pushing water.

Technical Brief | 3M™ Liqui-Cel™ Membrane Contactors Used in the Soft Drink and Brewing Industries to Control Dissolved Gases

CO₂ control of beer

- Adjust carbonation level on beer. Sometimes natural fermentation does not create enough CO₂ for the end product which impacts taste and the head of a beer. On the same note, removal of excess CO₂ in over-carbonated beer is also an easy process with 3M™ Liqui-Cel™ Membrane Contactors.

Nitrogenation of beer

- There is a growing interest in nitrogenation of beer. N₂ is added to beer to improve the foam head on top of the beer.

Deoxygenation of beer

- Liqui-Cel membrane contactors are also used for the removal of oxygen that can be picked up in beer during transfer.

CO₂ scrubbing

- The CO₂ is scrubbed with water to remove contaminants from the fermentation process (phenols, alcohol and other organics). Scrub water could be deoxygenated prior to scrubbing to prevent oxygen from contaminating the CO₂.

H₂S removal

- Well water may contain H₂S, which could negatively impact the flavor of the final product. Liqui-Cel membrane contactors can be used to help reduce H₂S levels.

Liqui-Cel membrane contactors are used in any part of the beverage process where gases need to be removed, added or controlled to a specific level.

Liqui-Cel membrane contactors are available in a variety of sizes to meet various application needs in dissolved gas control. Stainless steel products can be used for hot Clean-in-Place cycles and several product variants are available that are made with FDA CFR title 21 compliant materials. To learn more about how membrane contactor technology may be able to help improve one or more of your beverage processes, please contact your 3M representative or visit 3M.com/Liqui-Cel.

| 3M™ Liqui-Cel Membrane Contactor Features | Benefits |
|---|---|
| Modular, compact system | Small footprint that can be placed anywhere in the plant |
| Only 7.5 HP needed to run O ₂ level below 10 ppb, based on 250 gpm and temperature of 40°F | Low energy consumption No need to heat up water, then cool it down |
| Simultaneous gas transfer operation (carbonation/nitrogenation and deoxygenation in one module or one system) | Lower capital costs of equipment Replaces steam deareator and CO ₂ control system |
| Improved quality control | Lowers operating costs Efficient gas control/utilization |

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