

Bubble Removal From Ink Jet Inks and Coatings Using SuperPhobic[®] Membrane Contactors

Ink jet printers are adversely affected by bubbles in the fluid stream. These bubbles can create ink starvation to the print head. They can also cause foaming problems at the filler. SuperPhobic[®] Membrane Contactors provide a very simple, cost effective solution to eliminate bubbles from your process.

Background

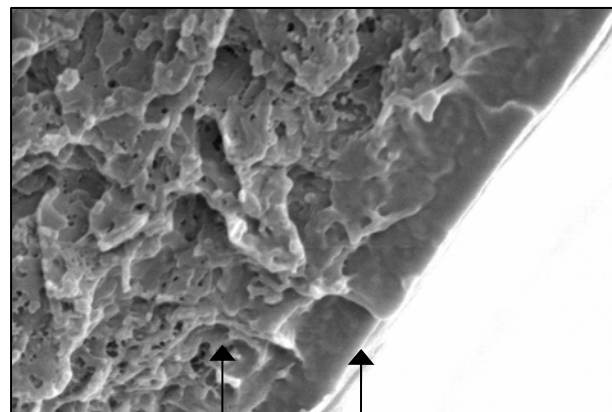
When liquids and gases are brought into contact, mass transfer between the gas and liquid phases will occur. The concentration of gas dissolved in the liquid will continue to increase until equilibrium is reached. When gas concentrations in a liquid reach equilibrium, the liquid is gas-saturated. Specific quantities of gases that are dissolved into the liquid depend on the physical properties of the liquid and gas as well as equilibrium temperature and pressure conditions. The point at which a liquid is saturated with a given gas will typically occur very quickly.

Bubble Formation

Once a liquid process stream is saturated with a given gas or gas mixture, the concentration of the gases in the liquid will remain constant until equilibrium conditions change. For example, an increase in system pressure will cause gases to dissolve into the liquid stream. A decrease in system pressure will cause gases to be released from the liquid. When gases are released in this manner, bubbles form in the liquid.

Bubble Prevention and Elimination

SuperPhobic Membrane Contactors offer a cost-effective and simple way to prevent and eliminate bubble formation. Due to the high efficiency of SuperPhobic Membrane Contactors, using only a single membrane contactor will be adequate to reduce the gas concentration to satisfactory levels.



Membrane Wall Outer wall

Magnification 20000X

The heart of the membrane contactor is the membrane. The polyolefin hollow fiber membrane has a thicker outer membrane wall. This thicker outer wall forms a barrier between the vacuum phase and the ink or coating. The membrane maintains its gas permeability allowing the gasses to be removed from the ink or coating through the membrane wall. The gas will travel through the membrane into the hollow fiber lumens while ink and other aqueous fluids will stay on the outside of the membrane and continue on through the ink jet or coating system.

A vacuum phase will be introduced to the lumenside (inside) of the hollow fiber membrane. The vacuum lowers the partial pressure of the gas phase. Because gas laws state two phases will re-establish equilibrium, the gasses in the ink or coating will travel through the membrane and be carried away through the vacuum source leaving you with inks and coatings free of excess dissolved gasses.

Membrane Contactors offer several distinct advantages over existing technologies. They

have a small footprint allowing SuperPhobic Membrane Contactors to be installed anywhere in your system: They can be placed right at the print head or further upstream in the process.

SuperPhobic Membrane Contactors are very simple to operate and the gas content in liquid process streams can be maintained very precisely.

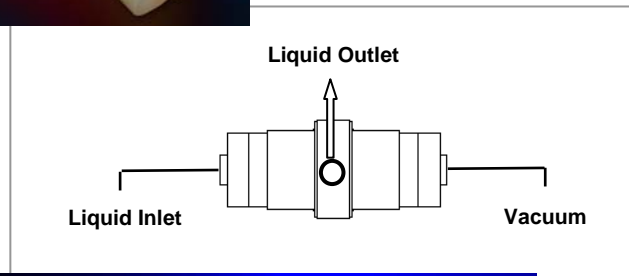
SuperPhobic Contactors are being used in many industrial ink jet printing systems today with a variety of ink chemistries. The same principles apply to coatings for paper and films.

We currently have a portfolio of products that can degas small and large process flow rates from a few ml/min to several gallons per minute. We are also working on new variants.

For more information on bubble removal in inks or coatings, please contact your Membrana representative or visit our web site at www.liqui-cel.com.

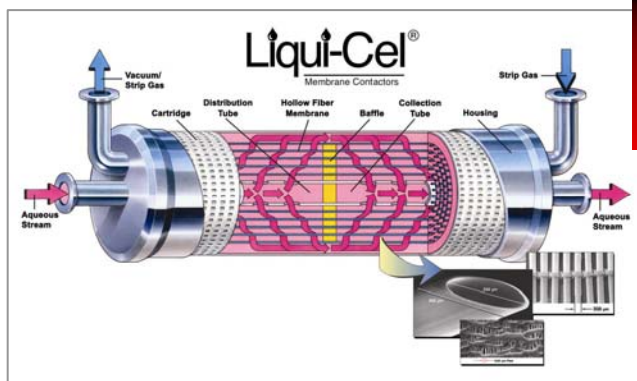
2 x 6 SuperPhobic Contactor
Capacity 100-1000ml/min

This design utilizes one vacuum port and two liquid ports



2.5 x 8 SuperPhobic Contactor
Capacity 1.9 – 11.4 L/min

This design has a liquid flow-directing baffle and is available in larger sizes to meet the needs of a variety of applications.



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