

Not All Ozone Laundry Systems are Created Equal

There is a difference!

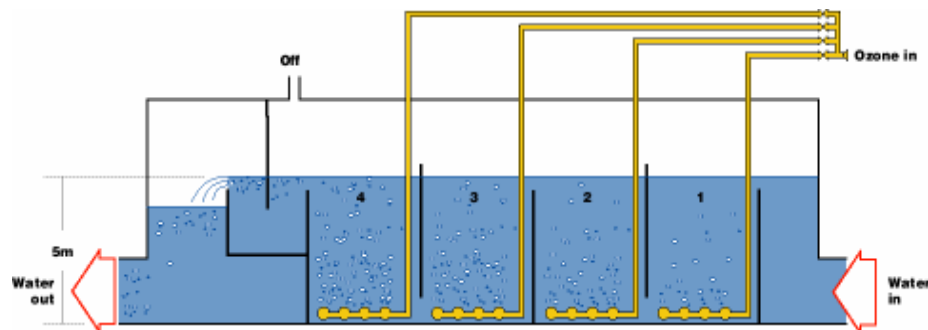
1: Mass Transfer: Venturi Injection vs Bubble Diffusion

When you blow air through a straw into a glass of water, what happens? The Air bubbles instantly rise to the top. This is what happens when Ozone is put into water.

There are two basic ways of injecting Ozone gas into water. The first way of injecting ozone into water is commonly known as the “Bubble Diffusion” way.

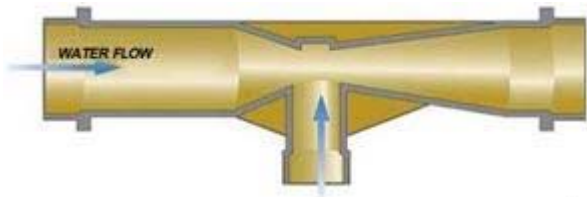


Bubble Diffusion is used primarily in the bottled water industry. During this process, Ozone is “Bubbled” into the bottom of a large tank, or column of water. An air stone, similar to what you can find in a fish tank is used. As was mentioned before, when you blow air, or most any type of gas into water, it will rise to the top, very rapidly. Mounted at the top of these 12-14 foot tall tanks is a relief valve that will strip off any un-dissolved Ozone. Also during this process, water is entering these tanks at the top and is traveling downward, to an exit point at the bottom of the tank. The flow of Ozone rising to the top of these



tanks is very turbulent, due to the “Counter flow” of water. During this process, approximately 50-60% of the Ozone gas is dissolved, due in part to the counter flow of water creating the turbulence. The undissolved gas is removed at the top of the tank via the Air relief valves, and destroyed (turned back into Oxygen).

The other method of dissolving Ozone is via Venturi Injection.



A Venturi Injector is a device that water flows thru. As the water passes through the Venturi, the speed or flow of the water is slowed down, then

increased very rapidly. At the point where the speed of the water is increased, a large amount of suction or vacuum is created. When Ozone gas is applied to this suction, the majority of the Ozone gas is dissolved into the water instantly.

The ability to dissolve large amounts of Ozone into water is what we call “Mass Transfer”. It is generally thought that the higher the amount of Mass Transfer that is achieved, the more efficient your Ozone system is. A Venturi Injector style system will typically achieve 75-95% Mass Transfer Versus 50% Mass Transfer from a bubble diffusion system. Therefore, it is generally accepted throughout the Ozone industry that Venturi Injection, although usually more expensive to install, is the best way to inject Ozone into water.

We have always pointed out to our customers, that Ozone can be hazardous, especially if the application is not properly designed to deal with any and all Ozone that is not properly dissolved.

As a potential owner of an Ozone Laundry System, you owe it to yourself, your employees, and your customers to investigate how

your potential system is designed, But more importantly, “How is Undissolved Ozone Controlled and disposed of?”

One percent of undissolved Ozone escaping into your laundry can expose your laundry workers to as much as 30 times the maximum exposure limit that OSHA has determined to be a safe-acceptable level.

When 50% or more of a bubble diffusion system and 10-20% from a Venturi Injection system is undissolved Ozone, it is critical that we know need to know where this gas is going.

Unless your Ozone Laundry System has a device to remove and destroy any undissolved Ozone, the gas will enter the washer in its most destructive form, and this gas will eventually enter the wash room as well.

Dissolved Ozone in water has never been documented to have caused any damage to a washer/extractor. Undissolved Ozone is another story. Some manufacturers of washer/extractors will void a new machine warranty if anything but a Venturi Injection system is used to apply Ozone to the wash water.

But don't be fooled. There are several Venturi Injection – Ozone Laundry Systems that flow water directly from the Venturi straight into the Washer/extractors. In these systems, you will have Off-Gas issues in the laundry.



Just remember that all Venturi Injection systems are not alike...



All of our systems at ArtiClean come standard with Venturi Injection, an Undissolved Ozone Gas Removal System, and a heated Ozone Destruct System. These Items are Standard, and WE WILL NOT COMPROMISE OUR REPUTATION BY BUILDING AN OZONE LAUNDRY SYSTEM WITHOUT THESE COMPONENTS, EVEN IF IT MEANS LOSING THE SALE! We would rather lose the sale than sacrifice the safety of well being of the workers in the laundry by removing this safety device from our system. Again Remember, All Venturi Injection systems are not built alike.

Now back to the bubble diffusion systems. There have been several companies come and go that were selling these type of systems. They took the bottled water systems and tried to adapt them to a washer/extractor. We sit back and wonder where their information and engineering come from. The Bubble Diffusion system for bottled water applications is described in great detail in a publication by the Water Quality Association, in a book known as the "Little Red Book." Where the problems start with the "Bubble" concept in a washer/extractor is that you have an average of 8-12 inches of water in the washer at any given time. Not the 10-12 feet of used in the Bottled Water Industry. So Mass Transfer is not achieved in any high concentration, not to mention that the counter flowing of water, that is so critical in achieving a high Mass Transfer with the "Bubble" system is not happening in a washer/extractor.

We are not stating that Bubble Diffusion is completely ineffective in a washer extractor, but rather, successful and consistent results are very limited, at best. There will be some transfer of ozone into

the water, therefore, some of the benefits of ozone are obtained this way. But the results and bacteria kill rates will be inconsistent, especially in heavier soiled laundry.

Bubble Diffusion has been a major failure in laundries as there is no provision to destruct any unused or undissolved Ozone.

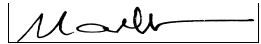
Quite simply, the unused/undissolved Ozone escapes through the vents in a washer/extractor, thus contaminating the air that your laundry workers breathe. This is a serious health hazard. We have observed the ambient Ozone in a laundry room with one of these type of systems to be 3-4 times the exposure limit as mandated by OSHA.

Some companies have tried to plug off the vents in a washer/extractor so that Ozone would not escape into the room, and some have installed cheap ozone room monitors that would shut down the system if the Ozone levels get to high. Again, this reduces the ability to achieve consistent results, and the Ozone levels are still higher than normal. Plus the fact that if the Washer/extractor cannot breathe, a vapor lock will occur during the drain steps and put undue stress on the Bearing and seals of the washer/extractor. Even if the Undissolved Ozone is "TRAPPED" inside the washer, the gas will escape when the washer door is opened to remove the clothing, thus letting the gas escape into the room.

We will not compromise your laundry equipment, your personnel, or your linen by installing an unsafe product as this is.

Ozone is a great addition to an on premise or commercial laundry, when it is done the correct way. When looking to purchase an Ozone Laundry System, you should only look for the Venturi Injection System type of system, and secondly, the system should have a way to remove and destruct any unused/undesolved Ozone

gas. If you go by these guidelines, you will have many years of good service from your Ozone laundry system. If you choose the cheaper “Bubble” route, you could very well become one of the hundreds of bubble buyers that have failed in the field.



Mark E. Moore
CEO
ArtiClean