Neoteric Water Solutions, Inc.

Electronic dissolved Oxygen Generation

Neoteric's Technology is a method as well as an apparatus for electronically treating liquids. The invention applies to the apparatus and the method for electronically generating dissolved oxygen, thus purifying and/or removing contaminants from the water.

A widely recognized problem with open and closed hydraulic systems is the degradation of the dissolved oxygen within the water. This problem is particularly significant in environments that are highly depended upon dissolved oxygen. For example, bodies of water that support marine life require the generation and maintenance of large amounts of dissolved oxygen. This is a necessary requirement for the survival of these aquatic organisms that live in lakes, and rivers. Fish die if the dissolved oxygen level drops below a given point. Persons familiar with aquatic and marine life often measure the quality and health of a body of water by the amount of oxygen present.

Large amounts of oxygen are also a requirement for industrial processes such as a paper mills, water purification plants, and sewage treatment plants also require large amounts of oxygen.

Various attempts have been made to aerate bodies of water to increase their dissolved oxygen content. For example, air or gaseous oxygen have been forced under water and allowed to escape bubbling to the surface in an attempt to increase the level of dissolved oxygen in water. The problem with gaseous oxygen is that, it is difficult to dissolve into water to any substantial degree.

Other attempts to encourage oxygen entry into water include spraying the water into the air, mechanically splashing the surface of water, and subjecting the water to elevated pressures in a container. Mechanical methods, as spraying the water into the air, or mechanically splashing the water are not very efficient methods of producing dissolved oxygen, and are unable to reach high levels of dissolved oxygen particularly with any stability.

Electrolysis has been previously used to break apart the various molecules of H2O to produce gaseous hydrogen and gaseous oxygen. It is important to note there is a

difference between gaseous oxygen and dissolved oxygen.

Neoteric's technology comprises of an ingenious U.S and worldwide-patented apparatus and a method for generating high levels of *dissolved oxygen* within water. This electronically removing of contaminants from the water is an environmentally safe process. The invention is compact, efficient, reliable, durable, and economical. It is easily installed and removed if the need should arise. It is also easily retrofitted into an existing installation. Once installed, the technology is very economical to operate and maintain. The apparatus does not require much space; consequently, replacement parts also require very minimal storage space, the most significant result, however, is the inventions ability to elevate the oxygen level at a high rate.

The invention eliminates the need for bulky, expensive, complex, and the maintenance of surface spray and mechanical aerator. No longer is there a need for a business enterprise or municipality to purchase large track of land for aeration, settlement, and treatment ponds. The attempt to create dissolved oxygen no longer needs to expose the water to surface air that creates aromatic, zoning, and ecology-related problems.

Installation of the invention does not mandate the extensive capital investment that conventional technology requires. The cost to maintain the invention is insignificant in comparison to the expense of building and maintaining the type of commercial aeration projects now in use. The savings to commercial enterprises by using this technology also includes not having to hire, pay and contribute fringe benefits to numerous supports personnel not exposing people to dangers such as falling into open ponds, injures and the necessity of operating machinery.

The treatment cell of the invention uses a process that breaks water molecules apart and causes the oxygen created to go directly into a dissolved state in the water. The oxygen molecules do not pass through a gaseous state. The oxygen in effect bypasses the gaseous stage that is required by other purifying processes and unites with the liquid in this dissolved state.

As a result, dissolved oxygen levels are relatively stables, and do not require pressurization in the process. The technology's ability to generate dissolved oxygen is relatively unaffected by the presence of minerals, chemicals, or organic materials that maybe present within the water. The cells operation is non-contaminating; it does not introduce any additional metals, minerals, or chemical components into the water.

The technology ' s inventor knows of no other apparatus that has been designed solely for the production of dissolved oxygen within water. Some electrolysis processes do produce minimal amounts of dissolved oxygen as a by-product. However, such processes are unable to produce the higher levels of dissolved oxygen that can be achieved by using Neoteric' s technology.

Using unprocessed water at 30 degrees centigrade, past mechanical devices and/or process could only obtain a maximum level of concentrated dissolved oxygen of 7.6 parts per million (p.p.m). A slightly higher level maybe detected in some processes before reaching an insurmountable saturation point.

Another method that is used to generate elevated concentration of dissolved gases is exposing the water or fluid to excessive gas pressurization. For example, carbonated water or soda generally uses pressurization to obtain higher level of gas saturation. The elevated dissolved oxygen levels achieve with the Neoteric' s technology is not obtained through the use of carbonation or elevated pressures. The water is not carbonated. The lack of pressurization is important to note.

The processes used within the present invention changes the gas balance of water. In other words, the Neoteric' s technology rearranges the various gas percentages of oxygen, nitrogen, and contaminants within the water. The oxygen now in the water in a dissolved state, is quite stable.

Henry' s law states; The concentration of a gaseous solute in a solution, Cg, is directly proportional to the partial pressure, Pg, of the gas above the solution.

The resulting equation is Cg = KgPg, wherein Kg represents Henry' s law proportionally constant. For example, at 25 degrees Celsius, oxygen gas collected over water at a total pressure of 1.00 atmosphere (atm) is soluble to the extent of 0.0393 grams per liter.

Accordingly, if the altitude and the temperature of an open body of water are known, one can determine the level of dissolved oxygen within the water by using Henry' s law.

Henry' s law, however, assumes that the percentage of gas contained within the water will be the same as that of the surrounding atmospheric air, or in other words seventy-eight (78%) percent nitrogen and twenty-one and nine-tenths (21.9%) percent

oxygen.

The inventor's discovery was that his process could force oxygen into the water in a dissolved state. During the electronic process, some of the dissolved oxygen within the water evaporates bleeds or boils off, along with a corresponding amount of nitrogen. As a result, a relative stable condition is obtained. At this point the one hundred (100%) percent dissolved gas limit of Henry's law is not yet exceeded. However, since nitrogen has been purged or expelled by the system, the water can directly and immediately absorbs a comparable amount of dissolved oxygen without the oxygen having to enter a gaseous state. Thus, the concentration of dissolved oxygen can be increased without a similar increase in dissolved nitrogen. The oxygen level increases and the nitrogen level decreases.

Consequently, Neoteric's technology allows liquid to reach triple the normal oxygen saturation and not violate Henry's law. The amount of gas in the solution remains at one hundred (100%) percent to one hundred one (101%) percent, but the percentage of oxygen as nitrogen changes.

The apparatus is preferably placed within systems that re-circulate water. Every time the water passes through the apparatus, more nitrogen is displaced and the level of dissolved oxygen increased. The process can continue until approximately twenty-two (22) parts per million of dissolved oxygen are achieved and maintained. This equates to over fifty (50%) percent of the gases in the water.

The dissolved oxygen process is impervious to the water's temperature as long as the water temperature is below 50 degrees Celsius. For example, the present technology can achieved and maintain a concentration of 22 parts per million of dissolved oxygen all day long with the water at 30 degrees Celsius.

A conventional use of Henry's law, however, would generally limit the concentration amount of dissolved oxygen to around 6 to 7 parts per million. In other words, according to Henry's law, the given body of water should have a dissolved oxygen concentration level of around 6 parts per million, but by using Neoteric's technology, the concentration level may be maintained at about 22 parts per million.

When trying to aerate water by pumping or blowing air underwater and allowing the gas to bubble to the surface, the injected air comprises approximately 78% of nitrogen and 22% of oxygen. The relative percentage of absorption of such gases is

comparable to the respective amount of injected and the bottom of the water. Consequently, with the increase in dissolved oxygen, there is a significant increase in the amount of dissolved nitrogen. Many fish and other aquatic life are sensitive to high nitrogen levels and can go into a state of embolism if the nitrogen levels are excessive.

Comparing Neoteric's technology, the level of dissolved oxygen can be effectively doubled, tripled, and even quadrupled in a single pass of water through the system, without any absorption of dissolved nitrogen. The result of this process far exceeds that which can be achieved by using air blowing or other older techniques and does it safely with no harm to aquatic life in fact it greatly enhances their environment.

Another method to obtained dissolved oxygen is to first liquefy air to separate the oxygen. The oxygen is then stored in pressurized tanks and later injected back into the water reservoir.

After being injected back into the water reservoir, the oxygen is allowed to again bubble back to the surface. There are several problems with this method including the expense and difficulty of separating the oxygen, the cost, and the trouble of handling, storing, and transporting flammable pressurized oxygen tank is troublesome to say the least.

In addition to a significant reduction in cost of equipment, and labor, Neoteric generation of dissolved oxygen is totally safe to use and operate. Once the apparatus is installed the only needed component to operate the apparatus is a flow of water and a direct electrical current. Obviously, it is much more convenient to obtain and maintain a supply of electricity than to keep replenishing a supply of pressurized oxygen tanks.

Neoteric's research has not only increasing amount of dissolved oxygen in water, the oxygen molecules actually displace and remove or reduce the amount of dissolved minerals, oils, and organic matter contained in the water. The water created not only is a healthier product because of the oxygen the cleaning of the contaminants is very efficient and uses no chemical additives, an added health value. Neoteric has actually created an electronically controlled scrubbing device that scrubs contaminated water at the molecular level.

Although Neoteric's apparatus used to treat water having physical, chemical, and/or

biological contaminants it is not a cure-all for every water problem. The dissolved oxygen generation with electronic purification will however, help or cure contamination problems in most cases. The following explanation describes how the invention affects each type of contamination.

The electrical flow and field generated by the invention causes coagulation or lumping together of solids, colloids, and thin oils that comprise of the physical contaminants within water.

As well, the large amounts of oxygen added to the water cause the oxidation and destructions of many other contaminants. Those that coagulate and oxidized fall or settle out of solution.

This coagulation, oxidation, and removal of the settled contaminants eliminate algae, hydrogen sulfide, and other elements that create most obnoxious odors. For example, the presence of hydrogen sulfide generally creates a smell of raw sewage.

Again, it is important to note that using the Neoteric's purification apparatus and processes purification is generally accomplished without using or adding chemicals or agents to treat the water.

Subjecting the water to high levels of dissolved oxygen actually reduces chemical contaminants. The dissolved oxygen oxidizes and breaks down many chemicals and hydrocarbons in common concentrations and gases them off. Minerals and dissolved metals in the water coagulate into filterable solids, as do many soaps and phosphates.

Biological contamination is safely and effectively treated using the Neoteric's technology. Dissolved oxygen is an effective, natural bactericide that is not toxic to animals, fish or plants. On the contrary; it is significantly advantages to animals, fish and plants.

Anaerobic bacteria live without oxygen. An example is a virulent type of anaerobic bactreria is that is commonly found in stagnant water. The simple introduction of oxygen into the water kills anaerobic bacterial. Introducing additional dissolved oxygen in the water kills aerobic bacteria, which live with oxygen. This is accomplished by raising the level of dissolved oxygen until aerobic bacteria die. The excess oxygen breaks down the outer wall of the bacteria cell causing the death of the organism. To the inventors' knowledge, no bacteria even the microscopic organisms

are immune to high levels of dissolved oxygen.

Because dissolved oxygen remains in the water, long pipe lengths and storage tanks are cleansed and purified of contaminants. There is a residual kill of bacteria as a result of the dissolved oxygen.

Dissolved oxygen can also be used very effectively to kill fecal cauliform, which is found in waters with sewage contamination.

Many cities use oxygen to purify the water output from sewage plants, as oxygen is an effective way to treat water without incurring harmful environmental side effects.

The contamination free operation of the Neoteric's technology makes the apparatus particularly valuable for use with fish farms, lakes, drinking water, and other environmentally sensitive water reserves. The invention however, is similarly effective in wastewater treatment, sewage treatment, water purification, paper processing, and with other industries that require high levels of dissolved oxygen in the water. Large open bodies of water can now be economically maintained with a stable, balanced, supersaturated state of dissolved oxygen.

Originally, the primary purpose of the invention was not the coagulation of contaminants, although this is an extremely beneficial by process. The primary purpose of the invention was increases the level of dissolved oxygen within the water. The technology turned out to be the best of all possibilities.

Neoteric's technology is a flow-through system. In other words, the technology allows the water to pass right through the apparatus without having to force the water in or out of the apparatus. The technology permits high water flow rates with only a minimum amount of drag or flow resistance.

The technology can be retrofitted into and will not interfere with existing water pumping and storage systems.

The construction and materials used within the system make the apparatus and process nearly, if not completely immune to normal water pressures and temperature changes. .