



Chlorine dioxide

- efficient and environmentally friendly

Chlorine dioxide is a gas that has the chemical formula ClO_2 . It is a very effective, environmentally friendly, and safe means of combating microbiological pollution. Chlorine dioxide is used worldwide for purification of drinking water and drinking water systems (both for humans and animals), as well as for disinfection of wastewater. In addition, the substance is also effective for mould and odour remediation. In various contexts, chlorine dioxide has been assessed and approved by several authorities, including the US authorities EPA and FDA.

A chemical degradation of microorganisms

Chlorine dioxide is very effective against bacteria and viruses in concentrations as low as 0.1 ppm. Not only does the substance effectively kill free-flowing microorganisms, but it is also very effective at disinfecting surfaces with adhering bacteria in the form of biofilm - a thin film of bacteria on the surface of a material.

With minimal contact time, chlorine dioxide is used effectively against many pathogenic organisms (and their resting stages) such as Legionella, Tuberculosis, Resistant Staphylococci and Enterococci, Listeria, Salmonella, Amoebae and Flagellates, E. coli, and Cryptosporidium. In addition, the ability of chlorine dioxide to degrade biofilms means that the regrowth of microorganisms is severely delayed and completely prevented by continuous addition of quite low concentrations.

Due to its mechanism of action, which consists of a chemical degradation of the cells' cell membrane by oxidation, there is no development of resistance to chlorine dioxide.

Highly effective method of disinfection

Infection with microorganisms is the cause of disease outbreaks in both humans and animals. In general, we have a very high degree of control over the microbiological quality of our drinking water in Australia, so it is rare that we see disease outbreaks due to water quality. But if we are to maintain the high standard, then preventive disinfection of containers and plants is an ongoing need. Drinking water systems in animal stables are more exposed to long periods of time and small flow, where waterborne infections can be a real and troublesome problem.

Out in the world, infections of Listeria, Salmonella, Shigella and E. Coli are often seen, which originate from food and several cases of infections from water installations in hotels, offices and cruise ships caused by Legionella, Noro virus, Cryptosporidium, etc.

Common to the above challenges is that chlorine dioxide, even in very low concentrations, can prevent the growth of microorganisms, as a continuous addition of between 0.2 and 0.8 ppm has proven to be very effective after an initial sterilization at a concentration of about



10 ppm. Since chlorine dioxide is a gas that is dissolved in the water, and since it is a stable solution, it can be transported around with the water by disinfecting water systems, and thus come into close contact with both the biofilm that sits on the inside of pipes and tanks as the free-flowing microorganisms. When chlorine dioxide encounters the microorganisms, it penetrates their cell membrane and thereby destroys their basic life process. This penetration is different from several other oxidative products that just “scorch the surface” of everything they come in contact with.

The same process occurs when chlorine dioxide is used in connection with mould decontamination and in decontamination after rising sewage water, where a concentration of 1000 ppm and a contact time of 60 seconds is enough to ensure a complete sterilization of even highly mould-infested surfaces.

An environmentally friendly solution

The effectiveness of chlorine dioxide is because the substance is very reactive. This high reactivity is also the reason why free chlorine dioxide is degraded very quickly by light. During decomposition, chlorine dioxide is converted to oxygen and sodium chloride (common table salt) without leaving traces of other chemicals, which makes it a very environmentally friendly agent.

This is not the case with other substances such as quaternary ammonium compounds or hypochlorite, which are found in many cleaning products. Quaternary ammonium compounds leave chemical residues that kill all aquatic organisms, and hypochlorite leaves a number of chlorinated compounds, some of which are suspected to be carcinogenic - see i.e. report no. 643, 2001 from the Danish Environmental Protection Agency.

Due to this harmful effect on the environment, both quaternary ammonium compounds and hypochlorite are included on the Danish Environmental Protection Agency's list of undesirable substances.

Note: In connection with odour remediation, it is not recommended to use products with chlorine dioxide on “soft” surfaces such as upholstered furniture, textiles, and carpets, as it has a bleaching effect. Here it is recommended instead to use Protox Odour Free, which does not contain chlorine dioxide and which has been developed based on a biological process with bacterial cultures and enzymes.