

Frequently asked questions about Tristel's chlorine dioxide

- 1 Is chlorine dioxide (CLO₂) the same as chlorine (CL₂)?** While chlorine dioxide has chlorine in its name, chlorine dioxide's chemistry is radically different from that of chlorine. One atom makes all the difference.

Chlorine dioxide is not “chlorine in disguise”, but a totally different chemical with completely different chemistry.

- 2 Where is chlorine dioxide most commonly used and how does it work?** World-wide, chlorine dioxide is used principally as a primary disinfectant for surface waters with odour and taste problems. It has been used for disinfecting water streams for over seventy years. It is used by many large cities in Europe such as Brussels, Zurich, Dusseldorf, Berlin, Toulouse and Vienna.

Chlorine dioxide is an effective biocide at concentrations as low as 0.1 ppm over a wide pH range.

Chlorine dioxide penetrates the cell wall and reacts with vital amino acids in the cytoplasm of the cell to kill the organism. The by-product of this reaction is chlorite. Of great importance is that toxicological studies have shown that chlorine dioxide's disinfection by-product, chlorite, poses no significant adverse risk to human health.

- 3 Does chlorine dioxide have any uses other than municipal water treatment?** About fifty years ago it was also discovered that chlorine dioxide is a very effective bleaching agent and today it is used extensively in the pulp and paper industry. In fact, in order to minimise the environmental effects of the bleaching process, chlorine dioxide is rapidly becoming the chemical of choice. In the late 1970's papers were published indicating that the mutagenicity of pulp mill effluents decreased significantly as chlorine dioxide was substituted for chlorine.

No other technique can match the high quality that is achievable with chlorine dioxide – it produces clean, strong and very bright paper – and over 2,000 tons per day are now consumed in this application.

Chlorine dioxide is also being used as a disinfectant agent in the food industry in fruit and vegetable washing, flume water disinfection, meat and poultry disinfection and odour control. In industrial processes, chlorine dioxide is used in industrial water treatment (cooling systems/towers), ammonia plants, pulp mills (slime control, paper machines), oil fields and the electronic industry. In North America it is used in certain household goods, for example toothpaste and contact lens cleaners.

Finally, of course, chlorine dioxide is becoming established in the medical field in the shape of the Tristel range of instrument sterilants.

- 4 How does chlorine dioxide affect the environment?** Chlorine dioxide is environmentally friendly and in fact is a pollution protection technology that protects the environment and human health from bacteria and by-products formed from other disinfection methods.

For example, in the pulp and paper industry the use of chlorine dioxide has virtually eliminated dioxin in mill waste water and has led to a significant improvement in the aquatic eco-system.

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- 5 In its most widespread application, ie water treatment, why is chlorine dioxide used rather than chlorine?** It should first be noted that both chlorine dioxide and chlorine are powerful disinfectant agents.

Chlorine has been and will continue to be a very effective disinfectant that is responsible for making and keeping drinking water safe for people around the world.

In the instances in which the drinking water source is surface water, which contains organic materials, chlorine dioxide offers the following benefit. Chlorine dioxide functions via an oxidative rather than chlorinating reaction. This virtually eliminates the formation of chlorinated organic compounds.

Chlorinated organic compounds have been shown to have the potential to create long-term health hazards such as the production of Trihalomethanes or Chlorophenols.

This characteristic is of great importance to man and the environment.

- 6 Is chlorine dioxide toxic?** Fifty years of worker experience has demonstrated that chlorine dioxide is a safe compound when handled properly.

As stated above, 2,000 tons of chlorine dioxide are used daily in the production of pulp and paper.

However, the emphasis must always be on handling a disinfectant chemical properly and in this regard chlorine dioxide is no different to other disinfecting agents.

- 7 Is chlorine dioxide expensive?** The cost of chlorine dioxide is dependent upon the cost of the precursor chemicals – sodium chlorite or sodium chlorate – and the chemicals required to convert these chemicals into chlorine dioxide. The cost of chlorine dioxide will also depend on the generation method employed.

In the Tristel system, chlorine dioxide is generated by the acidification of sodium chlorite (NaClO_2). This is a highly economic method of producing chlorine dioxide at time and point of use and the reason why the Tristel sterilants are the most affordable alternative to glutaraldehyde for medical applications.

- 8 Is it safe for pregnant women to be exposed to Tristel?** Yes. The following statement comes from the Health & Safety Executive Chlorine Dioxide Risk Assessment Document – EH72/14 – 3.7.10.4

“Well conducted studies in rats have shown that oral exposure at parentally toxic levels does not impair fertility or development. This is consistent with the view that as ClO_2 is a reactive gas it would be unlikely to reach the reproductive organs in significant amounts.”

- 9 Can Tristel cause Occupational Asthma?** The following statement comes from the Health & Safety Executive Risk Assessment Document – EH72/14 – 4.14 under Sensitisation:

“It would be anticipated that ClO_2 (chlorine dioxide) would not be a skin sensitiser. There are no reports of occupational asthma associated with ClO_2 .”