Health Risk in **Disinfecting Municipal Water** with **Chlorine**

The Ozone Solution

The use of chlorine in the treatment of drinking water has been predominant for ages now. This way of disinfecting water has saved lives across the world.

It was in the mid 1970s, that the new methods of analysis showed that some by-products such as chloroform appear when chlorine reacts with organic matter in untreated water. At that point of time, the alternatives were limited, unproven and by-products were considered lesser of the evil, comparison with the numerous waterborne diseases spread through water.

The incidence of cancer, especially in the gastro intestinal tract, have worried health authorities prompting many research institutes including the US National Cancer Institute to intensify their research which resulted in a link being found between chlorination and high rate of bladder, colon and rectal cancer.

This has persuaded many governments to agree that even a theoretical risk warrants action. As millions of people drink chlorinated water, even small carcinogenic effects could kill thousands. It is found out that people with more than forty years of exposure with the chlorinated water has doubled the risk of rectal cancer.

In 1979, the US EPA set up the first chlorination by-product law, limiting total trihalomethanes (THMs) to 100 microgram per liter in water. Many municipal drinking water systems have changed over to pre-ozonation from the conventional ozonation. Though ozone was used in the first municipal drinking plant in Holland in 1893, it took decades for the technology to be approved as GRAS (Generally Regarded As Safe).

Today, we find that most of the drinking water plants in the USA, Europe, China, Japan and some other countries like Malaysia, Singapore, and Iran have adopted pre-ozonation instead of pre-chlorination.

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However, in India, the situation is different. Even if you compare drinking water standards of developing countries, India is far behind in adoption of newer technologies. It has been reported the incidence of rectal and colon cancer is the highest in India and lung and breast cancer is only second after these two. However, these have not been related to chlorinated water for want of proper statistical records and research in India, unlike other developed countries.

Therefore, authorities providing municipal drinking water in India would do well to consider this fact and have a social obligation to provide water that is risk free.

The use of ozone will provide a solution since 'ozone' is known to remove all organic in the water, and using small amounts of chlorine to provide residual disinfectant during distribution is absolutely safe. In fact, ozonation process alone can achieve level of below 100 PPM, THM level in drinking water.

Apart from this, pre-ozonation can provide the following advantages:

Reduction of virus including Polio virus, Hepatitis A and C virus
Irradiation of Cysts of Amoeba, Giardia, and Cryptosporidium
Pseudomonas removal
Removal of Phenolic compounds and pesticides commonly found in water
Removal of color and odor in drinking water

The questions more often asked by municipal authorities are, and some of the stances taken by them are:

- India is a poor country and we cannot afford such technologies at the moment. Is India that poor?
- First of all, we need to provide drinking water to everyone before thinking of newer technologies for treatment.
- Most of our drinking water lines are mixed with sewers and so using ozone is not appropriate at present. We need to attend to this first.

These questions, at a glance, seems appropriate but then how long should we wait for risk free water supply? Afterall, we are already 30 years behind other fast developing countries like China.