

**PHARMACEUTICAL AND HOSPITAL WASTE WATER MUST USE OZONE
HERE IS WHY**

Pharmaceutical waste waters, have known to be contaminated with trace compounds, classified as EDC (endocrine disruptive agents) that have high environmental impact. EDCs can impact hormone functions in animals and humans. Natural or man-made that disrupts growth, development, or reproduction. These are anthropogenic substances that affect the hormone balance. Growing concern is the multiplier-effect these substances produce. They can cause resistances of bacteria to antibiotics, and genotoxicity

In hospitals, patients consume medicines such as antibiotics, hormones, beta blockers that all only partially metabolised in the body and the rest excreted through Urine and faeces. These trace compounds find their way into the waste waters. Ultimately these find their way to Municipal waste water and remain there till they find their way to ground water /surface water. This becomes a public health concern.

The effluent treatment technology adopted by Pharmaceutical Company may have advanced technology such as Membrane technology such as Nano technology and RO / activated carbon technology or combinations. However use of membrane technology has limitations due to increased power costs and replacement costs. They need to have waste waters with very low COD and BOD and NOM for reliability of removal of these micro pollutants. Carbon filters have very high replacement costs as they can hardly be recharged when used in such process. Also like RO and Nano Filters, carbon filters are also not effective in removing micro pollutants, in waste waters containing NOM (natural Organic water)

The present technology that is commonly used in hospitals for their waste waters such as activated sludge method is not sufficient enough to eliminate these toxic compounds. They do not totally remove these micro pollutants and an analysis has shown these micro pollutants in many treated waste waters in Hospitals. Also unless the sludge generated is incinerated, you can never claim to have removed these micro pollutants as these compounds can find their way when the sludge water seeps into the ground water

As Early as January 2009, there was a front page news in a leading English daily , expressing shocking evidence that in an around Pattancheru (28 kms from Hyderabad and where more than half of worlds bulk drugs are produced),they have found more than 20 different active pharmaceutical ingredients in the ground water. It is this ground water the villages around drink and the villagers thereby drink every day a cocktail of these chemicals. Health repercussions unknown .

Ozone and AOP to the rescue: Ozone pre-treatment process have been found to be very effective in either complete mineralisation of the micro pollutants or breaking down these recalcitrant molecules to more degradable substances so that they are totally removed during normal activated sludge process. (Not suitable in Municipal Plants because of NOM content where ozone has selective chemical action and requires very high dose) Ozone can also be retro fit in existing treatment where ozone is used in secondary treatment. This could be used to eliminate or break down the compounds into to nontoxic compounds. When AOP process is used (Ozone /H₂O₂, Ozone/UV) , these compounds could be demineralised

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It is always prudent to strive for complete elimination of these compounds since depending on the type of micro pollutants, it is not guaranteed that the broken down compounds are also safe. Measurement of parameters such as TOC, DOC, COD and AOX and comparing them could provide some indication on the required quality of the waste water but when the aim is to remove micro pollutants, it is always recommended that the wastewater be analysed for the micro pollutants and its known by-products by technologies such as gas chromatography or liquid chromatography

Advantages of Using Ozone: When ozone is dissolved in water, O₃ molecules and OH – radicals are found. The proportion of OH- will depend on the pH and at pH 8 , enough OH- radicals are found to simulate an AOP process . OH- radicals are the most powerful oxidant next only to Fluorine . It has a very high EOP .

Advantages of Using Ozone

1. Ozone treatment achieves removal rates >90% for most investigated compounds
2. Ozone reduces the overall estrogenicity
3. Relatively low doses (3-10 mg/L) ensure selective oxidation of contaminants
4. Ozone reactions are more selective and predictable in wastewater than radical reactions
5. Ozone is the best available technology for EDC removal
6. Ozone technology is available in reliable large scale
7. Practical experiences and references exist in ozone use for EDC removal

ISSUED IN PUBLIC INTEREST BY

V.BARATHARAJ

OZONE TECHNOLOGIES & SYSTEMS INDIA PVT LTD

1-A, 12TH Cross Street, Shastri Nagar, Chennai 600 020

Tel: 44 4211 8266 ,9840149184 .e-mail :otsilozone@gmail.com.

web: www.otsil.net