

"The use of ozonation water treatment in North America will increase in the near future, driven by regulatory pressures to decrease the use of chlorine. Ozone will also become more appreciated here because of its inherent advantages over other oxidants. Novel oxidant systems such as ozone with hydrogen peroxide and UV radiation will continue to be investigated as they show promise for removal of synthetic organic compounds and intractable taste and odor compounds."

"New Developments in the O₃/UV Photo-oxidation Process for Industrial Wastewater Treatment," by H. William Prenalge, Jr., Chemical Engineering Dept., University of Houston.

"Among available chemical oxidation and carbon absorption processes for industrial wastewater treatment, photo-oxidation using O₃/UV provides greater removal of toxic and refractory species than O₃-only, Cl₂, O₂, Cl₂, H₂O₂, and carbon absorption."

"Conventional chemical oxidation processes are not able to completely remove inorganic and organic toxic and potentially toxic bio-refractory species, since the reaction mechanism results in highly stable oxidation species as a last step. Ozone/UV does not have this limitation, but provides highly efficient and effective chemical oxidation for toxic and refractory species, which are not removed by tertiary treatment such as carbon absorption."

"As a result, ozone/UV oxidation can now be applied to three major areas: industrial wastewater streams from manufacturing operations, chemical plants, and refineries; residual organic removal and disinfection of municipal secondary effluent streams; and source water processing for domestic water supplies."

"Oxidation of Water Supply Refractory Species by Ozone with Ultraviolet Radiation," United States Environmental Protection Agency, Municipal Environmental Research Laboratory, Cincinnati, Ohio, EPA-600/2-80-110, August, 1980

"Kinetics of Ozone/UV Reactions

"Ozone/UV treatment was found to be four to fifty times faster than ozone or UV alone, depending on compound and matrix.

"Of the three contributing reactions considered to occur during an ozone/UV experiment (ozonolysis, photolysis, and ozone/UV), the ozone/UV term contributes 65-98% of the reaction rate. In other words, the ozone/UV reaction is 2-50 times faster than the other important reaction, photolysis, while ozone appears to contribute negligibly."

"Application of Oxidation by a Combined Ozone/ultra violet radiation system to the Treatment of Natural Water," by H. Pailiard, R. Brunet, M. Dore, Centre de Recherche dy Groupe Generale des Eaux, Chemin de la Digue, France

"With regard to the application as such of the O₃/UV system, Prenalge showed that the oxidation of chlorinated insecticides was 10 to 10³ times faster with the O₃/UV system than with ozone by itself. Moreover the oxidation of compounds refractory to ozonation, such as acids, alcohols, amino-acids, fatty acids and poly-alcohols was effected 10² to 10⁴ times faster.

"According to Glaze, reactions with the O₃/UV system are from 2 to 50 times quicker than by photolysis alone and the effect of ozone is negligible on saturated organochlorine compounds."

"Ozonation alone ensures a 20% abatement of TOC for an ozonation rate of 10mg/l whereas the O₃/UV system provides an abatement of 65%..."

"In all cases, combined O₃/UV proved to be at least as efficient as ozonation alone and always superior to radiation alone."

