Treatment of organic pollutants in wastewater by ozone microbubbles and cyclodextrins

*Fu-Yin XIE[1], Meng-hau Sung[1]

1. Department of Environmental Science and Engineering,Tunghai University,Taichung City,Taiwan

The hydroxyl radicals generated during ozonation can be used to oxidize organic pollutants in water. However, ozone gas is only slightly soluble in water. To increase the treatment efficiency, ozone microbubbles and cyclodextrins can be applied to increase the solubility. Microbubbles have high surface area and long residence time in aqueous solution. If they are combined with ozone gas to form ozone microbubbles, the solubility and half-life of gaseous ozone in water can be significantly improved. In definition, microbubbles refers to bubbles with a diameter between 1 micrometer and 1 millimeter. In addition to oxidative hydroxyl radicals generated, at the moment when the microbubble bursts, the pressure will be released, resulting in a high-speed microjet and ultra-high temperature locally. Under this condition, organic pollutants can also be degraded by pyrolysis. Cyclodextrins are often used in foods and are not harmful to humans. Adding cyclodextrin to the ozone microbubble system can increase the residence time of ozone in water and increase the half-life of ozone in water. Consequently, the combination of microbubbles and cyclodextrins appears to be a promising method for effective degradation of organic pollutants in water. Pesticides are common organic pollutants in water. After application, it may enter the environment via surface runoff, which may directly or indirectly enters water resources such as lakes or reservoirs. It has a certain impact on the environment and ecology, and may enter the groundwater system, which may affect the drinking water quality. The objective of this study is to establish an ozone microbubble system with cyclodextrin to treat organic pollutants in water. A variety of tests are conducted to examine its performance. Parameters considered in the experiments are pH and dosages of ozone microbubbles and cyclodextrin. The best condition for efficient degradation will be determined.

Keywords: wastewater treatment, green remediation, ozone microbubbles, cyclodextrin

