Degradation of 2,4-Dichlorophenoxyacetic Acid (2,4-D) by Ozonation and TiO2/UV Treatment

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Abstracts

The degradation of 2,4-dichlorophenoxyacetic acid (2,4-D) was conducted by ozonation, TiO_2/UV treatment only, and two-stage treatment of ozonation followed by TiO_2/UV treatment. In the case of ozonation, 2,4-D could be degraded and vanished within about 10 min at pH 9 and 20°C, but the TOC value was reduced by only about 40% by 30 min ozonation. In the case of TiO_2/UV treatment, about 5 d was needed for complete disappearance of 2,4-D at pH 5 and 20°C. On the other hand, when the two-stage treatment of ozonation plus TiO_2/UV treatment was applied, 90% decline of TOC was achieved within about 20 h, i.e., 30 min ozonation and 20 h TiO_2/UV treatment thereafter. Furthermore, 90% of chloride ions in 2,4-D were liberated by the two-stage treatment. From a bioassay test of the two-stage treated water by the use of an osteoclasts of goldfish scales or *Daphnia magna*, it was found that 2,4-D was degraded into harmless substances with little estrogen activity and toxicity.

Keywords: 2,4-D, Ozone, TiO2/UV, Osteoclast of Goldfish Scale, Daphnia magna