

## Comparative Study of Ozone Based AOP's for Mineralization of Reactive Black 5

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**Abstract :** The present work focuses on the comparative study of ozone based advanced oxidation processes (AOPs): O<sub>3</sub>, O<sub>3</sub>/UV and O<sub>3</sub>/UV/Persulfate for mineralization of synthetic wastewater containing Reactive Black5 (RB5) dye. The effect of various parameters: pH, ozone flow rate, initial concentration of dye and intensity of UV light was analyzed to access performance efficiency of AOPs. The performance of all the three AOPs was evaluated on the basis of decolorization, % TOC removal and ozone consumption. The highest mineralization rate of 86.83% was achieved for O<sub>3</sub>/UV/Persulfate followed by 71.53% and 66.82 % for O<sub>3</sub>/UV and O<sub>3</sub> respectively. This is attributed to the fact that Persulfate ions (S<sub>2</sub>O<sub>8</sub><sup>2-</sup>) upon activation produce sulfate radical (SO<sub>4</sub><sup>•-</sup>) which is very strong oxidant capable of degrading a wide variety of recalcitrant organic compounds, moreover to enhance the performance of Persulfate it is activated using UV irradiation. On increasing the intensity of UV irradiation from 11W to 66W, TOC removal efficiency is increased by 59.04%. Ozone based AOPs gives better mineralization on basic conditions, at pH 12 it gives 68.81%, 60.01% and 40.32% TOC removal for O<sub>3</sub>/UV/Persulfate, O<sub>3</sub>/UV and O<sub>3</sub> process respectively. The result also reveals that decolorization of 98.95%, 95.17% and 94.71% was achieved by O<sub>3</sub>/UV/Persulfate, O<sub>3</sub>/UV and O<sub>3</sub> process respectively. In addition to above, ozone consumption was also considerably decreased by 17% in case of O<sub>3</sub>/UV/Persulfate, as efficiency of process is enhanced by means of activation of persulfate through UV irradiation. Thus study reveals that mineralization follows: O<sub>3</sub>/UV/Persulfate > O<sub>3</sub>/UV > O<sub>3</sub>.

**Keywords :** AOP, mineralization, TOC, recalcitrant organic compounds

**Conference Title :** ICAES 2016 : International Conference on Agriculture and Environmental Systems

**Conference Location :** Miami, United States

**Conference Dates :** March 24-25, 2016