

An Overview of Advanced Oxidation Processes Reported to the Abatement of Contaminants in Landfill Leachates

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ABSTRACT

In most countries, sanitary landfill is nowadays the most common way to eliminate municipal solid wastes (MSW). However, sanitary landfill generates large quantity of heavily polluted leachate, which can induce ecological risk and potential hazards towards public health and ecosystems. The application of advanced oxidation processes (AOPs) including ozone-based processes, Fenton-based, and other AOPs to treatment of landfill leachate was reviewed, from 2011 to the present. The treatment efficiency in term of COD, BOD₅, NH₄⁺-N, NH₃-N, among other, of various AOPs was presented. Advantages and drawbacks of various AOPs were discussed. Although, most of recent experimental studies and developments combined AOPs with biological or physico-chemical treatments to improve treatment efficiency. Among the AOPs reviewed, Fenton-based processes are the most applied AOPs (46%) in the field of treatment of landfill leachate and give the impression be the best choice, because it can achieve high percentage of COD removal and simple in technological aspects. Nevertheless, Fenton process also shows drawbacks that large amount of iron sludge may form and if we want the complete degradation (mineralization) of the pollutants, this is not economically acceptable. Hence, the combination with biological techniques should be considered to decrease the overall treatment costs and ensure an effective removal of undesirable contaminants. In this sense, our general proposal to reduce the pollution of a landfill leachate is a four-stage process: biological pretreatment, followed by coagulation and Fenton process step, and finally, a biological treatment (as a polishing step), with a back-flow to influent flow.