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Editorial Open Access

Pretreatment to Improve the Degradability of Refractory Organic Matter using Advanced Oxidation Processes

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Editorial

Tons of refractory wastes have been released since the industrial revolution. Except for some natural organic matter such as humic substances, most refractory organics are anthropogenic. These organics released at point sources are usually collected and treated in municipal/industrial wastewater treatment plants (WWTPs). Activated sludge process and its modified processes have been usually used for the treatment of municipal wastewater since over 100 years. The main disadvantage of these processes generates the tremendous excessive biomass after treating organic matter and nutrient in the influent. In the case of the industrial wastes, the design of treatment process of each waste is highly dependent upon the waste sources. System engineers should take the characteristics of each waste into consideration because the design of treatment process is determined by organic and nutrient loading as well as the biodegradability of wastes. When the influent consists of the high concentration of refractory organic matter, it is necessary that the treatment process be lessen the persistence of organic matter first. Several investigators showed that the excellent performance for the reduction of refractory organic matter using physicochemical, thermal and advanced oxidation processes (AOPs) including ozone, ozone/UV, ozone/H_2O_2 and gamma irradiation. These pretreatment processes improved the overall efficiency in the treatment process, and led the reduction of volatile solids in the following anaerobic digestion process. Anaerobic digestion is considered as the most feasible method to reduce the volume of excessive activated sludge because of its long history and the cumulative design/operating parameters. In addition, the reduction of the biomass using anaerobic digestion is actually the cost comparable. To efficiently digest the excessive biomass in an anaerobic digestion process, several investigators reported with successful results for last few decades. It is well-known that hydrolysis of the biomass is the rate-limiting step in anaerobic digestion. AOPs have attracted great interest of scientific and engineering because they were recognized as a feasible option for the pretreatment of many refractory wastewaters. AOPs usually use hydroxyl radicals in order to oxidize contaminants or reduced organic matter in aqueous phase. To facilitate refractory organic matter using a biodegradation/bioremediation process, AOPs can be a very active tool to overcome some bottleneck in anaerobic digestion. In addition, industrial wastewaters are efficiently able to be treated by a combined AOPs/biotreatment technology. When pathogens are exposed to hydroxyl radicals, they suffer an fatal damage in the nucleic acid from the attack of hydroxyl radicals. It is possible that more efficient removal of refractory organic matter in the wastes using the pretreatment of AOPs and the following biological treatment process.