TITLE: ***Treatment of leather industry effluent for removal of color and chemical oxigen demand.***

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ABSTRACT

The leather industry represents an important economic sector in many countries. On the other hand, generates large amounts of wastewater containing ammonium ion, sulfides, surfactants, acids, dyes, sulfonated oils and organic substances including natural or synthetic tannins agents. Tannery wastewater treatment is very complex, due to the addition of large number of chemicals in several concentrations. The advanced oxidation processes (AOPs) involve the generation of the hydroxyl radicals (•OH), a very powerful and non-selective oxidizing species with the oxidation potential of 2,8 V. These processes represent an alternative for the destruction of refractory and hazardous pollutants from the industrial wastewater, contaminated surface waters and groundwater. This work has as objective to select among five AOPs (hydrogen peroxide and persulfate photolyses, Fenton and photo-Fenton processes, and photocatalysis by semiconductors) the most suitable process to degrade the leather industry effluent, generated in the retanning step. The best results for the effluent degradation took place when it was used the semiconductors photocatalysis such as zinc oxide and titanium dioxide irradiation, obtained through the determination of the chemical oxygen demand (COD). In the presence of ZnO semiconductor, the COD reduction attained 98% using an initial pH 8.0 after 4 h irradiation at 30ºC. Using TiO2 in photocatalysis, the COD maximum removal was 68% at initial pH 7.0 after 4 h irradiation at 30°C. Thus, ZnO semiconductor was selected in order to do the retanning effluent treatment. Once known the most efficient process, the Botryosphaeria rhodina fungus and chemical/biological and biological/chemical combinations were investigated to degrade the tanning effluent. After the treatment by Botryosphaeria rhodina and Vogel solution, it was observed the decolorization and 91% COD reduction and 93% TOC. Furthermore, the COD did not decrease significantly in the photocatalytic and biological sequential processes, while the combination of biological followed by photocatalytic process reduced 79% of COD. The tannery effluent, after the ZnO photocatalytic treatment, followed the experimental parameters recommended by CONAMA and FEEMA. The toxicity analysis showed that the treated effluent is not toxic to Artemia salina microcrustace.

Palavras-chave: Advanced oxidation processes; photolysis; H2O2/UV; Fenton; photo-Fenton; photocatalysis; tannery effluent; Botryosphaeria rhodina; Artemia salina.