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CATALYTIC WET PEROXIDE OXIDATION OF LEACHATE WATERS USING LOW-COST CARBON-BASED MATERIALS AS CATALYSTS

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The Directive 2008/98/EC established a hierarchy for management of Municipal Solid Waste (MSW), according to which landfilling should be avoided. In this direction, Mechanical and Biological Treatment (MBT) plants play an important role, since it allows the conversion of the organic fraction of MSW into biogas and compost, with applications as fuel and fertilizer, respectively. However, MBTs generate a wastewater, referred as leachate, with high load of organic matter, that is not properly treated by conventional systems. In addition, the production of compost in MBTs tends to be higher than its demand, resulting in accumulation on landfilling sites. This work aims to address the Catalytic Wet Peroxide Oxidation (CWPO) of a real leachate effluent obtained from a MBT, whose properties are summarized in Table 1. The compost obtained from the MBT was considered to produce the catalyst for the CWPO process. The low-cost catalytic materials were prepared by hydrothermal carbonization at previously optimized operating conditions (230 °C, 4 h and 130 g_{compost}/L). Figure 1 shows the profile of H₂O₂ decomposition, COD and TOC upon time of reaction at 50 °C (solid line) and at 80 °C (dashed lines). At 80 °C, a removal of 40% and 55% for COD and BOD₅, respectively, was achieved, increasing BOD₅/COD ratio from 0.33 to 0.45, along with a reduction on turbidity (to 12 NTU) and color of the effluent, as observed in Figure 1.

Table 1: Characteristics of the leachate waters from the MBT

Parameter	Value
Chemical Oxygen Demand (COD)	59 g L ⁻¹
Biological Oxygen Demand (BOD ₅)	24 g L ⁻¹
pH at 25 °C	7.20
Total Organic Carbon (TOC)	27 g L ⁻¹
Chlorides	5 g L ⁻¹
Turbidity	410 NTU
Conductivity	38.8 mS cm ⁻¹

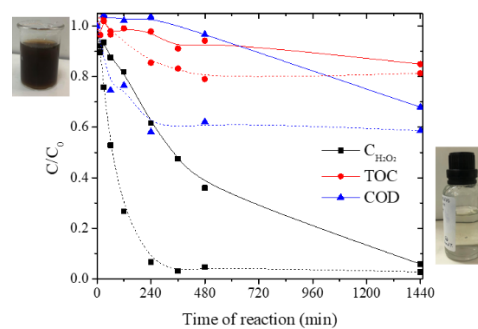


Figure 1. Profile of H₂O₂, TOC and COD upon time for CWPO at 50 °C (solid lines) and 80 °C (dashed lines). Operating conditions: stoichiometric amount of H₂O₂ to mineralize COD₀, pH₀ = 6.00 ± 0.02, C_{catalyst} = 2.5 g L⁻¹.

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