

Advanced Oxidation Processes as a Pre-oxidation Step for Biological Treatment of Leachate from Technical Landfills

Authors : Ala Abdessemed, Mohamed Seddik Oussama Belahmadi, Nabil Charchar, Abdefettah Gherib, Bradai Fares, Boussadia Chouaib Nour El-Islem

Abstract : Algerian cities are confronted with large quantities of waste generated by the disposal of household and similar residues in technical landfills (CET), such as the one in the location of Batna. The interaction between waste components and incoming water generates leachates rich in organic matter and trace elements, which require treatment before discharge. The aim of this study was to propose an effective process for treating the leachates, which were subjected to an initial chemical treatment using the (H₂O₂/UV) system. Optimal treatment conditions were determined at [H₂O₂] of 0.3 M and pH of 8.6. Next, two hybrid biological treatment systems were applied: hybrid system I (H₂O₂/UV/bacteria) and hybrid system II (H₂O₂/UV/bacteria/microalgae). The three processes resulted in the following degradation rates, expressed in terms of total organic carbon (TOC) 27.4% for the (H₂O₂/UV) system; 58.1% for the hybrid system I (H₂O₂/UV/Bacteria); 67.86% for the hybrid system II (H₂O₂/UV/Bacteria/Microalgae). This study demonstrates that a hybrid approach combining advanced oxidation processes and biological treatments is a highly effective alternative to achieve satisfactory treatment.

Keywords : leachate, landfill, advanced oxidation processes, biological treatment, bacteria, microalgae, total organic carbon

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