

Treatment of Landfill Leachate using Solar UV Facilitated Photocatalytic Degradation

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Abstract

The use of heterogeneous photocatalytic degradation for the treatment of landfill leachate was investigated in this study. The photocatalytic degradation studies were carried out using Zinc oxide (ZnO) as photocatalyst and the process was facilitated by ultra violet radiation (UV) from sunlight. Characterisation of the raw leachate revealed that its physicochemical properties did not meet the requirements set by the Federal Environmental Protection Agency (FEPA) thus necessitating the need for the treatment. Results obtained showed that there was a significant reduction in biochemical oxygen demand (BOD) (85.6%), turbidity (82.5%) and heavy metals (~100%) as well as a significant increase in the dissolved oxygen (DO) (85.2%) of the treated leachate. Increasing the contact time favoured the degradation process while higher loading of ZnO enhanced the process too. The physicochemical characteristics of the treated leachate were within the limits set by FEPA suggesting that the treated leachate could be safely discharged into natural water bodies without fear of it causing any deleterious effect on the ecosystem.

Keywords: Leachate, Adsorption, Zinc oxide, Biochemical oxygen demand, Turbidity.

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