Modified Soil Compositions for Removals of Acetaminophen

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The wide use of Acetaminophen (ACT), which is typically released with human excreta, and the lack of capability of most treatment plants to treat wastewater containing ACT residues have increased the risk of surface and groundwater contamination. Constructed wetlands (CWs) are one of natural wastewater treatment technologies, employing soil-plant interactions in treating pollutants through a number of reactions such as plant uptake, ion adsorption, advanced Fenton reaction. In addition, the wetland plants are well-known to generate H_2O_2 in the surrounding rhizosphere environment for advanced oxidation processes. In this study, the potential of laterite soil in initiating Fenton reactions by its abundant composition of iron (Fe) and its modified structure with activated carbon, cement and crushed shellfish (modified soil) are determined for ACT treatment. The induced H_2O_2 soil environment in the constructed wetland units could remove ACT almost 80% in comparison with the original concentration. About 70% of ACT was reduced at relatively short period i.e. 1 minute, whereas, treatment time of 35 minutes was required to achieve the treatment efficiency of 82%. The results showed the well occurrence of Fenton process on both natural laterite soil and modified media bed (Cement : Laterite soil $_{fine}$: 50% Laterite soil $_{coarse}$: 50% Activated carbon). Likely due to the Fenton reaction is favorable at low pH, the crushed shellfish plays minor contribution in the modified soil in an increasing alkaline environment.