

Reduction of Color, COD, and BOD₅ of Treated Leachate Using an Activated Coconut Charcoal – Fired Clay Brick System

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Removal of color from waste water by activated carbon is a common practice and studies have also been done with fired clay bricks. Nevertheless, no studies have been carried out to evaluate the removal of color by a combination of activated carbon (CC) and fired clay bricks (BR). The present study was therefore, planned to evaluate the potential of the combination of CC (activated by ZnCl₂) and BR for the removal of color, chemical oxygen demand (COD) and five day biochemical oxygen demand (BOD₅) of the treated leachate discharged from sanitary landfill located at Dompe, Gampaha, Sri Lanka. CC was impregnated with 0%, 5%, 10%, 15% and 20% ZnCl₂ and activated in an oven at 200°C afterwards. The activated CC – BR systems were prepared in PVC pipes with the ratio of 1:0 (T1), 0:1 (T2-T6), 1:1 (T7-T11), 1:3 (T12-T16) and 3:1 (T17-T21) BR particles and CC respectively. Leachate was filtered through the prepared systems at flow rate of 1L/hour. Color, COD, BOD₅ and pH of filtrate were measured. Percentage reductions of parameters were first subjected to arcsine transformation and then to One-Way ANOVA in MINITAB 14. Tukey's pair wise comparisons were also carried out to identify significant differences of parameters among different percentages of activated carbon. Results revealed that 20% ZnCl₂ impregnated CC and BR at 1:0 system showed the highest percentage of color (>90%) and COD (>85%) reductions. CC - BR at 1: 1(CC activated by 20% ZnCl₂) (T-11) and CC - BR at 3: 1(CC activated by 20% ZnCl₂) (T-16) showed the highest percentage of BOD₅ (more than 95%) reduction. After 5-hour filtration, 20% and 15% ZnCl₂ impregnated CC and BR at 1:0 system showed pH lower than 6. The lowest pH was observed from 20% ZnCl₂ impregnated CC. The study concludes that CC impregnated with high amount of ZnCl₂ has a great potential to remove the color of leachate. Thus, the present study recommends the combination of 20% ZnCl₂ impregnated CC: BR at 3:1 ratio as the most suitable combination for the removal of color, COD and BOD₅ of the biologically treated leachate.

Keywords: Activated carbon; fired clay bricks; ZnCl₂; treated leachate

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