



DEVELOPMENT OF A BIOCHAR-BASED LABORATORY- SCALE FILTER FOR INDUSTRIAL WASTEWATER TREATMENT

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Abstract

Industries produce wastewater at an alarming rate, which may have a negative impact on the environment. Recently, Biochar (BC) has become a promising agent for wastewater treatment. Production of BC using aquatic invasive plants is an alternative management strategy to control invasive plants. In this study, invasive aquatic plant *Pistia* spp. was used to produce BC. Prepared non-activated and chemical activated BC were separately incorporated as a sandwich layer in sand and gravel filter. Wastewater from a rubber factory was used for the experiment and following water quality parameters were measured; pH, Total Suspended Solids (TSS), Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Total Kjeldahl Nitrogen (TKN), Ammoniacal-Nitrogen (NH₃-N), Electrical Conductivity (EC), Total Dissolved Solids (TDS), turbidity, Total Phosphates (TP), Nitrate, and heavy metals (Chromium, Zinc). Measurements were taken before and after treatment. The control filter was developed only with sand and gravel. Brine shrimp lethality assay (BSLA) was carried for toxicological evaluation. Optimization studies were carried out by repeated treating and investigating the effect of particle sizes (65-125 μ m and 125-250 μ m) on treatment efficiency. The study concludes that the filter unit incorporated with activated BC gave the best treatment efficiency compared to the control setup and non-activated biochar incorporated filter. BSLA showed zero mortality in activated BC treated water. The optimization study showed that the activated BC had the potential to treat wastewater for three consecutive times according to the standard values. The filter unit with 65-125 μ m BC gave the best treatment compared to the 125-250 μ m particles containing filter unit. Filter unit with 65-125 μ m activated BC showed more than 80% reduction in Turbidity, TP, NH₃-N, TSS, COD, BOD, TKN and nitrate. Hence, the present study proposed a sustainable green technique to treat wastewater with effective usage of invasive aquatic plants.

Keywords: Biochar, Waste water, Water quality parameters, *Pistia* spp.