

WASTE PEANUT HULL AS A BIOSORBENT TO TREAT RICE MILL WASTEWATER: A COMPARISON WITH THE EFFICIENCY OF GRANULAR ACTIVATED CARBON

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The objective of this study was to evaluate the performance of waste Peanuthull as a biosorbent in treating ricemill wastewater. The performance of the peanuthull was compared under similar conditions with coal based Granular Activated Carbon (GAC) which is a well-known adsorbent for organic pollutants. The adsorbents were carefully washed, dried, grinded and sieved to obtain uniform particle size <1 mm. Batch adsorption studies were conducted for peanuthull and GAC for varying doses (0 - 6 g/L) and contact times (0 - 300 min) to determine the optimum dosage of adsorbents and contact time with wastewater respectively at pH 8.0±0.25 and at temperature 28±2⁰C. The performance efficiencies of the adsorbents were tested based on the removal (%) of Nitrates, Phosphates, five days-Biological Oxygen Demand (BOD₅) and Chemical Oxygen Demand (COD) from wastewater which was collected from a ricemill located in Vavuniya. Three replicates were carried out for each test. The optimum removal of organics and nutrients were observed with Peanuthull at the dose of 4 g/L, in which the removal efficiency of BOD₅, COD, nitrate and phosphate were 65, 70, 67 and 24% respectively. In comparison with GAC, the optimum removals were noticed at the dose of 1 g/L in which the removal efficiency of BOD₅, COD, nitrate and phosphate were 90, 75, 56 and 24% respectively. According to contact time of adsorbent with wastewater, the peanuthull attained optimum removal at 120 mins whilst the GAC attained the optimum removal at 45 mins in which the optimum doses of peanuthull and GAC were maintained at 4 g/L and 1 g/L respectively. Based on t-test, the performance of peanuthull was similar to GAC in terms of COD, nitrate and phosphate (p-value > 0.05) reduction from ricemill wastewater. Since the adsorbent was prepared from waste Peanuthull and no chemicals are required, this can be used as a cost-effective option and environmentally friendly biosorbent to treat ricemill wastewater.

Keywords: Adsorbent, Biosorbents, Peanuthull, Ricemill, GAC, Wastewater