

Design and Fabrication of Sand Filter to treat Greywater to use in Cottage level

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As the world's population grows and prosperity spreads, water demands increase and multiply without the possibility for an increase in supply. The amounting demand on this finite and invaluable resource has inspired creative strategies for freshwater management, including innovative techniques for wastewater recycling. Social acceptability of use of wastewater in agriculture is low leading to protests by general public. High costs associated with treatment facilities are major hindrance to the proper disposal of wastewater. Hence the objective of this study was to construct a compact, portable sand filter treatment plant for treating the greywater and assessing its efficiency with different height of the layers. Water samples were collected from the washroom of the male's hostel located at Ariviyal Nagar, Killinochi and stored in a tank. Samples were analysed in different time during the collection to ensure there were no significant differences in the quality of the input water with time. Parameters such as COD, pH and TDS were monitored after the filtration through the filtering materials such as fine sand, coarse sand and charcoal. A compact portable sand filter was design and constructed to treat greywater. It was tested with the sand layers and charcoal at different height to analyse it's performance. The average value of measured parameters pH, TDS, and COD of greywater were 8.45, 816 mg/l and 386ppm, respectively. Out of these values pH and TDS were closer to the maximum recommended values of tolerance limits for industrial wastewater discharged on land for irrigation purpose. COD values are not higher or closer to the maximum recommended values, but they were reduced by the sand filter to the lower levels. The pH of the inlet (8.45) water was reduced to the near neutral (7.02) by the sand and charcoal filter. It was effective with the charcoal rather than sand alone. The average TDS in the greywater was 816 mg/l. Mean reduction of the TDS was 320 mg/l. The average COD value from the untreated water was 386ppm and it was reduced to 211 ppm in the final outlet. There were no significant difference in COD with increasing height of the filter material at $p < 0.05$ level. There were significant differences in raw, filtered through fine sand and charcoal filter materials. Finally the sand layers along with charcoal had the significant reduction in all measured parameters and all the parameters were bring down to the recommended values of the tolerance limits for industrial wastewater discharge on land for irrigation purpose.

Keywords: Sand filter, Greywater treatment, pH, Chemical oxygen demand, Electrical conductivity