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AN INVESTIGATION ON GREYWATER TREATMENT OPTIONS FOR REUSE: RANKING BY ANALYTIC HIERARCHY PROCESS

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Abstract

The objective of the present study was to (i) compare different treatment options for greywater (GW) reuse, (ii) assess the potential of treated GW for reuse, and (iii) select the optimal treatment option by using Analytic Hierarchy Process (AHP). Raw GW was settled for 2 h. Five different treatment options were investigated simultaneously in parallel using the same influent (settled GW). The treatment options were (1) sand filtration, (2) sand/brick bat filtration, (3) alum coagulation/flocculation (COF), (4) polyaluminium chloride COF, and (5) ferric chloride COF as the main treatment. Almost all the treatment options examined could produce GW quality suitable for reuse in restricted access area irrigation, construction, and industrial cooling. The mean biochemical oxygen demand (BOD₅) varied from 15-33 mg/L, and total suspended solids (TSS) varied from 11-26 mg/L after treatment.

The treatment options were ranked using AHP. Three main criteria (1) compliance of treated GW with reuse standards (CS), (2) treatment cost, and (3) ability of treatment option to work robustly were selected in the present study. Criteria for CS was further divided into sub criteria, which include the reuse parameters pH, turbidity, electrical conductivity, TSS, oil and grease, BOD₅, ammonia nitrogen, and sodium adsorption ratio. Considering compliance to CS, the selection string was option 4-5-1-3-2. Whereas, considering all the attributes, the selection string was option 5-4-3-1-2. This article gives an insight on investigation (comparative study) of GW reuse options and a scientific way for their ranking.

Key words: analytic hierarchy process, greywater, ranking, reuse, treatment options

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