

D-53: A small-scale in-house wastewater treatment unit for laboratory education

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In a teaching laboratory, chemicals are handled all the time and toxic waste is generated. Wastewater treatment can be taught within the laboratory by designing a purification process for laboratory wastewater.

A treatment unit was designed by combining physical, chemical and biological processes. Source of the wastewater was the wastes produced by laboratory experiments. Wastewater was fed into the model treatment plant consisting of four units(Figure 1). The glass tank unit A, was used as the wastewater collecting tank. Unit B is a single tank separated into five compartments. Chemical and physical processes occur in unit B. $\text{Ca}(\text{OH})_2$ was added in the compartment one and the coagulant $\text{Al}_2(\text{SO}_4)_3$ followed by small amount of NaOH was added at the compartment two of unit B. Filtration and absorption occurs in unit C. Latter is a glass column packed with activated charcoal and sand. Unit D was used for the aeration and is made up of plastic. Experiments were conducted using laboratory wastewater and a model wastewater sample that was prepared at the laboratory where pH, conductivity, absorbance and temperature were measured during the treatment. Conductivity of wastewater was reduced to a greater extent along the treatment indicating a reduction of ionizable species. The initial pH of the wastewater sample was 1.66 (i.e highly acidic) and acidity was reduced during the treatment process and it was pH 6 at the latter part. The absorbance becomes negligible during the final step indicating the removal of coloured impurities.

Financial assistance by NARESA (Research grant RG/95/SE/02) is acknowledged.