TREATMENT EFFICIENCY OF THE BIOLOGICAL TREATMENT PLANT FOR THE BREWERY WASTEWATER INTERMS OF CHEMICAL OXYGEN DEMAND AND THE QUALITY OF TREATED WATER FOR IT'S DISPOSAL

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ABSTRACT

Nowadays, water resources are becoming increasingly scarce and many of them are polluted by anthropogenic sources such as industries, agriculture and households. Therefore, the treatment of wastewater remains a critical need before discharging it to natural water streams. The main purpose of wastewater treatment is to remove the various contaminants that are present in the wastewater. With the rapid development of the food industry, a large amount of wastewater is discharged, which poses a great threat to the environment. In fact, beer is the fifth most popular beverage drunk worldwide after tea, carbonated drinks, milk, and coffee. The majority of the ingredients in beer are made up of water. The brewing process often generates large amounts of wastewater effluent and solid wastes that must be disposed off or treated in the least costly and safest way. As a result, many brewers are today searching for ways to cut down on this water usage during the beer brewing process, and/or means to treat the brewery wastewater cost-effectively and safely for reuse particularly important for water scarcity. Lion Brewery Ceylon PLC is one of the leading company in Sri Lanka producing beer at Biyagama area with the waste water treatment facilities. In this view, this study was conducted to evaluate the performance of the biological treatment plant of a brewery located at Biyagama, Sri Lanka and find the suitability for the use of it for different purposes. The biological treatment consists of anaerobic treatment through an anaerobic hybrid reactor (AHR) and conventional aerobic treatment (Activated Sludge Process (ASP). The data was collected for the month of January and February starting from 1st January 2023 to 3rd Februray 2023 and used for this study. The inlet and outlet characteristics were measured at a particular point before and after each process unit at every treatment plant. The treatment efficiency in terms of Total Suspended Solids, pH, Temperature, Chemical oxygen demand, biological oxygen

demand, alkalinity, volatile fatty acids and Mixed liquor suspended solids were also analyzed.

In this study, collected data was analyzed to identify the treatment efficiency of the brewery wastewater plant. The Up-flow anaerobic sludge blanket used as the anaerobic process shows high COD removal efficiency of the effluent. COD removal efficiency of the anaerobic A digester (D101A) around 72 -98% with an average efficiency of 78.9% whereas, anaerobic digestor B (D101 B) shows the COD removal efficiency around 72-94% with an average of 80.4% and aerobic digestion around 90-99%. The final treated water was containing the E-coli and coliform up to a certain level and it was not harmful to discharge into the surface water based on the Central Environmental Authority standards. Further, treatment of the treated water to remove the remaining E-coli and Coliform Reverse Osmosis plant or Microbial fuel cell will be suggested from this finding of the study.

Keywords: Aerobic treatment, Anaerobic digester, Brewery wastewater, Chemical Oxygen Demand, Up-flow anaerobic sludge blanket

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