Determination of a Suitable Treatment Methodology to Treat Rice Washed Water Released from Rice Mills

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In this experimental study, the wastewater eliminated from the rice washing in the rice mills is taken into account. This wastewater possess very high COD, BOD and turbidity and do not comply with the wastewater discharge limits imposed by the National Environmental Regulations No 01 of 2008 of Central Environmental Authority. Five methods were used to treat the rice washed wastewater and its efficacy have been analyzed mainly through the variation of Chemical Oxygen Demand (COD) and Biological Oxygen Demand (BOD). By doing this research, it is intended to obtain water that is suitable to discharge into the environment. The five methods tested are, biological treatment method by using the Moving Bed Biofilm Reactor (MBBR), physical method by applying heat, chemical treatment by using 99% alum, treatment with hydrogen peroxide and ferrous sulfate and finally by treatment with activated carbon. In the MBBR treatment, COD and BOD removals were 53.15% and 29% respectively. On heating, the most efficient COD and BOD removal was obtained at 45^{o}C. Adding 99% alum did not show any efficacy towards the removal of COD and BOD. When 200ml of raw water was treated with 30% hydrogen peroxide 5 ml, and ferrous sulfate 0.6 g, and overnight stirred, COD and BOD removals were 85.7% and 88% respectively. When 200 ml of raw water was treated with 0.5 g of activated carbon, the COD and BOD removals were 87.5% and 90% respectively. From the results obtained, it can be concluded that using activated carbon is the most efficient among the treatment methods used for removal of COD BOD and turbidity and using hydrogen peroxide and ferrous sulfate too can be considered an efficient method as it too has a higher removal percentage of COD and BOD. MBBR treatment is a moderately efficient method. Applying heat and using alum are inefficient. From the data obtained from Fourier Transform Infrared Spectroscopy, the substances responsible for the rise of COD and BOD were recognized.

Keywords: Moving bed biofilm reactor, Biological oxygen demand, Chemical oxygen demand