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Treatment of Sugar Mill Wastewater by Column Type Sequencing Batch Reactor

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Abstract—*Sugar industry is the second largest agro based industry in India. It is a seasonal industry which operates for only six months. Currently there are about 435 registered units producing sugar. They produce about 99 lac tonnes of sugar. A sugar factory has a crushing capacity in the range of 400 to 5500 tonnes/day, but mostly between 1000 to 5500 tonnes/day. There are 191 small, 88 medium, and 20 large scale industries in the country. The pollutants generated in a sugar industry are wastewater, bagasse, molasses, filter-mud, furnace ash and air pollutants. A number of biological treatment systems have been used for the treatment of sugar mill wastewater. In the recent times column type sequencing batch reactors (SBR) have gained popularity owing to low space and power requirement, better effluent quality and formation of aerobic granules. The present study was carried out to assess the feasibility of column type sequencing batch reactor for the treatment of sugar mill wastewater. A column type SBR (5cm diameter and 100 cm height) with a working volume of 1.4 lit was used in the study. The effluent was drawn at 50 cm from the bottom at a volumetric exchange ratio of 50%. A fine bubble aerator in the bottom of the column introduced air. The reactor was seeded with the aerobic sludge of a working sewage treatment plant. Initially diluted wastewater was fed to the reactor and the reactor was operated till significant COD removal efficiency was achieved. The dilution was decreased and finally undiluted wastewater with a COD of around 1500 mg/L was fed o the reactor. The performance of the reactor was assessed in terms of BOD removal, COD removal, TSS removal. pH and alkalinity was also monitored on alternate days and VSS on every two weeks. The reactor was operated for 100 days. The maximum COD removal efficiency of 70% was achieved and the reactor showed constant COD removal efficiency till the end of the experiments. The maximum BOD removal was around 65%. There was build up in VSS from 4380 mg/L to around 5000 mg/L. The pH and alkalinity remained more or less constant throughout the experiment. It can be concluded from the study that column type SBR may proved to be a better alternative to existing biological treatment systems and better COD/BOD removal may be achieved if the reactor is operated for a longer duration of study.*