TREATMENT OF RUBBER THREAD MANUFACTURING INDUSTRY WASTEWATER BY AN UPFLOW ANAEROBIC FILTER

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CONTENT

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ABSTRACT

Wastewater from the rubber thread manufacturing industry is acidic in nature with pH ranging from 3.6 to 4.7 and contains high concentrations of COD, BOD, nitrogen and zinc. The high BOD to COD ratio of the wastewater indicated that the wastewater is easily biodegradable and therefore can be effectively treated by the anaerobic digestion process. However as the wastewater contained high concentration of zinc which could inhibit the digestion process, it was first pretreated by chemical precipitation for the removal of zinc. The study showed that the treatment using a combination of sodium sulphide and LT 27 at concentrations of 800 and 5 mg/L respectively is the most cost effective precipitation/flocculation system for removing zinc from the wastewater. The studies involving the use of an upflow anaerobic filter or reactor which contained polyurethane foam as the packing media have shown that the rubber thread manufacturing industry wastewater can be effectively treated by the anaerobic digestion process. The optimum loading rate and the HRT obtained were about 8 g COD/L/d and 1.5 days respectively. Other factors such as temperature and pH of the wastewater were also found to influence the anaerobic digestion process of wastewater from the rubber thread manufacturing industry. The study revealed that in view of cost, the

anaerobic treatment of rubber thread manufacturing industry wastewater by an upflow anaerobic filter is best carried out at the mesophilic temperature of about 35 °C and pH of 6.0 to 9.0 although the highest biogas production rate was obtained at the thermophilic temperature of 50 °C. With regard to specific biogas yields and nutrients requirements, the study showed that by increasing the organic loading rate from 2 to 14 g COD/L/d, the specific biogas yield decreased from 0.250 to 0.069 L CH_4 /g COD added. At the same time, the amount of nitrogen and phosphorus utilized by anaerobic microorganisms also decreased from 1.55 to 1.20 mg and from 0.30 to 0.26 mg for each 100 mg of COD consumed respectively. On the effect of micronutrients, the study showed that the addition of micronutrients like Ni and Co improved biogas yield of the process. The present study also showed that the attached biomass in the upflow anaerobic filter contributed more than 70% to the COD removal in the treatment of rubber thread manufacturing industry wastewater.

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LIST OF ABBREVIATIONS

BOD	Biochemical Oxygen Demand
COD	Chemical Oxygen Demand
DOE	Department of Environment
d	Day
g	Gramme
HRT	Hydraulic Retention Time
L	Litre
m	Metre
mg	Milligramme
kg	Kilogramme