Waste Water Treatment and Emerging Waste Water Contaminants in Developing Countries

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INTRODUCTION

Wastewater may be classified into four categories - Domestic: wastewater discharged from residences and commercial institutions and similar facilities; Industrial: wastewater in which industrial waste predominates; Infiltration/inflow: extraneous water that enters the sewer system through indirect and direct means such as through leaking joints, cracks, or porous walls and Storm water: runoff resulting from flooding due to rainfall. Waste water treatment process are – conventional process, preliminary treatment, primary treatment, secondary treatment and advanced treatment process. The three waste water treatment technologies are – mechanical, aquatic and terrestrial treatment methods.

MATERIALS AND METHODS

Okomu Oil Palm Company uses an effluent treatment facility. In this facility, there are two basic systems namely- the effluent sedimentation pit and the pond system. The waste water and the effluent from the factory process are initially discharged into a sedimentation pit. The pit has four compartments. However, solid waste and dirt are further recovered from the pit. Furthermore, the recovered waste is sorted in the green, orange and red bins for good rubber, bad rubber and dirt respectively. While the sludge that is recovered from the pit is taken to the plantation and applied as manure.

The pond system is where the lagoon systems will be used to treat the factory effluent. The system will comprise two ponds and one pond/basin inseries designed to receive, hold and treat the factory effluent for a predetermined period of time. The ponds will be constructed and lined with clay material that will prevent seepage to the groundwater below. While in the lagoon, the effluent will receive treatment through a combination of physical, biological and chemical process. Much of the treatment will occur naturally. Essentially, the treatment shall involve a combination of anaerobic and aerobic sequentially.

RESULTS AND DISCUSSION

From the laboratory sample analyzed by Searchgate Laboratories Limited , the results shows that the pH at 25 ^{o}C for the stream effluent and the treated effluent is 7.76 and 6.72, respectively, it is still within WHO standard for pH tolerance limit of 6.00-9.00 and 6.76 for effluent from the Rubber factory. Chemical Oxygen Demand (COD) is the measure of amount of oxygen required by bothpotassium dichromate and concentrated sulphuricacid to breakdown both organic and inorganicmatters. The COD for the Stream Effluent andthe Treated Effluent is 87 and 320 respectively,it is lower than WHO standard of COD of waste discharge of 1000mg/L and 278 for the Effluent from the Rubber factory. Biological Oxygen Demand (BOD) is the measure of the oxygen required bymicroorganisms whilst breaking down organicmatter. The BOD for the Stream Effluent 1.07, 3.62 for the Treated Effluent, and 0.60 for the effluent from the Rubber factory. This is still within the WHO standard which is 50mg/L. The TDS for the Stream Effluent is 2100, 4200 for the Treated Effluent and 440 is for the Effluent from the rubber factory. The TDS for the Stream Effluent and treated Effluent are higher than WHO standard,

which is 2000mg/L. Conductivity of water which is a useful indicator of its salinity ortotal salt content is high in the wastewater from the Stream Effluent and that of the Treated plant. The conductivity for the Stream Effluent and that of the Treated plant- 3040 and 6330 μs/cm respectively is higher than WHO standard of 1000 μs/cm, but the conductivity from the rubber factory is 647 μs/cm which is far less. The WHO standard for Nitrate is 45mg/L while that for the Stream Effluent, Treated Effluent and Rubber factory are -50 mg/L, 100.6 mg/L, and 81 mg/L respectively. This is above the WHO standard.

Table 1. Physcio-chemical test characterization of industrial effluent analyzed.

	Stream Effluent	Effluent from Treatment Plant	Effluent from Rubber Factory
pH	7.76	6.62	6.76
Temperature (°C)	25	25	25
EC (μs/cm)	3060	6330	647
Turbidity	76	1100	220
TDS (mg/L)	2100	4200	440
Sulfate (mg/L)	80	92	60
Nitrate (mg/L)	50	100.6	81.0
BOD (mg/L)	1.07	3.62	0.6
COD (mg/L)	87	320	278
Chloride (mg/L)	265	475	12.5

CONCLUSIONS

From the data collected from this research, the physicochemical parameters monitored in the Stream Effluent, the Treated Effluent and the Rubber Factory Effluent shows low level of some major parameters - COD, BOD, and pH but the substances have high conductivity and TDS. This shows that there is high amount of dissolved salts and presence of a lot of dissolved solids present in the Stream Effluent, the Treated Effluent and the Rubber Factory Effluent. This justifies the stages of operation. Thus, the effluent treatment technology applied by Okomu Palm Oil Plc meets international Standard and as a result is recommended for global best practice.

Acknowledgement:

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