Planning Proposal of Treatment Chain for Industrial Wastewater Using Water Hyacinth

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Abstract— In the face of the increasing scarcity of water resources, industries need to undertake audits for their existing water supply and find an alternative solution for wastewater. Phytoremediation is the easiest way to treat such type of water. For that, we will give Planning Proposal for the complete effluent treatment chain, which can reduce the physicochemical parameters like TDS (Total Dissolved Solids), TSS (Total Suspended Solid), COD (Chemical Oxygen Demand), BOD (Biochemical Oxygen Demand) and many more from the contaminated water. The Roots of Water hyacinth naturally absorb pollutants and some organic compounds. Water hyacinth can be cultivated for Waste Water Treatment, and it can be used in the process of water purification for industrial wastewater. Water hyacinth provides a suitable environment for aerobic bacteria to remove various impurities present in water. The Basic Purpose is to use a water hyacinth plant to purify industrial wastewater and its treatment.

Keywords: Phytoremediation, Textile Waste Water Treatment, Water Hyacinth, Treatment Chain

I. Introduction

A Constructed wetland is a shallow basin filled with some sort of filter material (substrate), usually sand or gravel, and planted with vegetation tolerant of saturated conditions. Firstly, wastewater is introduced into the basin and flows over the surface or through the subsurface and eventually discharged out of the basin through a structure that controls the depth of the wastewater in the wetland.

Since the 1950s, CWs have been used effectively to treat different wastewaters with different configurations, scales and designs throughout the world. Existing systems of this range types from those serving single-family dwellings to large scale municipal systems. Nowadays, constructed wetlands are common alternative treatment systems in Europe in rural areas and over 95% of these wetlands are subsurface flow wetlands. In the following years, the number of these systems is expected to be over 10,000 only in Europe.

II. Aim

To Treat Waste Water Contaminated by chemically which is treat by Construction Wetland.

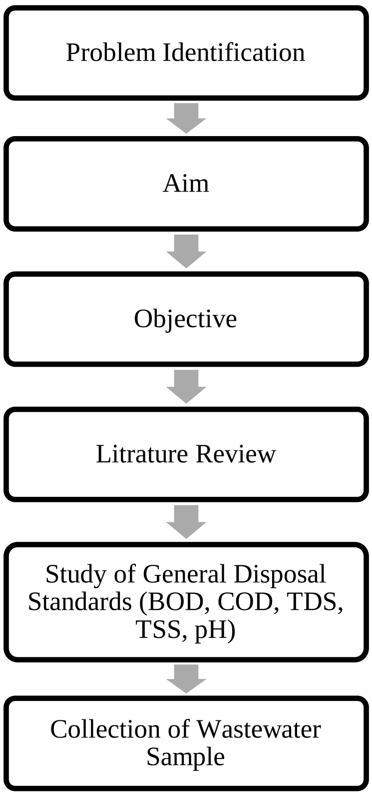
III. Objective

- The objective of carrying out the physical and chemical parameter of waste water in Textile Industry.
- To give Planning Proposal of Treatment chain of the Industrial Waste Water.

IV. Need of Study

All of the world's major cities have gone into the 21st century facing an environmental crisis. The world's crisis not only meets the challenge of supplying adequate sanitation facilities to its residents but must also ensure that the available water resources are not contaminated. The discharge of untreated wastewater contributes to deteriorating health conditions and pollution of nearby water bodies. The problem is expected to increase due to the rapid pace of urban growth unless measures are taken to control and treat effluents.

V. Methodology



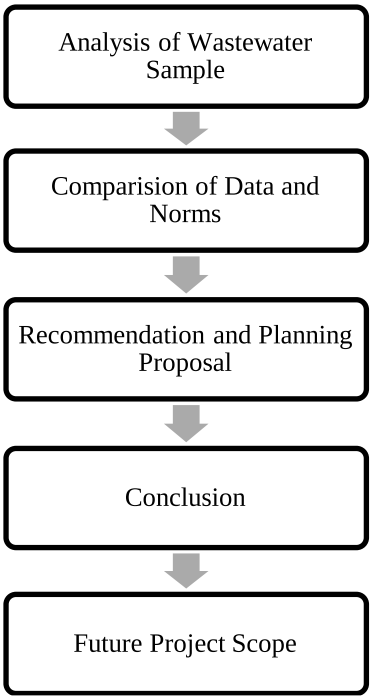


Fig. 1: Procedure of Methodology

VI. STUDY AREA

A. General

In India, Surat is a rapid growth city, and here textile Water-jet industries are flooded; the wastewater from that industry is discharged in an uncontrolled manner to the environment, leading to pollution and health problems.

B. Site Location

Well talking about a particular location, we choose the Rajhans Texpa, which is located near Palsana, Surat, Gujarat, India it has the global location of North Latitude 21.10° and East Longitude 72.97° situated beside of Highway-Baleshwar Road, and it is spread on 99 Acres. Where the industries of Water-jet are developing, we can efficiently study the wastewater and how to implement our project in the field.
Name of Industry: Shri Sai Textile
Plot Size: 20 m X 85 m

Fig. 2: Location

VII. RESULT OF PHYSIO-CHEMICAL PARAMETERS

Sr No	Characteristics	Before Treatment			Disposal Standards IS: 2296
		Sample 1	Sample 2	Sample 3	
1	Temperature	35	31	29	Offensive
2	pH	7.18	6.45	6.87	5.5 – 9.0
3	TDS (mg/lit)	750	748.64	878	Below 2100
4	BOD_5 (mg/lit)	115.35	109.32	83.00	Below 30
5	COD (mg/lit)	483.34	334.21	282.00	Below 250
6	TSS (mg/lit)	70	60	75	Below 100
7	DO	7.9	8.5	7.6	Tolerance limit 4

Table 1: Physio-Chemical Characteristics of Waste Water

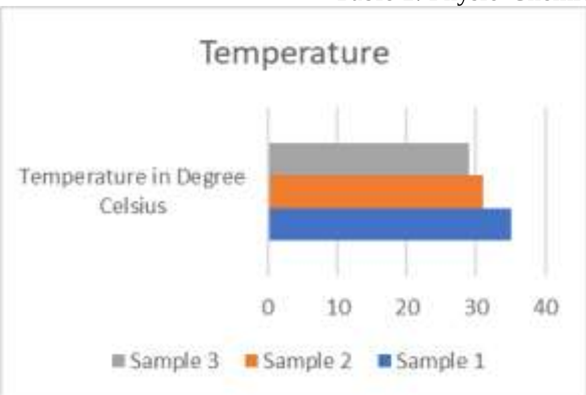


Fig. 3: Temperature

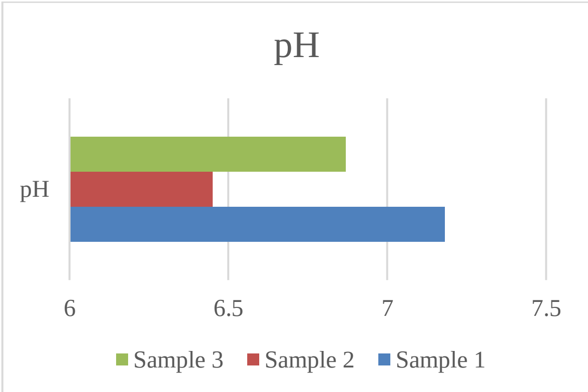


Fig. 4: pH

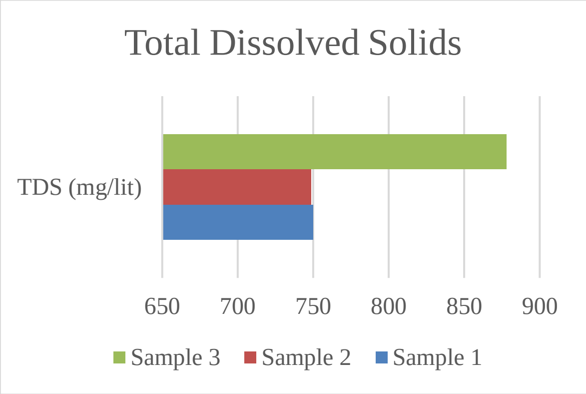


Fig. 5: Total Dissolved Solids

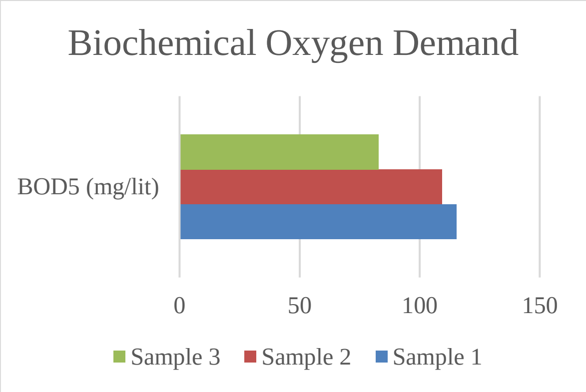


Fig. 6: Biochemical Oxygen Demand

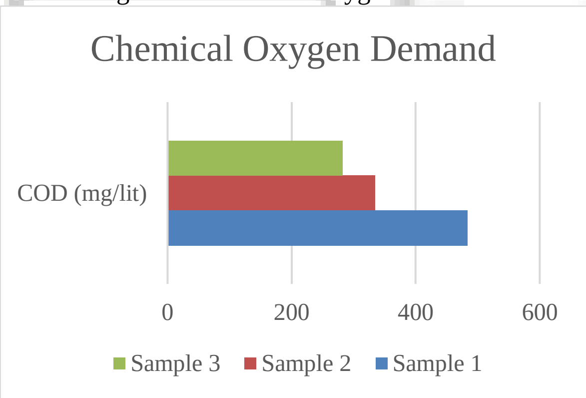


Fig. 7: Chemical Oxygen Demand

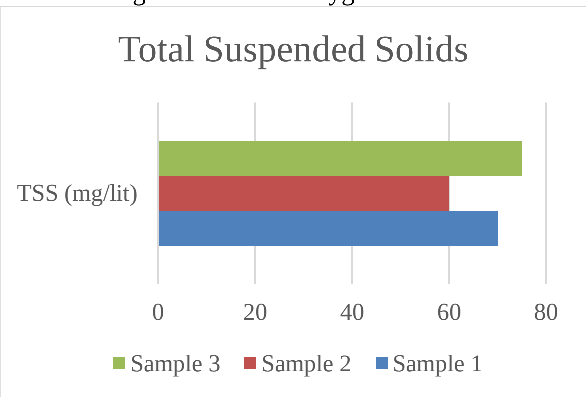


Fig. 8: Total Suspended Solids

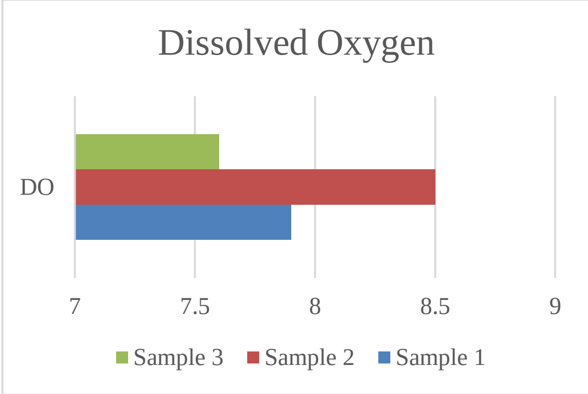


Fig. 9: Dissolved Oxygen

VIII. PLANNING PROPOSAL

1) Aeration Tank

$Q = 3\ m^3/day$
$V = 4\ m^3$
$l = 1.45$ m
$b = 1.45$ m
$h = 1.9$ m
Detention Time (DT) = $3\ m^3 / 3\ m^3/day$
= 1 day
Horizontal Velocity (Vh) = Q / BH
(1.1)
= 1.089 m/day
Hydraulic Loading Rate (HLR) = Q/A
(1.2)
= 1.427 m

2) COD = 366.517 mg/lit

= 366.517 mg/lit * 3000 lit/day
= $1.1 * 10^6$ mg/day
= 45 mg/hr
Where, for 5 mg/hr → 4.24 hr required

3) Water Hyacinth Design

Area of Construction Wetland = $Q\ (l_nC_f - l_nC_i) / K_{BOD}$
(1.3)
= $3\ (l_n (102.56) - l_n (30)) / (0.592)$
= $6.23\ m^2$
Where, $K_{BOD} = K_T\ (1.06)^{(35-20)}$
= $03\ (1.06)^{(15)}$
= 0.592

$L = 4.32$ m
$B = 1.44$ m
Therefore, $L/B = 3/1$ ……Check Ok.

$H = 0.25 + 0.15 + 0.25 + 0.7$
= 1.35 m
Detention Time (DT) = LBH / Q
(1.4)
= 2.79 days
which is equal to 3 days
Horizontal Velocity (Vh) = Q / BH
(1.1)
= 3 / (1.44 * 1.35)
= 1.54 m / day

Hydraulic Loading Rate (HLR) = Q / A

(1.2)

= 3 / 6.23

= 0.482 m/day

4) *Size of Treatment Chain (proposed): 4 m X 5 m*
5) *Size of ETP (existed): 4 m X 2 m*

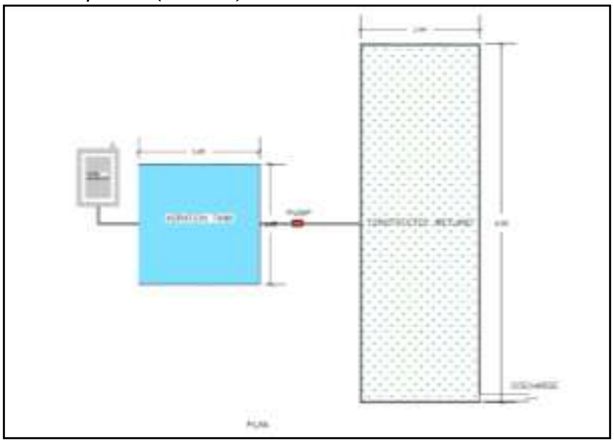


Fig. 10: Plan View of Treatment Chain

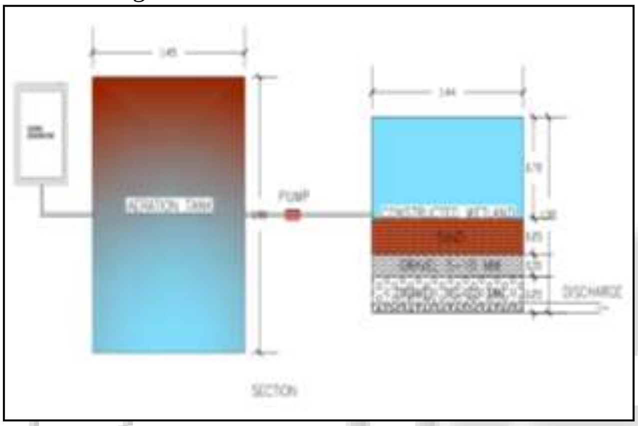


Fig. 11: Section View of Treatment Chain

Fig. 12: Construction Wetland

IX. Recommendation

To gain over the value of COD as per the Indian Standard for wastewater disposal, we will be using the Advance Oxidation Process by using an Ozone Generator. But on the other hand, we may also use a Surface or Sub-Surface Aerator for Aeration Process. In simple aeration process we have to open the tank from the top that's why labours and workers feel the odour of that wastewater, and at one time they will suffer, and also tank is open from the top then the dust will also involve in that tank, and it will more contaminate that water, and we need more aeration of that water and also need screening or gritting chamber.

So, if you can find the solution to those problems, you can use simple aeration with the help of the aerators.

X. Conclusion

In conclusion, the water samples we collected and the values of BOD and COD are more significant than their disposable limit. So, we gave a planning proposal to reduce the value of BOD and COD. We also ensure that the treatment definitely reduces the values, and also these values will also fulfil the disposal standard's limit of wastewater.

XI. Future Project Scope

Water Hyacinth can reduce the DO level and increase mosquito nuscence on surface-level; therefore, one can give a solution.

XII. Reference

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