

A Study on Development of Bio Mechanical Filter For Effluent Treatment

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Abstract- An emerging demand for sustainability of environment mainly concerns with water. Therefore there is a major necessity for treating wastewater. Hence in this paper an attempt has been taken to develop Bio mechanical Filter for treating the waste water. The availability of water gets highly contaminated effluents in the industries. This pollutants affects the human needed water purposes and mainly agriculture related problems. In the present situation there is a necessity to provide zero effluent discharge in industries. A bio mechanical filter was developed for effluent discharge of sludge.

Keywords- Wastewater, Bio mechanical filter, Pollutants, Effluents

I. INTRODUCTION

The present era shows a hike in population. Hence there is a major scarcity of water. The water is the vital source for living organisms. Due to rapid industrialization a huge of effluents has been discharged to the environment, hence there is major contamination of water. In this case there are many researches have been undertaken for treating the water and waste water. There are various methods for treating the wastewater for reuse and recycle of wastewater. Filters are a porous device for removing impurities or solid particles from a liquid or gas passed to separate out matter in a suspension. The filtration process consist of various physical, chemical and biological processes to remove these contaminants and produce environmentally safer treated water. The usage of Filter bags are worldwide applicable for waste water treatment of industrial and commercial water. Bag filters are widely used for the industrial well water filtration, silt removal, pipe scale removal and sand and algae removal from the sea water. There are various type of filters used in the treatment of waste water released from the industries. The filters includes rapid filters, high rate filters, pressure filters , tickling filters, ultra filter, vermifilter, sand filter etc.

II. LITERATURE REVIEW

Pratibhasingh et al., (2004) studied on “Removal of colour and detoxification of pulp and paper mill effluents by

microorganisms in two step bio-reactor”. This paper examined the utilization of biological treatment for the decolourisation of pulp and paper effluents. The complete removal of halogenated organic compounds was made possible by the usage of Bio-reactor. The microorganisms White rot fungi played a vital role for the removal of lignocellulogic and colour from the effluents. In the next process, a reduction in the PH value and degradation of chlorinated substances was found in bio reactor. It was concluded this is an efficient way of the removing colour of the paper plant effluents in an eco-friendly manner

Saravanan V et al., (2005) studied on “Bio-physico-chemical treatment for removal of colour from pulp and paper mill effluents”. This paper examined the techniques such as ultra-filtration, reverse osmosis, ion exchange, chromatography methods were used for removal of the colour from the paper plant effluents. These methods had been in treating the waste water effluents in an eco-friendly manner. From this it was suggested that biological method alone was not sufficient to remove the colour from the paper plant effluents hence, some chemical treatments such as addition of potash alum were involved in treatment of paper plant effluents.

Angelika sharma et al.,(2014) studied on “Physico chemical analysis of paper industry effluents in Jammu city”. This paper examined the physical and chemical properties of paper mill effluents. In this study the author analysed the BOD, COD, TDS content present in the paper effluents, and the results shown that the pH, turbidity, and ion content present in the effluents were higher than the prescribed limit which leads to the environmental pollution. It was concluded that the effluents from the paper industry were not treated in an effective manner hence it causes a severe environmental pollution in the preferred location.

Richasharma et al.,(2014) studied on “Degradation of pulp and paper mill effluents”. This paper reveals that Effective Microorganisms (EM) were used to decolourize and degrade 4the toxic materials. The author suggested various techniques such as microbial remediation, phyto remediation and photo remediation to degrade the toxic material present in

the paper plant effluents. Therefore it was concluded that there were no negative impacts on the environment while using the microbial degradation for the treatment of paper plant effluents.

Raj kumar K (2016) studied on “An evaluation of biological approach for the effluent treatment of paper boards industry”. This paper suggested that the biological oxidation method is an effective method in treating the paper board industry waste water, there is a high reduction in the BOD, COD, and TSS. It is concluded that the biological waste water treatment is efficient in removing the organic solvents present in the paper plant effluents in addition to that RO is used to remove the TDS in an effective manner.

III. MATERIALS AND METHODS

For this study a Bio mechanical filter unit was developed. The filter layers are initially studied based on their properties for design.

MATERIALS:

The following are the material used for the development of bio mechanical filter

Table 1.

MATERIAL	SOURCE	PROPERTY
Activated carbon	It was collected from the coal industries.	It absorbs the iodine well and it is resistant to attrition. It purifies the organic compounds.
Sand	It was collected from the river beds.	It provides a high quality water free from pathogens, odour without the need for chemical acids.
Grass	It was collected in the lawn	It removes the toxic materials such as cadmium, arsenic, manganese present in the waste water.
Fly ash	It was collected from the chulas.	It is an effective adsorbent of fluorine content, BOD, COD, TSS present in the waste water.
Pebbles	Pebbles was collected	It acts as a filter media. It is widely

	from the river bank.	used for treating domestic and industrial effluents.
Peanut shells	The peanut shells were collected from the farm	It removes the copper ions and act as an filtering agent for the waste water treatment

Methods:

Initially for the purpose of study the bio mechanical filter was designed especially for the ETP from Paper and Pulp Industry for the following criteria:

Table 2.

PH	7.8
TS	4200 mg/l
TSS	1400
BOD	1050
COD	4570
Colour	Dark brown

To find out the efficiency of a single stage and two stage filter the NRC (National research council) equations are used. The Velz equation is used based on the loading of BOD remaining at a filter depth. The Rankine equation is also used to calculate the performance of the filters.

For the sample of study a model was created in used water bottle and the setup was created for 6 layers of filter materials.



Figure 1. Model of Bio Mechanical Filter

IV. CONCLUSION

The vertical columnar filter design has been found to act satisfactorily in segregating the viscous pulpy paper plant effluent for agriculture manure and relatively clear water recovered for use as irrigation water. In short the bio-mechanical filter have high possibility of removing of high toxic organic materials from the paper plant effluent. Bio – mechanical filter can be used in a efficient manner and it is has long term life and simplicity in operation.

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