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REMOVAL OF HEAVY METALS FROM TANNERY WASTE WATER BY USING NATURAL ABSORBENTS

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Abstract- *The absorption of heavy metal from tannery industry waste water by charcoal from various eco-friendly natural available absorbent materials. The discharges of industrial effluents into aquatic life as well as human health. This is a matter of great concern due to their toxic nature and adverse effect. The small scale of tannery industry generates the large amount of pollution and sludge waste which is discharged into environment without any precautions. The tannery industry releases harmful Heavy metals 20 to 40 then the standard values. Heavy metal is one of major cyclic pollutant which affects the human health as well as fertility of the soils. Many chemical methods of used to treat the waste water and the formation of sludge is more effective which leads to cause land and river pollution. The usage of the natural waste materials as an absorbent or adsorbent will reduce the formation of sludge and usage of chemicals. These leads to easy contamination of the waste water. The present study about the recycling of tannery waste water with bark canker, chlorophyll dead and neem leafs as a mixing absorbent. Bark canker, coffee husk, dried watermelon peel, charcoal as a filtration bed along with slow sand filter. The effect of various parameters such as removal of heavy metals pH and effect of contact time are studied. The absorbent gives the optimum result.*

Keywords: **Absorbents, Heavy metals, Bark canker, Charcoal, Coffee husk, Neem leaf, Watermelon peel.**

1. INTRODUCTION

Heavy metals is released from different industrial operation such as leather tanning, paint, textile, pulp production, refining, dying industry etc. by compare all those industries the leather tanning industry releases the high amount of heavy metals. It is toxic when it is mixed with using water or fresh water will leads to cause skin disease, throat cancer, respiratory illness and featal death of child etc. according to world health organization the maximum recommendation limit for heavy metals cadmium is 0.01 mg/l and chromium is 0.05 mg/l and lead is 0.05mg/l for drinking water. The natural absorbent is major role to remove heavy metals from the waste water.

The most advantage of using natural waste material to remove heavy metals is the reduction of sludge as well as the effectiveness in reducing the concentrations. The treatment of waste water is important in now a day to reuse the waste water and reduce the water scarcity. In the research dry powder of different types of bark canker and coffee husk, chlorophyll dead neem leafs is used to remove Cd, Cr, and Ni & Pb Present in tannery waste water. Parameter such as pH, COD, BOD, TDS and TSS is also investigated.

2. MATERIALS AND METHODS

2.1 Material

Barks of neem tree and king tree coffee husk, chlorophyll dead neem leaf, tulsi neem leaf powder, dried watermelon peel, charcoal are used to remove the heavy metals. These Martials are economic alternative for the removal of heavy metals from tannery industries waste water. The main component of peel is cellulose, pectin and lignin which contain functional group of a possible binding for metal ions.

2.2 Absorbent preparation

Neem tree bark and king tree bark is collected at local market where cut into small pieces and washed then dried at room temperature. The king tree bark is partially powdered for a mixing absorbent. Charcoal and watermelon peels are collected at local market and washed and dried at room temperature. Coffee husk is collected at Theni and that dried at sunlight for two days.

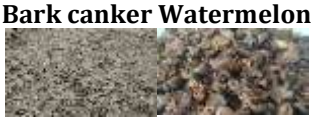
2.3 Waste water

The waste water sample is collected from the effluent of E.K.M leather industry, perunthurai, erode, Tamilnadu. It was bottled in a container

and was taken to the laboratory for further process and analysis.

2.4 Analysis

Bark canker Watermelon



Tulsi leaf Coffee husks

3. FILTRATION TANK

The slow sand filtration tank is fixed with the layer absorbent of charcoal, coffee husk, charcoal, neem tree bark & king tree bark is followed by river sand passing through 0.6mm sieve and gravel.

Filtration tank

4. METHODOLOGY

The waste water is mixed with the following parameters and rest to undisturbed for 24 hours.

- Tulsi leaf powder – 1.5gm per lit
- Dried neem – 1gm per lit
- Bark powder- 2.5gm per lit
- Neem tree bark powder- 3 gm. per lit
- After 24 hours it is mixed with dried water melon peel powder as 3gm per lit and then aerated for 20 minutes. After that the solution is rested for 30minutes.

- And that the supernatant liquid is poured to the filtration tank with minimum discharge to regulate the flow to provide enough timing for the absorbent to absorb heavy metals and the discharge is collected.

5. TREATED WATER ANALYSIS

S.NO	PARAMETER	LIMIT	RESULT
1	color	-	-
2	Odor	-	-
3	Taste	-	-
4	pH	5.5 to 9.0	8.01
5	Turbidity	-	4.27
6	Dissolved solids	<2100	1956
7	Cod	<250	179
8	bod	<20	44
9	Cadmium	<2.0	3.75
10	Chromium(I, II, III)	<2.0	1.83, 1.45, 1.67
11	Lead	<0.1	2.93
12	Nickel	<3.0	1.04

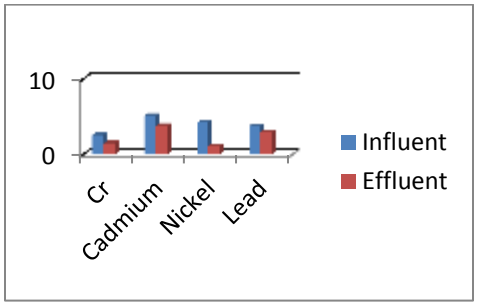


Chart No-1 Result values for Cr, Cd, Ni and Pb

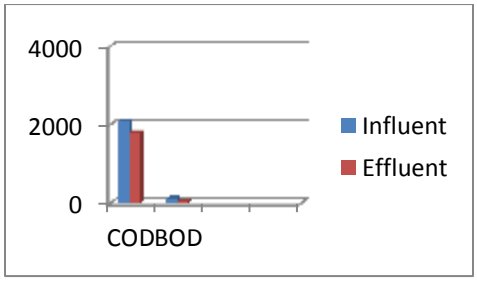


Chart No-2 Result values for COD & BOD

6. CONCLUSIONS

The usage of waste organic material in removing of heavy metals is effective. Reduce the usage of fresh water in industries. The treated wastes are easily degradable. Thus degradation can be done within the industry. The reduction of chromium, cadmium, lead and nickel metals are up to 90%. There was considerable reduction in pH, total solids, color & odor. No formation of sludge. Using charcoal is reducing the color to the tannery waste water. The pH values are reduced from 8.93 to 8.01. Turbidity unit is reduced from 15.6 to 4.27 NTU. COD is reduced from 2080 to 1792mg/lit. BOD is reduced from 114 to 44 mg/lit. Total dissolved solids reduced from 52668 to 1956 mg/lit. Total suspended solids reduced from 3732 to 700 mg/lit. Chromium ions reduced up to 75%. Cadmium ions are reduced from 5.08 to 3.75 mg/lit. Lead metal is reduced from 3.74 to 2.93 mg/lit. Nickel ion reduced from 4.21 to 1.04 mg/lit.

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