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STUDYING THE QUALITY OF LEATHER INDUSTRIAL WASTE WATER AND TREATING IT FOR THE FUTURE PURPOSE

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Abstract - *Waste water from tanneries are considered to be one of the major environment pollution from industries. Waste water from tanneries contains toxins which are carried downstream and contaminate water used in domestic and irrigation etc., This project present the efficient treatment of tannery waste water using the saw dust, an agricultural product. The main constituent of saw dust is carbon, potentially making it suitable for making activated carbon for adsorption experiments. The effects of pH, contact time, particle size and dosage of the adsorbent on the adsorption of the waste water were studied. Hence using activated carbon, the tannery waste water can be efficiently treated which turns reduce the pollution on land and water. In this project we have compared the physical and chemical characteristics of the waste water such as chemical oxygen demand (COD), Biochemical oxygen demand (BOD), pH, Total suspended solids (TSS) and total dissolved solids (TDS), Hardness test were analysed. Now a days treatments plants are costly, need highly trained man power and high electricity. Alternatively for those cost expansive treatments, we are choosing this type treatment using saw dust. The process is eco-friendly without use of chemicals, special equipments, electricity and also with zero operational and maintenance cost. As global water resources decline due to rapid increase in population, demands of irrigation, domestic and industrial consumption. The waste water generated from leather industry is collected and treated after that treated water can be used for the irrigation of gardens is quickly becoming widespread in many area.*

Key Words: **water treatment, saw dust, activated carbon, Treatment using natural adsorbent, irrigation purpose.**

1. INTRODUCTION

This project deals with the treatment of Leather Industry waste water using saw dust. Manufacturing of leather, leather goods, Leather boards and fur produces numerous by-product solid waste, high amount of waste water containing different loads of pollutant and emissions into the land and water. The uncontrolled release of tannery waste water to natural water bodies increases health risks for human beings and environmental pollution. Waste water from raw hide processing tanneries, which produce wet-blue, crust leather or finished leather contain compounds of copper, nickel, lead, chromium, cadmium etc., in most cases. Organic and other ingredients are responsible for high BOD (Biological Oxygen Demand) and COD (Chemical oxygen Demand) values and represent and immense pollution load, causing technical problems, sophisticated technologies and high costs in concern with waste water treatment.

Tanning industry is one of the oldest industries in the world. It is typically characterized as pollutants generated industries which produce wide varieties of high strength toxic chemicals. It is recognized as a serious environmental threat due to high chemical levels. Large quantity of water is used in tanning process of which 90% of the water is discharged of waste water a part of the leather processing, solid and gaseous waste are also discharged into the environment. The necessity for treating waste water that it pollutes the water there by causing disease and affecting flora and fauna. 80-90% of world-wide tanneries use. Cr (III) salts in the tanning processes. Due to stringent regulations for heavy metals, there removal has become a serious environmental problems. This review surveys the various commercially available adsorbents and natural bio-sorbents used over the past decades for the removal of Chromium, Cadmium and Copper ions from waste water. Commercial adsorbents are those adsorbents which are produced commercially on a large scale, such as activated carbon, silica gel, alumina, etc., however they are costly. Natural bio-adsorbents are those obtained from biological materials and are comparatively cheap. However, cost analysis is an important criterion for selection of an adsorbents for heavy metals removal from waste water. The cost of the adsorption process depends on the cost of the adsorbents.

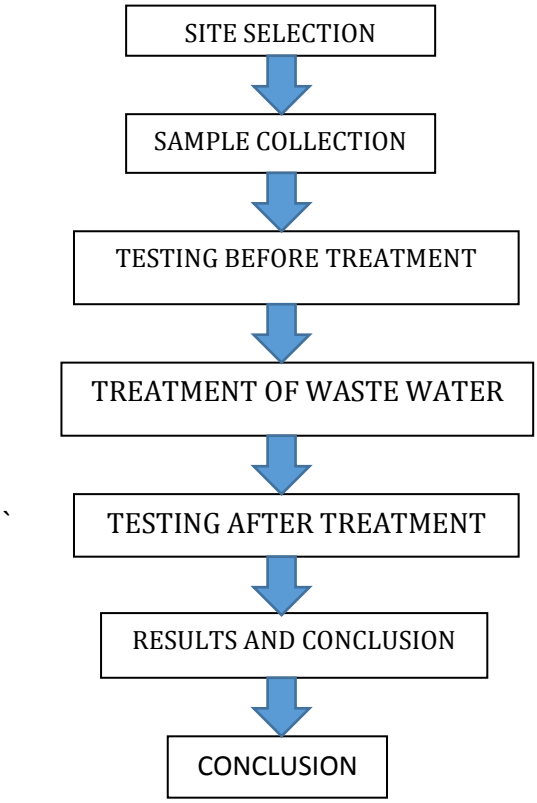
2. NEED FOR STUDY

The need for is to get detailed idea about the treatment of tannery effluent by using the natural adsorbent.

3. OBJECTIVES OF STUDY

1. To treat the raw tannery waste water using saw dust effectively.
2. To identify and analyze the metals concentration the raw waste water.
3. To conduct the volumetric test on raw and treated waste water.
4. To reduce and analyze the concentration of metals from the treated waste water.

4. METHODOLOGY



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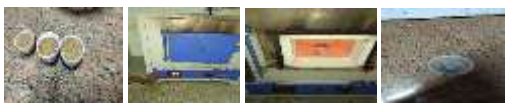
5. PREPARATION OF ACTIVATED CARBON (SAW-DUST)

1. The saw dust so called adsorbent materials were ripped off well to remove the dust and muddy particles and washed in water.
2. Then the washed saw dust were dried under sunlight for 8 to 10 hours for easy burning.
3. The dried dust were grinded and weighed on the electrical balance.
4. Then the saw dust is placed in muffle furnace for 3 hours at 800^0c. Then cool it in the desiccator.



(1) (2) (3) (4)

Fig 5.1

Table 5.1 Characteristics of waste water with respect to samples

S.NO	SAMPLE	pH	NATURE
1	Raw waste water	3.6	Acidic
2	Water with UV illumination	4.21	Acidic
3	Waste water with carbon	6.2	Acidic
4	Waste water with activated carbon	7.03	Neutral

6. MODEL OF TREATMENT PLANT

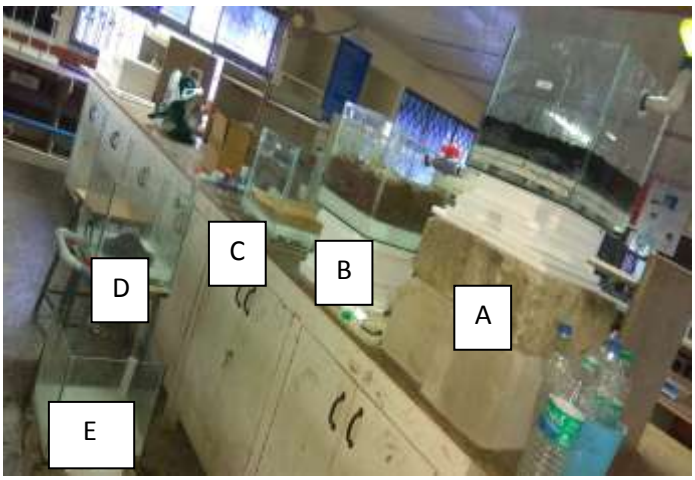


Fig 6.1

A. CARBON

1. Carbon is derived from the "Latin word", "Carbo" means "Coal". Carbon is a chemical element with symbol C and atomic number 6.
2. It is non-metalic and tetravalent – making four electrons available to form covalent chemical bonds. It belong to group 14 of the periodic table.
3. The carbon is used in this treatment is to oxidize the organic impurities present in the waste water.

B&E. FILTER MEDIA

1. The filter media used here is sand, stone and gravel.
2. It is used to remove the sediments and dissolved solids.

C. SAW DUST

1. Saw dust is a by-product or waste product of woodworking operations such as sawing, milling, planning, routing, drilling and sanding.
2. It is composed of fine particles of wood. These operations can be performed by woodworking machinery, portable power tools or by use of hand tools.
3. Saw dust is used to remove the color of the industrial waste water.

D. ACTIVATED CARBON

1. Activated carbon also called activated charcoal, is a form of carbon processed to have small, low available for adsorption or chemical reactions.
2. Activated is sometimes substituted with active.
3. Activated carbon is used to purify liquids and gases in a variety of applications, including municipal drinking water, food and beverage processing, odour removal, industrial pollution control.

4. Activated carbon is product produced from carbonaceous source materials, such as coconuts, nutshells, coal, peat and wood.
5. It is used here to remove the colour and to kill the micro-organism present in the industrial waste water.

7. ANALYSING THE CHARECTERISTIC OF UNTREATED WATER

Table 7.1 Characteristics of untreated sample

S.NO	TEST CONDUCTED	BEFORE TREATMENT	PERMISSIBLE LIMIT FOR IRRIGATION
1	pH	3.6	6 to 8
2	Ammonia nitrogen (mg/l)	Nil	10 to 20
3	BOD (mg/l)	6	100
4	COD (mg/l)	128	250
5	TDS (mg/l)	51300	2100
6	TSS (mg/l)	34700	200
7	Chromium	9.84 ppm	1.25 ppm
8	Hardness (mg/l)	220	300

8. ANALYSING THE CHARECTERISTIC OF TREATED WATER

Table 8.1 Characteristics of treated sample

S.NO	TEST CONDUCTED	AFTER TREATMENT	PERMISSIBLE LIMIT FOR IRRIGATION
1	pH	7.03	6 to 8
2	Ammonia nitrogen (mg/l)	Nil	10 to 20
3	BOD (mg/l)	3.3	100
4	COD (mg/l)	30	250
5	TDS (mg/l)	351	2100
6	TSS (mg/l)	91	200
7	Chromium	1.47ppm	1.25 ppm
8	Hardness (mg/l)	175	300

9. RESULTS AND DISCUSSIONS

Table 9.1 Comparison of untreated and treated sample

TEST	BEFORE TREATMENT	AFTER TREATMENT	PERMISSIBLE LIMITS FOR IRRIGATION
pH	3.6	7.03	6 to 8
Ammonia Nitrogen (mg/l)	Nil	Nil	10 to 20
BOD (mg/l)	6	3.3	100
COD (mg/l)	128	30	250
TDS (mg/l)	51300	351	2100
TSS (mg/l)	34700	91	200
Chromium	9.84 ppm	1.47ppm	1.25 ppm
Hardness (mg/l)	220	175	300

10. CONCLUSIONS

The adsorption level of chromium by activated carbon increases at the contact time of 2 minutes and it decreases in 3 minutes. The adsorption level of chromium increases as the time increases, this is due to the higher interaction between the sorbent surface and the metal ions. The chromium removal increases for the first 2 minutes and increases more in the next 2.5 minutes and after 3 minutes it brings no significant change in the removal concentration which in turns decrease in the removal

The effect of pH on chromium removal by activated carbon was investigated and the results are presented that the optimum pH for the maximum uptake of chromium was found to be in pH of 3.6 where the stabilization is more. Thus from these study, the removal of chromium is and it is analyzed by using Atomic Absorption Spectroscopy (AAS) which is effective method of treatment using the saw dust.

After treating the tannery waste water with the activated carbon, the characteristics of treated waste water included pH, BOD, COD, TDS,TSS, Hardness, sodium, phosphate, potassium, is analyzed and compare with the untreated waste water shows a large variation. This analysis of results source that most of the parameters of treated waste water are within permissible limit for discharge.

The treatment is eco-friendly without use of chemicals, special equipment's, electricity and also with zero operational and maintenance cost.

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