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Analysis and Treatment of Industrial Effluent Using Sugarcane Bagasse

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A B S T R A C T

Increased Demand of Edible Oil Throughout The World Has Resulted In Establishment Of Many Edible Oil Industries Leading To Generation Of Huge Amount Of Wastewater. The Treatment Of Industrial Effluent Water Has Become A Pressing Issue In Recent Times. Waste Water Treatment Is A Process Used To Remove Contaminants From Raw Water And Converting It Into An Effluent That Can Reduced To The Nature. Bagasse The Agricultural Waste That Have Shown Promise In The Treatment Of Industrial Effluent Water[. The Process Involves The Adsorption Of Pollutants Present In The Effluent Water By The Bagasse, Which Act As Natural Adsorbents. The Process Is Cost-Effective, Environmentally Friendly, And Has The Potential To Significantly Reduce The Amount Of Pollutants Released Into Water Bodies. The Purpose Of Raw Water Treatment Is To Protect Human And The Ecosystem From Harmful And Toxic Elements Found In Raw Water. The Activated Carbon Was Prepared With Bagasse And The Activated Carbon (ACS) Obtained And Were Essentially Microporous. The Process Used For Treating Effluent Water That Is Produced By Oil Industries Are An Undesirable By Product. The main objective of the project is to purify the effluent and reduce the toxicity of turbidity, colour, COD (chemical oxygen demand) and phenol.

Keywords:turbidity, color, COD (chemical oxygen demand) and phenol.

INTRODUCTION

Treatment of industrial effluent water by bagasse, Effluent from industries can contain a variety of pollutants that can be harmful to the environment and human health. Treatment of industrial effluent water is therefore essential to minimize its negative impact on the environment. One effective and cost-efficient method for treating industrial effluent water is the use of bagasse. Bagasse is the fibrous residue that remains after sugarcane has been crushed to extract its juice. Bagasse is the abundant agricultural wastes that are typically burned or discarded, causing environmental pollution. However, they can also be utilized as an adsorbent material for removing pollutants from wastewater. Bagasse contain high levels of lignocellulose, which makes them effective in adsorbing heavy metals, organic compounds, and dyes from industrial effluent water. They also have a large surface area and porosity, which enhances their adsorption capacity. Additionally, the use of bagasse for water treatment is sustainable and eco-friendly since it repurposes agricultural waste products that would otherwise go to waste. In summary, the use of bagasse for treating industrial effluent water is a promising approach that can contribute to a cleaner environment and better health outcomes.

Nomenclature

DO Dissolved Oxygen

TDS Total Dissolved Solid

COD Chemical Oxygen Demand

BOD Biological Oxygen Demand

LITERATURE AND REVIEW

ROLLS OF WASTE WATER MANAGEMENT SAFETY:

Wastewater management safety plays a crucial role in protecting human health, the environment, and the economy. The important roles of wastewater management safety:

Protecting human health: Proper wastewater management ensures that harmful pathogens, chemicals, and other pollutants are removed from wastewater before it is released into the environment. This helps to prevent the spread of waterborne diseases and other health hazards.

Protecting the environment: Wastewater can contain a variety of pollutants that can harm aquatic life and disrupt ecosystems. Proper treatment and management of wastewater can help to reduce these impacts and protect the environment.

Preserving water resources: Wastewater can be treated and reused for a variety of purposes, such as irrigation, industrial processes, and even drinking water. Proper wastewater management can help to conserve water resources and reduce reliance on freshwater sources.

Supporting economic development: Proper wastewater management can support economic development by providing a reliable source of water for industrial processes and other uses. It can also help to reduce the costs associated with water treatment and pollution control.

Meeting regulatory requirements: Wastewater management is subject to a range of regulations and standards aimed at protecting human health and the environment. Proper wastewater management is necessary to ensure compliance with these regulations and avoid penalties and fines.

ANALYSIS:

PHYSICAL EXAMINATION:

Physical examination is the process of evaluating objective anatomic findings through the use of observation, palpation, percussion, and auscultation physical methods are used for cleaning the wastewater. Processes like screening, sedimentation and skimming are used to remove the solids. No chemicals are involved in this process.

1.Colour

2.Turbidity

3. Odour

4.Tempeture

CHEMICAL EXAMINATION:

Chemical examination refers to the analysis of a substance or material to identify and quantify its chemical components. This process involves a variety of techniques and methods to separate, identify, and measure different chemical substances present in a sample.

1.Chemical oxygen demand

2.Dissolved oxygen

3.Biochemical oxygen demand

4.Oil and grease

BIOLOGICAL EXAMINATIONS:

Biological wastewater treatment method, also known as the conventional method, is a common and widely used method of treatment. It takes into account biodegradation bleaching by taking aid of several micro-organisms, fungi, bacteria, yeasts, and algae. This is a cheap and easy process that goes through a combination of aerobic and anaerobic processes.

1.Aerobic

2.Anaerobic

LITERATURE

1. **Mohammad Jibriljaafar Noraini –** Removal of colour from waste water using bagasse and rice husk activated carbon
2. **DimitriosKoutoulakis –** The activated carbon (ACs) obtained had BET surface area of 811 and 864 m2/g, respectively, and were essential microporous. The adsorption of arsenic, humic acid, phenol and a municipal solid waste landfill leacheate was examined.
3. **Anupriva J*, Naufal Rizwan P S, Jansi, Sheela S, ChellaGifta C –** The oil industry has grown up to great heights due to the population growth and modernization in urban culture etc., To produce 1 kg of textile we have spent around 200-500 liters of water. This is one of the main reason for water scarcity across the world. The water utilized for the production of the textiles are not even suitable for irrigation standards also. The main aim of this paper is to analyze the different characteristics of water by adding banana stem extract with the waste water collected from the oil Industry in to the natural stream in and around the southern parts of Tamil Nadu. In the preliminary study Virudhunagar and Thoothukudi district have been selected and the waste water has been collected from the textile industry. The possible

methodologies to convert the wastes into irrigation standards are described in the paper and the application of banana stem extract has also been discussed.

4. **Upadhyay Shreya Rajendra 1, Asha Rani. N. R –** Water is one of the major considerations for economic improvement globally as it is extensively utilized in various productive zones which includes agriculture products, industry, and urban supply. The rapid-placed industrial development, financial growth and inhabitants growth in emerging countries have involved in unexpected requirements of water in towns. Over the last few times, the quantity of water used and production of waste water in household segments has risen extremely. There is a lot of existing methods used for the treatment of waste water usually coagulation and flocculation are the process that is widely used. This treatment process is usually being put into practice because it is cost-efficient, consistent, simple and considered as minimal energy using methods. The recognized physical-biochemical methods eliminates suspended, soluble particles and colloidal, cost-effectively by encouraging the removal of large-scale and small by sedimentation.

5. **Namrata S Naragundkar, Davanagere Kavya B K, DavanagereManoj Kumar K S -** Water is one of the large scale attention for financial development general as its miles drastically applied in diverse efficient zones which incorporates agriculture products, industry, and concrete supply. The rapid-paced business development , monetary increase and population increase in rising international locations have worried in surprising necessities of water in towns. This led to the concept of treating waste water and utilize it for any other purpose.

6. **Venkatesh A L1, Chandralekha D2, Bhoomika S3, Sreenidhi S4, Abhjith G-** Many companies use fresh water to transport trash from the plant, then dump the garbage into rivers, lakes and seas, polluting the water and endangering aquatic life and also cause problems to all those who depend on these rivers and lakes for their daily needs. Industries often need 200-500 liters of water to generate 1kg of goods. This is one of the primary cause of global water scarcity. The water generated by these industries are not even appropriate for agriculture, necessitating wastewater treatment. Because of their adsorbing qualities many forms of agricultural wastes are presently being investigated for waste water treatment.

METHODOLOGIES:

SELECTION OF SOURCES

The sources that we have selected are:

1.Adani Wilmar limited outlet pipe**.**

2.Center point of the canal

3.End point of canal

APHA:

Standard method: The procedures described in these standards are intended for the examination of waters of a wide range of quality, including water suitable for domestic or industrial supplies, surface water, ground water, cooling or circulating water, boiler water, boiler feed water, treated and untreated municipal or industrial wastewater, and saline water. The unity of the fields of water supply, receiving water quality, and wastewater treatment and disposal is recognized by presenting methods of analysis for each constituent in a single section for all types of waters.

PREPARATION OF ACTIVATED CORBON:

Activated carbon can be prepared from sugarcane bagasse, a waste material from the sugarcane industry, through a process known as pyrolysis. Pyrolysis involves heating the material in the absence of oxygen, which leads to the formation of activated carbon.

1.The following steps can be followed to prepare activated carbon from sugarcane bagasse:

Collect sugarcane bagasse and dry it to reduce its moisture content. This can be done by spreading the bagasse in a thin layer and exposing it to the sun or by using a dryer.

2. Grind the dried sugarcane bagasse into small particles using a grinder.

3. Heat the ground sugarcane bagasse in a pyrolysis reactor at a temperature of 100°C for 30 minutes. This can be done in a micro oven. After removing sugarcane bagasse from the oven and add the Zinc chloride. After place the mixture in muffle furnace up to 4 hours.. the activated corban is prepared.

4. The final activated carbon product can be used for treatment of waste water.

ANALYSES OF VARIOUS PARAMETERS IN THE WASTE WATER SAMPLES

Indian Standards 10500 – 2012 (Source :www.bis.org.in)

S.no	Parameter	Indian Standards	
		Desirable	Permissible
1.	Turbidity	10 NTU	50 NTU
2.	pH	6.5-8.5	6.0-9.0
3.	Total Dissolved Solids	500 mg/L	2000 mg/L
4.	Electrical Conductivity	1000 ppm	3000 ppm
5.	Chemical Oxygen Demand	250 mg/L	500 mg/L
6.	Biological Oxygen Demand	20 mg/L	30 mg/L
7.	Acidity	6.5-8.5	6.0-9.0
8.	Alkalinity	20 mg/L	500 mg/L
9.	Dissolved Oxygen	5 mg/L	3 mg/L
10.	Phenol	0.001 mg/L	0.002 mg/L

EFFLENT WATER SAMPLE

s.no	Parameter	Limits		Sample-1
		Desirable	Permissible	
1	Turbidity	10 NTU	50 NTU	60NTU
2	pH	6.5-8.5	6.0-9.0	8.1
3	Total Dissolved Solids	500 mg/L	2000 mg/L	1854mg/L
4	Electrical Conductivity	1000 ppm	3000 ppm	1211ppm
5	Chemical Oxygen Demand	250 mg/L	500 mg/L	5624mg/L
6	Biochemical Oxygen	20 mg/L	30mg/L	24mg/L

	Demand			
7	Acidity	6.5-8.5	6.5-9.0	7.4
8	Alkalinity	20 mg/L	500 mg/L	324mg/L
9	Dissolved Oxygen	5 mg/L	3mg/L	5.1mg/L
10	Phenol	0.001mg/L	0.002mg/L	3.82mg/L
11	Oil and Grease	10 mg/L	100mg/L	PRESENT

Here we are using sugarcane bagasse activated carbon for removal of phenol, turbidity, chemical oxygen demand in the waste water sample. After treated with activated carbon that phenol content in the sample.

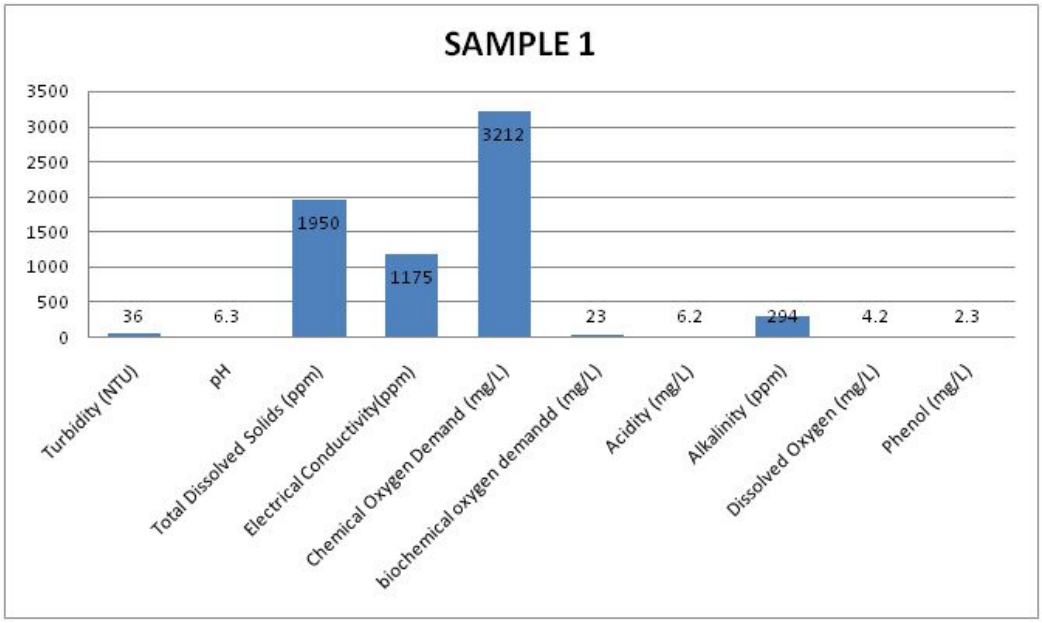
S .No	Parameter	Sample-1	Treated Same
1	Phenol	3.82mg/L	2.4mg/L
2	Turbidity	60NTU	39NTU
3	COD	5624mg/L	3656mg/L

RESULTS:

After the calculation and comparison of samples with APHA standards we here observed that the samples 1,2,3 was found that it is in desirable limits after completion of treatment with sugarcane activated carbon. The activated carbon showed the best adsorption behavior towards turbidity, phenol, chemical oxygen demand removing around 65% at the equilibrium time of 3h.

DISCUSSIONS:

The water sample collected from the outlet of Adani Wilmar limited. The results of various tests carried out for the sample is shown in the below figure. The water sample was found to be in the range as per the Indian standard value, the total dissolved solids are little bit high.



CONCLUSIONS:

The efficiency of toxicity in waste water sample-1 of pH, electrical conductivity, biochemical oxygen demand, acidity, alkalinity, dissolved oxygen are little bit reduced and those are desirable limits. The phenol, turbidity, chemical oxygen is highly reduced. These are in desirable limits. But these water is not useful for drinking purpose, the little bit toxicity content will be remained in the sample.

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