

Removal of Oil and Grease from Wastewater by using Natural Adsorbent

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Abstract

There are several pollutants that can harm our environment. Oil and grease are one of the examples of a pollutant that can cause a severe environmental problem. The highest concentration of oil and grease inside the sewer system can cause the sewer to clog that can lead to overflow. It can affect not only to the environment but can also affecting our health. There are various methods of oil and grease removal that one of the examples is by using adsorption method. This method commonly uses activated carbon that is one of the effective adsorbents. Although effective, the cost for activated carbon is expensive thus a study was conducted by using natural resources as alternative adsorbents for oil and grease removal. This study objective is to determine the ability of three adsorbents, which are curry leaf, neem, and banana pith as an adsorbent in removing oil and grease from wastewater. It involved the characterization of adsorbent and the performance studies of the adsorbent. Dosage are the parameter used for performance studies, to see the ability of adsorbents in removing oil and grease.

Keywords: Curry leaf, Neem, Banana pith (natural adsorbents)

INTRODUCTION

Organic toxic waste (oil and grease (O&G)) causes ecology damages for aquatic organisms, plant, animal, and equally, mutagenic and carcinogenic for human being. They discharge from different sources to form a layer on water surface that decreases dissolved oxygen. O&G layer reduces biological activity of treatment process where oil film formation around microbes in suspended matter and water. This lead to decrease dissolved oxygen levels in the water. Then oxygen molecules are difficulty to be oxidative for microbial on hydrocarbon molecules and cause ecology damages to water bodies.

The conventional techniques remove oil and grease using skimming tanks and oil and grease traps in treatment plants but the main disadvantage of these methods is their low efficiency of removal.

The most important pollutants in the oil processing wastewaters are conventional pollutants such as oil and grease, suspended solids and pH, and non-conventional pollutants such as phenolic compounds, COD, sulphide and ammonia. Among

these pollutants, oil and grease is one of the most complicated pollutants to remove. This paper summarizes available technologies to remove oil and grease, and should assist oil and grease discharges in complying with their effluent limits.

To remediate this problem, DEP has developed an outreach program aimed at eliminating FOG from the sewer system. FOG buildup in sewer lines has many harmful and costly effects. Sewer backups into homes create a health hazard as well as an unpleasant mess that can cost hundreds and sometimes thousands of dollars to clean up. In certain parts of the City, FOG can enter storm drains and flow directly into water bodies and onto beaches creating serious environmental and health conditions.

Collection of sample

The sample collected from Textile industry. The water collected in 2000 ml clean plastic bottles were rinsed several time with distilled water and twice with water which were being sampled, samples are transported to laboratory and starts the further tests.

Adsorbents

Natural adsorbents were extracted from three types

- Curry leaf
- Banana pith
- Curry leaf

Description of natural adsorbents

Curry leaf

Southern and Western Indian cooking often features fresh Curry leaves. They are used somewhat like bay leaves in Indian cooking, although the leaves are edible after they are cooked and don't need to be removed from dishes before eating.



Curry leaf



Curry leaf powder

Initial test

The initial test values for the sample are given below. The values are used to study the properties of the sample

S.No	Parameters	Initial value
1	pH	7.33
2	Turbidity	75
3	Hardness	564mg/l
4	Oil and Grease	1554mg/l
5	TSS	2100mg/l

Banana Pith

Poorly managed urban runoff and wastewater collection systems contaminate surface water, making it necessary to treat the water before use in households. Coagulation and flocculation are essential components of the treatment of drinking water and wastewater. This study evaluated the efficacy of banana pith as a natural polyelectrolyte and coagulant.



Banana pith



Banana pith powder

RESULT AND DISCUSSION

The various wastewater parameter test are analyzed. The initial test value and final test value are compared with wastewater quality standard.

S.No	Parameter	Initial test value	Final test value		
			Neem	Banana pith	Curry leaf
1.	pH	4.17	5.21	5.38	5.80
2.	Turbidity	75	15.25	22	20
3.	Sulphate	1208	850	1100	950
4.	Oil and Grease	1554	352	537	840
5.	TSS	2100	1500	1600	1800
6.	TDS	3950	1076	2179	2150
7.	BOD	58	19.67	13.47	11.88
8.	COD	480	209	164	215

Neem leaf

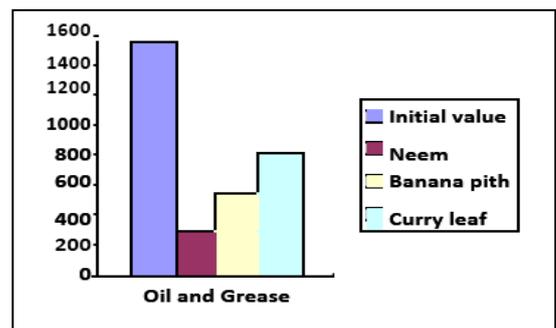
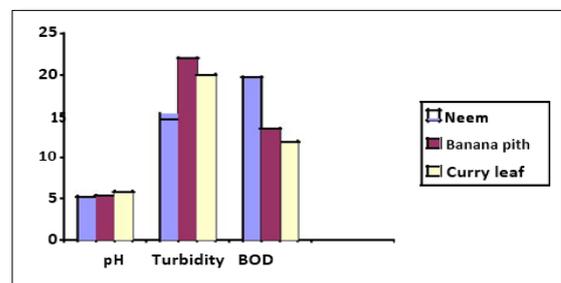
Neem is a tree with an incredible variety of beneficial properties. Every part of the tree contains some level of active compounds, which have been found to be useful in organic and natural cosmetics, medicine and agriculture. The Neem tree originates from India and is part of the culture's traditional Ayurvedic medicine. Neem Oil is derived from the seeds of the Neem fruit. Neem Oil and Neem leaves are the most common forms in which Neem is used since they are renewable.



Neem leaf



Neem leaf powder



CONCLUSION

- Thus, the project study was done successfully and the result has been found. Among neem, banana pith, and curry leaf the effective reducing capacity is found in neem adsorbent. It is very efficient in reducing oil and grease content from the obtained waste water.
- The obtained oil and grease waste water is obtained from the basis of textile wastewater and its standardized limits of waste water is 10-500mg/l. The removal of oil and grease from wastewater by using natural adsorbents is done with an identified result as NEEM ADSORBENT is best adsorbent. Compare the three adsorbents, the Neem adsorbent is best result out of the three adsorbent.

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