

Kernel System of an Automobile Service Station

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Abstract- This experimental work defines the effectiveness of chemical and physical methods in treating the wash water collected from automobile service stations. Wash water was collected from a service stations in the city of Visakhapatnam , and the effluent was characterized for different parameters such as pH, total hardness, turbidity, total dissolved solids, oil and grease, detergents. For chemical treatment, alum was used as coagulant. Sugarcane bagasse and wood chips were used as filter media for physical treatment. Alum at different concentrations was agitated with the effluent for a prescribed contact period (30 min) which led to the formation of flocs. The sifted tests were tried and the rate decrease in oil and grease was connected with the profundity and sort of filter media. The physical and concoction strategies for treatment uncovered that normal materials are compelling in evacuating real parameter like oil and oil and cleansers from the vehicle emanating and subsequently give a practical arrangement in view of its eco-amicability. From the exploratory investigations it is seen that in physical treatment. As adsorption procedure, the adsorption limit of any material is reliant on its porosity, specific surface zone and thickness of filter bed.

Keywords: Kernel system, Automobile service stations, Physical treatment, Adsorption technique, Specific surface area.

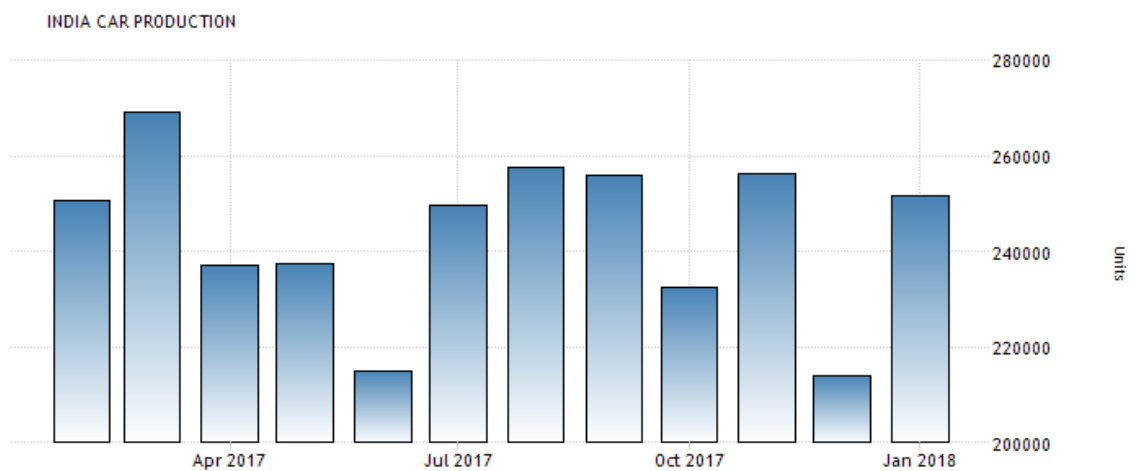
1. INTRODUCTION

On location wastewater treatment is an imminent heading towards the decrease of contamination load to the civil or consolidated urban wastewater. One of such territories is car benefit station and vehicle washing. A portion of the current petroleum siphons, fuel benefit stations are encouraged with vehicle washing the large Car washing pools of garage and service stations are insisted upon by the respective PCB's to provide necessary treatment for the effluents. Proficient vehicle wash frameworks make wastewater that can greatly affect the earth, if not appropriately oversaw and released. Contaminants in wash wastewater incorporate oil and grease, detergents, phosphates, hydrofluoric acid, ammonium bi-fluoride items (ABF) etc. Oil and grease and detergents, including biodegradable cleansers can be harmful to aquatic animals. Then again, Phosphates, which are plant supplements, can cause inordinate development of disturbance plants like microscopic plants.

1.1 Current scenario of automobile service station

An administration station is where notwithstanding care of the engine vehicle like mechanical administration and minor fixes, oil is provided autos are greased up, and cleaned; washed and different kinds of less difficult administrations that are required every day are performed. As a rule it incorporates various segments like carport general it incorporates various segments like carport general administration. An administration station is expansion to the hardware accessible is carport is normally kept running related to a business office for a specific kind of engine vehicle to give exhaustive fix administration to that specific vehicle. The gear accessible, in a general carport will be included with specific hardware like lifting tackle, and distinctive kinds of dances, apparatuses and devices uncommonly intended for checking, modifying and fix of specific sort and make of the vehicle.

An administration station may comprise of a machine shop having a machine, boring machine and so on. If there should be an occurrence of huge administration station uncommon sorts of machines like wrench shaft pounding machine, valve reface, surface processor, re-exhausting and exhausting machine, and brake drum machine likewise will be equipment's. For as long as one and a half decade the traveler vehicle populace has been consistently expanding. This is essentially on the grounds that the Indian economy is presently impressively changed for a wide range of businesses. India is having around 30 odd traveler vehicle models on the streets grew indigenously and square with number of models in business vehicle fragment. Despite the fact that there has been a reduction in offer of business vehicles, the offer of autos and different vehicles has been expanding. All the global real traveler vehicle makers and bike Manufacturers are demonstrating distinct fascination in the Indian market, and many have turned out with new models. The Indian business with its cost leverage and principal building capacities has turned into a noteworthy source.



Source: Tradingeconomics.com/CMIE center for monitoring Indian economy

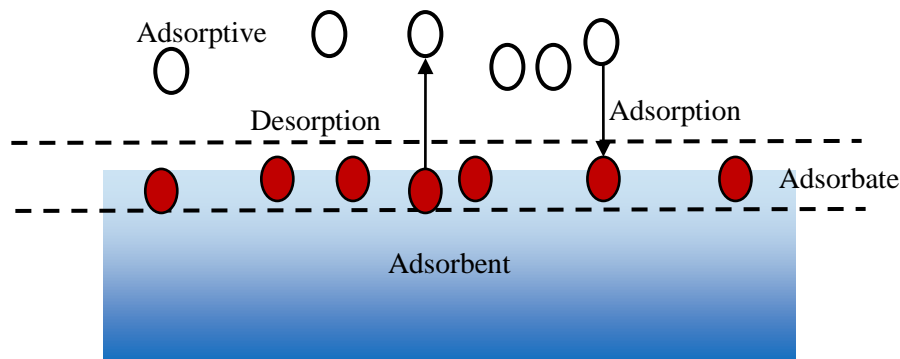
1.2 Mechanism of treatment process:

Adsorption

“Adsorption” may be defined as accumulation of any substance giving higher concentration of compound on the surface of another substance as compared to that in the bulk. When a solid surface is exposed to a gas or a liquid, molecules from the gas or the solution phase accumulate or concentrate at the surface. The phenomenon of concentration of molecules of a gas or liquid on a solid surface is called adsorption. “Adsorption” is an esteemed and powerful technique for treating domestic, commercial and industrial effluents in water treatment,

Adsorbate: - The substance that accumulates at the surface is called adsorbate.

Adsorbent: - The substance upon whose surface the adsorption done it is called an adsorbent.



1.3 Adsorption principle

The basic principle of operation for adsorption is the mass transfer and adsorption of a molecule from a liquid or gas into solid surface. Adsorption occurs because of the contaminant has low solubility in the waste.

Description of Site:

The present examination was directed in a garage at Visakhapatnam in Andhra Pradesh, India. The garage as a rule handles the activity Bikes, Cars and Autos and so on. These are utilized for conveying strong squanders either from compartment area or from exchange station. There are inside and out 40 nos. of vehicles including recuperation unit, stockpiling van, jeep etc., in the garage.

The exercises of the Garage yard incorporate the accompanying:

- Vehicle washing and adjusting area,
- Tyre fixing area,

- Body building area,
- Engine updating area,
- Vehicle running upkeep area,
- Break down upkeep area,
- Ancillary segment,
- Machine shop and
- Procurement cell for gathering saved parts of vehicles.

Wastewater Survey

The wastewater is dominantly produced from washing of various sorts of vehicle. In the current office 2 to 3 vehicles are overhauled on pivot premise. The washing is finished by showering high weight water flies through spout guided by blower engine get together. Generally 2 - 3 kilo liters of water are utilized every day for washing of vehicle. Oil weapon is utilized to trigger greases to various parts of the vehicles as a normal methodology. Each carport unit is encouraged with one washing straight. For washing reason, vehicles are adjusted on the cove and high weight water fly is showered on the vehicles. The washed wastewater is then depleted to metropolitan sewerage framework through the washing narrows. The washing cove is made of bond solid stage. The spent water containing earth, oils and different solids is depleted through drains and after that gathered in a pit. The entire substance of the crude wastewater is directed to the civil seepage framework.

Collection and Preparation of Wastewater Sample

The examination was done by gathering test from the vehicle wastewater accumulation pit of washing territory of the carport. The Supernatant wash water was gathered in a 20 liters limit plastic compartment tests were gathered.

Factors influencing adsorption

- Specific Surface area
- Nature of the adsorbate
- Hydrogen ion concentration (pH) of the solution
- Temperature
- Mixed solutes

Material used:

- Sugarcane bagasse
- Wood chips
- Alum
- Filter mesh
- PVC Pipe (110 mm long)

- Collection container

Physical properties of materials used as filter bed:

Sugarcane Bagasse:

Bagasse is a side-effect of sugar processing and critical fuel asset for that industry. It is a sinewy, low thickness material with an extensive variety of Patrice size and tallness dampness content. It is hard to describe properties of bagasse particles in the standard ways. These properties are important to apply ordinary structure strategies to, for instance bagasse considered as three sections substance, fiber and skin, are illustrated. Normal properties may then to be gotten dependent on the weight properties of the parts establishing the bagasse.

Sugarcane with 45-half dampness substance and comprising of a blend of hard fiber, with delicate and smooth parenchymatous (essence) tissue with high hygroscopic property. Bagasse contains fundamentally cellulose, hemi cellulose, pentosans, lignin, Sugars, wax, and minerals. The amount got differs from 22 to 36%.

Each 100 tons of Sugarcane pounded; a Sugar industrial facility delivers about 30 tons of wet Bagasse. Bagasse is frequently utilized as an essential fuel hotspot for Sugar factories; when consumed in amount, it produces adequate warmth and electrical vitality to supply every one of the necessities of a regular Sugar process, with vitality to save. The subsequent CO₂ emanations are equivalent to the measure of CO₂ that the Sugarcane plant consumed from the air amid its developing stage, which makes the procedure of cogeneration ozone harming substance unbiased.

Wood chips

Wood chips are a result or waste result of carpentry activities, for example, sawing, lathing, processing, arranging, steering, boring and sanding. It is made out of fine particles of wood. These activities can be performed by carpentry hardware, convenient power instruments or by utilization of hand devices. Wood dust is likewise the result of specific creatures, winged animals and creepy crawlies which live in wood, for example, the woodpecker and craftsman subterranean insect. In some assembling enterprises it tends to be a noteworthy fire danger and wellspring of word related residue presentation.

Wood chips are the fundamental segment of particleboard. Wood dust is a type of particulate issue, or particulates. Research on wood dust wellbeing perils comes extremely close to word related wellbeing science, and investigation of wood dust control comes quite close to indoor air quality designing.

The fundamental physical properties of wood chips are shading, surface, and scent; dampness including porosity, water maintenance, and water seepage were dissected to demonstrate its appropriateness for use as channel media. Material preparation

In the present study the materials are collected (i.e. sugarcane bagasse and wood chips) and then these are dried for twenty four hours and then washed and dried again for twenty four hours. After that the fibre content is separated from sugarcane bagasse. And it is used as filter bed. Whereas the wood chips are dried and can be directly used.

Coagulant utilized

In this present examination alum is utilized as coagulant which is the hydrated type of potassium aluminum sulfate and has the compound equation $KAl(SO_4)_2 \cdot 12H_2O$. Nonetheless, any of the mixes with the exact equation $AB(SO_4)_2 \cdot 12H_2O$ are viewed as an alum. Here and there alum is found in its crystalline shape, in spite of the fact that it is regularly sold as a powder. Potassium alum is a fine white powder that you can discover sold with kitchen flavors or pickling fixings.

Physical Analysis

The tests which are performed in this category are:

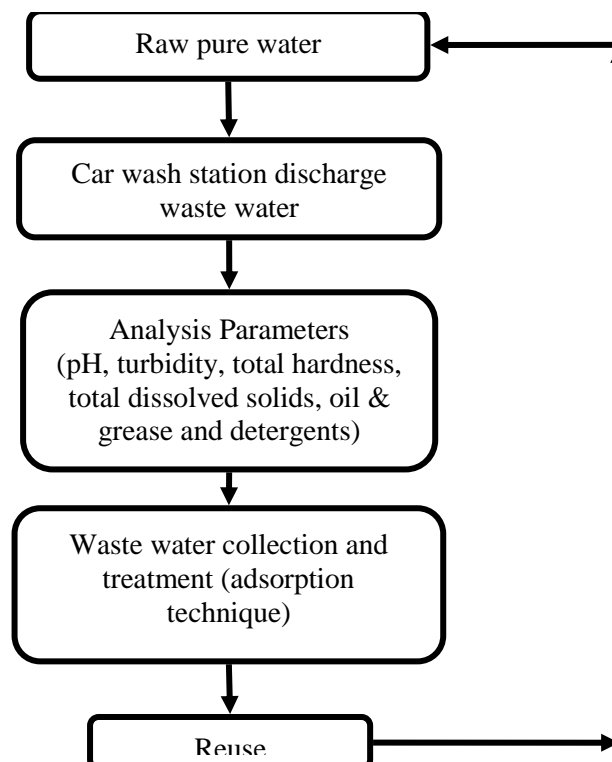
- Odour
- Colour

Chemical Analysis

The tests which are performed in this category are:

- pH
- Turbidity
- Total Hardness
- Total dissolved solids
- Oil and grease Detergents

METHODOLOGY



RESULTS AND DISCUSSION

The samples were collected from an automobile service station in P.M.Palem near traffic police station. The results were found to be as follows:

Table1. Permissible Limits for treated Water Quality Parameter according to IS 10500:2012

S.NO	PARAMETER	INDIAN STANDARDS
1	pH	6.5-8.5
2	Turbidity	1-5 mg/l
3	Total Hardness	200-600 mg/l
4	Total dissolved solids	500-2000 mg/l
5	Oil and grease	1-5 mg/l
6	Detergents	5 mg/l

1. pH:

pH is a critical parameter for deciding the nature of water in an amphibian situation and used to express the force of corrosive or basic state of an answer. As per our examination pH estimations of few examples are relatively close to standard esteem. The outcomes are appeared in underneath table 2 and Fig1

Table2: The results of pH

pH	Before treatment	After treatment
Sugarcane bagasse bed 10cm thick with alum 175mg/l	9.07	6.02
Sugarcane bagasse bed 10cm thick with alum 200mg/l	9.07	4.86
Sugarcane bagasse bed 10cm thick with alum 225mg/l	9.07	5.61

Sugarcane bagasse bed 12cm thick with alum 175mg/l	9.07	6.00
Sugarcane bagasse bed 12cm thick with alum 200mg/l	9.07	5.33
Sugarcane bagasse bed 12cm thick with alum 225mg/l	9.07	6.45
Wood Chips bed 10cm thick with alum 175mg/l	9.07	6.33
Wood Chips bed 10cm thick with alum 200mg/l	9.07	6.23
Wood Chips bed 10cm thick with alum 225mg/l	9.07	6.32
Wood Chips bed 12cm thick with alum 175mg/l	9.07	6.42
Wood Chips bed 12cm thick with alum 200mg/l	9.07	5.85
Wood Chips bed 12cm thick with alum 225mg/l	9.07	6.43

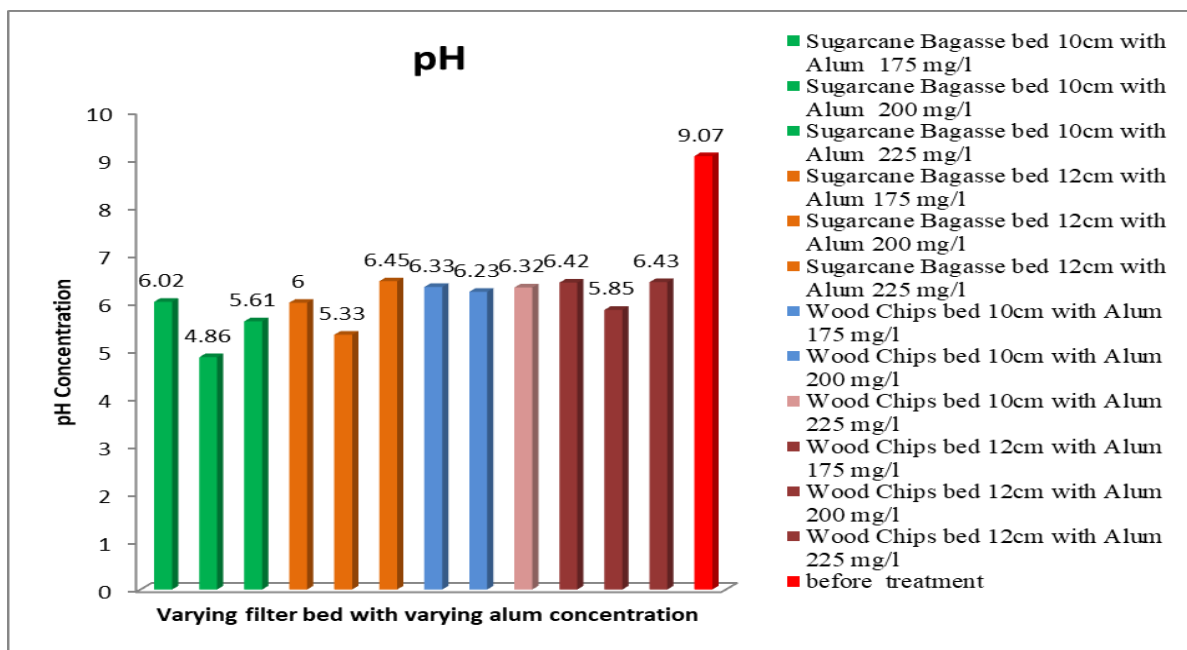


Fig 1: The results of pH

2. Turbidity:

Turbidity is caused by the nearness of suspended and disintegrated matter, for example, mud, residue, finely separated natural issue, tiny fish and other minute living beings, natural acids, and colors. Turbid water will seem shady, dinky, or generally hued, influencing the physical look of the water. Suspended solids and dissolvedshaded material lessen water lucidity by making an obscure, foggy or sloppy appearance. Turbidity estimations are regularly utilized as a pointer of water quality dependent on clearness and evaluated totalsuspended solids in water. The outcomes are appeared in beneath table 3 and Fig 2

Table 3: The results of Turbidity

Turbidity	Before treatment	After treatment
Sugarcane bagasse bed 10cm thick with alum 175mg/l	8	1.15

Sugarcane bagasse bed 10cm thick with alum 200mg/l	8	1.12
Sugarcane bagasse bed 10cm thick with alum 225mg/l	8	1.16
Sugarcane bagasse bed 12cm thick with alum 175mg/l	8	1.57
Sugarcane bagasse bed 12cm thick with alum 200mg/l	8	1.2
Sugarcane bagasse bed 12cm thick with alum 225mg/l	8	2.68
Wood Chips bed 10cm thick with alum 175mg/l	8	1.2
Wood Chips bed 10cm thick with alum 200mg/l	8	1.18
Wood Chips bed 10cm thick with alum 225mg/l	8	1.67
Wood Chips bed 12cm thick with alum 175mg/l	8	1.85
Wood Chips bed 12cm thick with alum 200mg/l	8	1.9
Wood Chips bed 12cm thick with alum 225mg/l	8	1.95

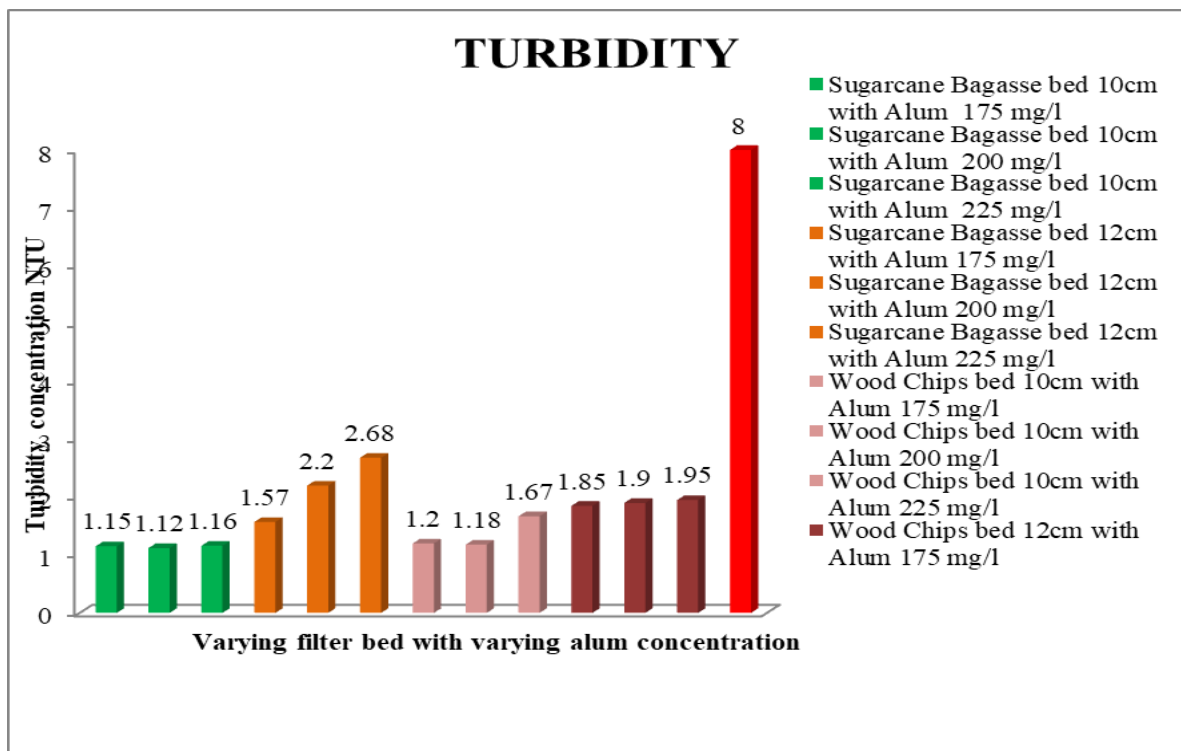


Fig. 2: The results of Turbidity

3. Total Hardness:

Total hardness of water is the total of groupings of soluble earth metals present in it. In new water, these are credited basically by calcium and magnesium, albeit different metals, for example, iron, strontium and manganese can likewise affect hardness when present in obvious focuses. The outcomes are appeared beneath in underneath table 4 and Fig 3

Table 4: The results of Total Hardness

Total Hardness	Before treatment	After treatment
Sugarcane bagasse bed 10cm thick with alum 175mg/l	941.60	80.42
Sugarcane bagasse bed 10cm thick with alum 200mg/l	941.60	51

Sugarcane bagasse bed 10cm thick with alum 225mg/l	941.60	86.3
Sugarcane bagasse bed 12cm thick with alum 175mg/l	941.60	96.1
Sugarcane bagasse bed 12cm thick with alum 200mg/l	941.60	88.3
Sugarcane bagasse bed 12cm thick with alum 225mg/l	941.60	97.1
Wood Chips bed 10cm thick with alum 175mg/l	941.60	179.5
Wood Chips bed 10cm thick with alum 200mg/l	941.60	117.0
Wood Chips bed 10cm thick with alum 225mg/l	941.60	219
Wood Chips bed 12cm thick with alum 175mg/l	941.60	108
Wood Chips bed 12cm thick with alum 200mg/l	941.60	117
Wood Chips bed 12cm thick with alum 225mg/l	941.60	162

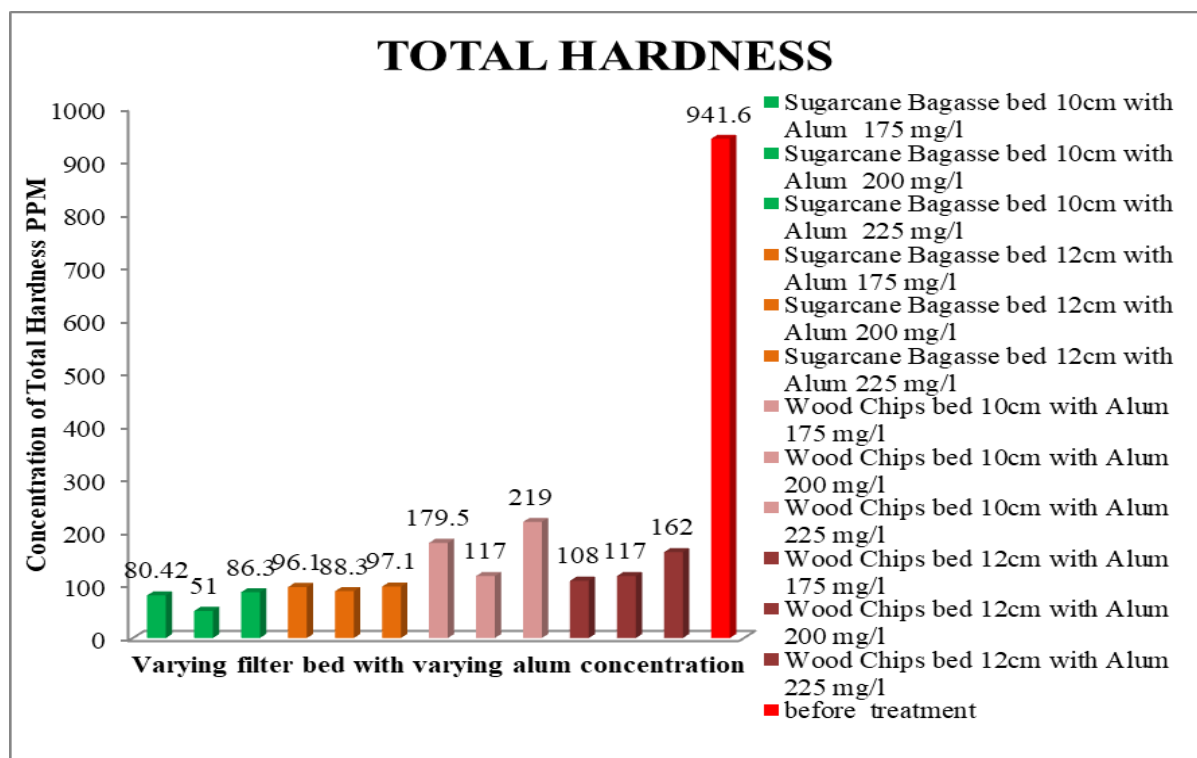


Fig 3: The results of Total Hardness

4. Total dissolved solids:

Total dissolved solids are estimated for inorganic salts, natural issue and other disintegrated materials in water and furthermore can make poisonous quality amphibian life through increments in saltiness, changes in the ionic structure of the water, and the harmfulness of individual particles. The outcomes are appeared in beneath table 5 and Fig 4

Table5: The results of Total dissolved solids

Total dissolved solids	Before treatment	After treatment
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Sugarcane bagasse bed 10cm thick with alum 175mg/l	740	710
Sugarcane bagasse bed 10cm thick with alum 200mg/l	740	700
Sugarcane bagasse bed 10cm thick with alum 225mg/l	740	686
Sugarcane bagasse bed 12cm thick with alum 175mg/l	740	723
Sugarcane bagasse bed 12cm thick with alum 200mg/l	740	696
Sugarcane bagasse bed 12cm thick with alum 225mg/l	740	689
Wood Chips bed 10cm thick with alum 175mg/l	740	683
Wood Chips bed 10cm thick with alum 200mg/l	740	695
Wood Chips bed 10cm thick with alum 225mg/l	740	690
Wood Chips bed 12cm thick with alum 175mg/l	740	692
Wood Chips bed 12cm thick with alum 200mg/l	740	684
Wood Chips bed 12cm thick with alum 225mg/l	740	701

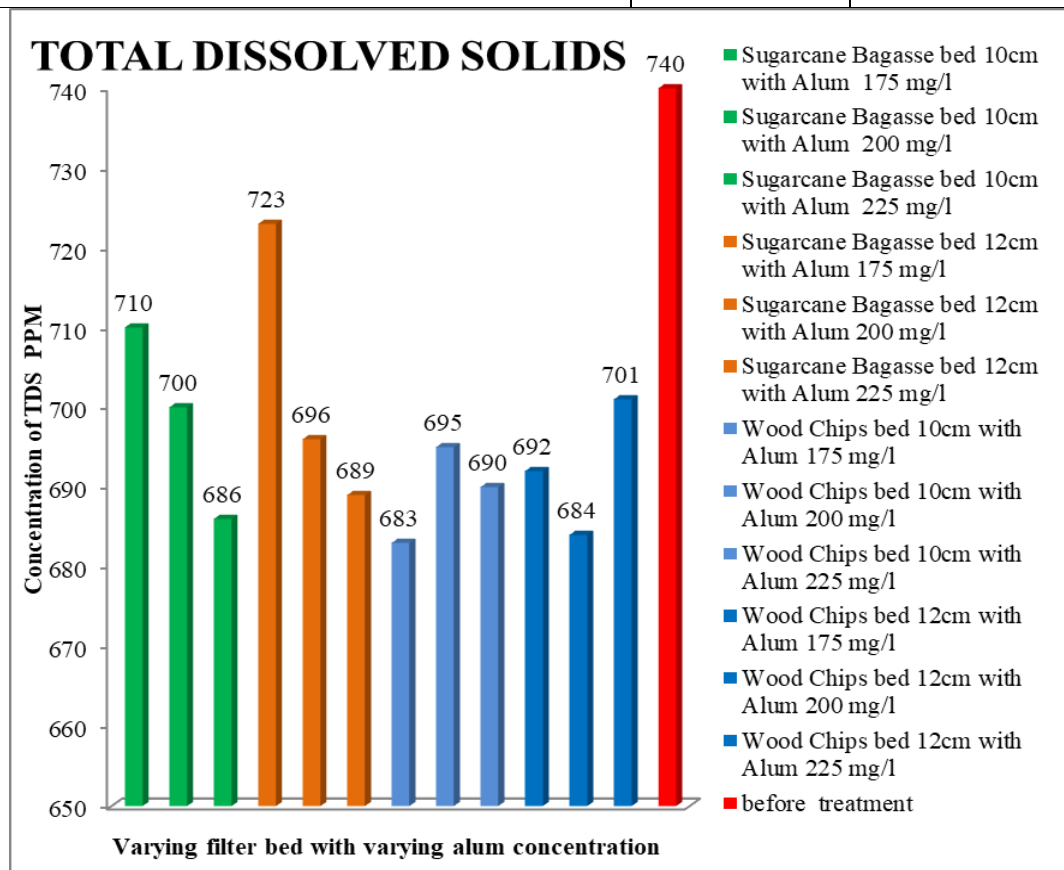


Fig 4: The results of Total dissolved solids

5. Oil and Grease:

Emulsified or Disintegrated oil and grease is separated from water by private contact with a removing dissolvable. Some extractable, particularly unsaturated fats and unsaturated fats oxidize promptly; thus, exceptional precautionary measures with respect to temperature and dissolvable vapor uprooting are incorporated to limit this impact. Natural solvents shaken with a few examples may shape an emulsion that is exceptionally hard to break. This strategy incorporates methods for dealing with such emulsions. The outcomes are appeared in underneath table 6 Fig 5.

Table 6: The results of Oil and Grease

Oil and Grease	Before treatment	After treatment
Sugarcane bagasse bed 10cm thick with alum 175mg/l	9	2.86
Sugarcane bagasse bed 10cm thick with alum 200mg/l	9	2.17
Sugarcane bagasse bed 10cm thick with alum 225mg/l	9	3.6
Sugarcane bagasse bed 12cm thick with alum 175mg/l	9	3.5
Sugarcane bagasse bed 12cm thick with alum 200mg/l	9	2.17
Sugarcane bagasse bed 12cm thick with alum 225mg/l	9	2.13
Wood Chips bed 10cm thick with alum 175mg/l	9	0.98
Wood Chips bed 10cm thick with alum 200mg/l	9	2.17
Wood Chips bed 10cm thick with alum 225mg/l	9	3.6
Wood Chips bed 12cm thick with alum 175mg/l	9	3.5
Wood Chips bed 12cm thick with alum 200mg/l	9	2.17
Wood Chips bed 12cm thick with alum 225mg/l	9	4.1

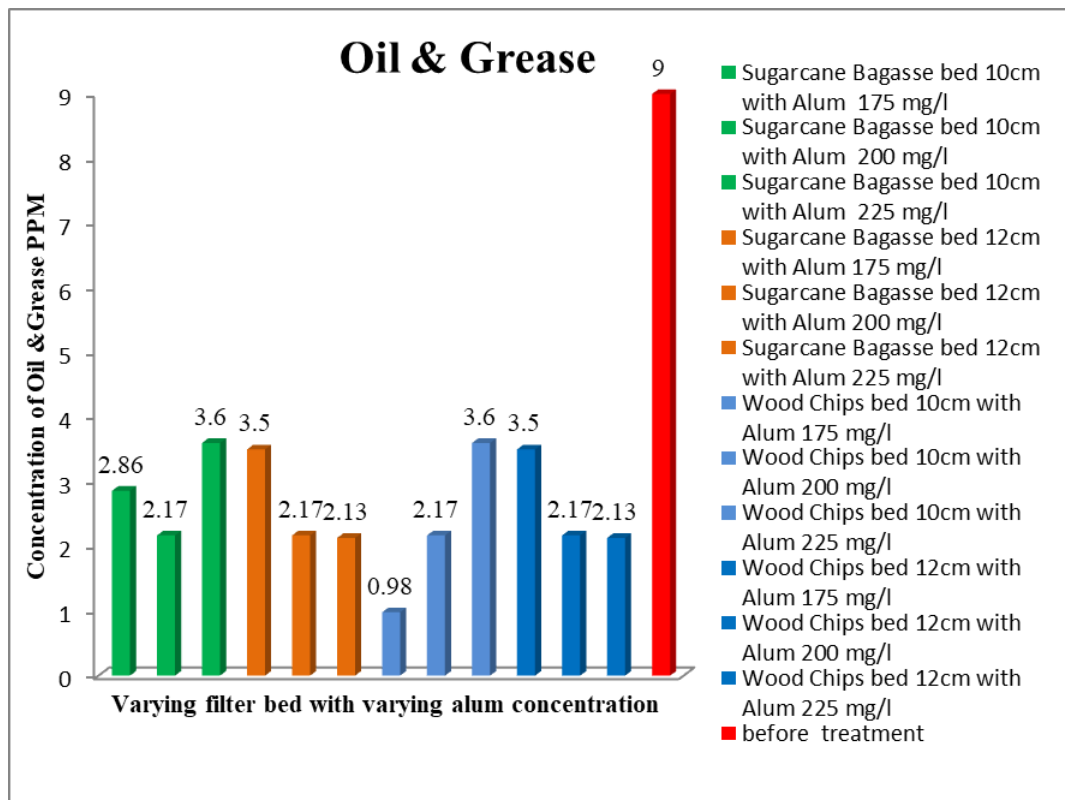


Fig 5: The results of Oil and Grease

6. Detergents:

Detergency is the capacity to clean or evacuate soil, generally associated with the action of a cleaning agent such as soap, detergent, or alkaline salt by and large connected with the activity of a cleaning specialist, for example, soap, shampoo, or antacid salts. The outcomes are appeared in beneath table 7 and Fig 6

Table 7: The results of Detergents

Detergents	Before treatment	After treatment
Sugarcane bagasse bed 10cm thick with alum 175mg/l	7.8	3.5
Sugarcane bagasse bed 10cm thick with alum 200mg/l	7.8	4.3
Sugarcane bagasse bed 10cm thick with alum 225mg/l	7.8	3.7
Sugarcane bagasse bed 12cm thick with alum 175mg/l	7.8	4.6
Sugarcane bagasse bed 12cm thick with alum 200mg/l	7.8	3.7
Sugarcane bagasse bed 12cm thick with alum 225mg/l	7.8	4.5
Wood Chips bed 10cm thick with alum 175mg/l	7.8	4.9
Wood Chips bed 10cm thick with alum 200mg/l	7.8	5.01
Wood Chips bed 10cm thick with alum 225mg/l	7.8	4.8
Wood Chips bed 12cm thick with alum 175mg/l	7.8	4.9
Wood Chips bed 12cm thick with alum 200mg/l	7.8	4.7
Wood Chips bed 12cm thick with alum 225mg/l	7.8	4.1

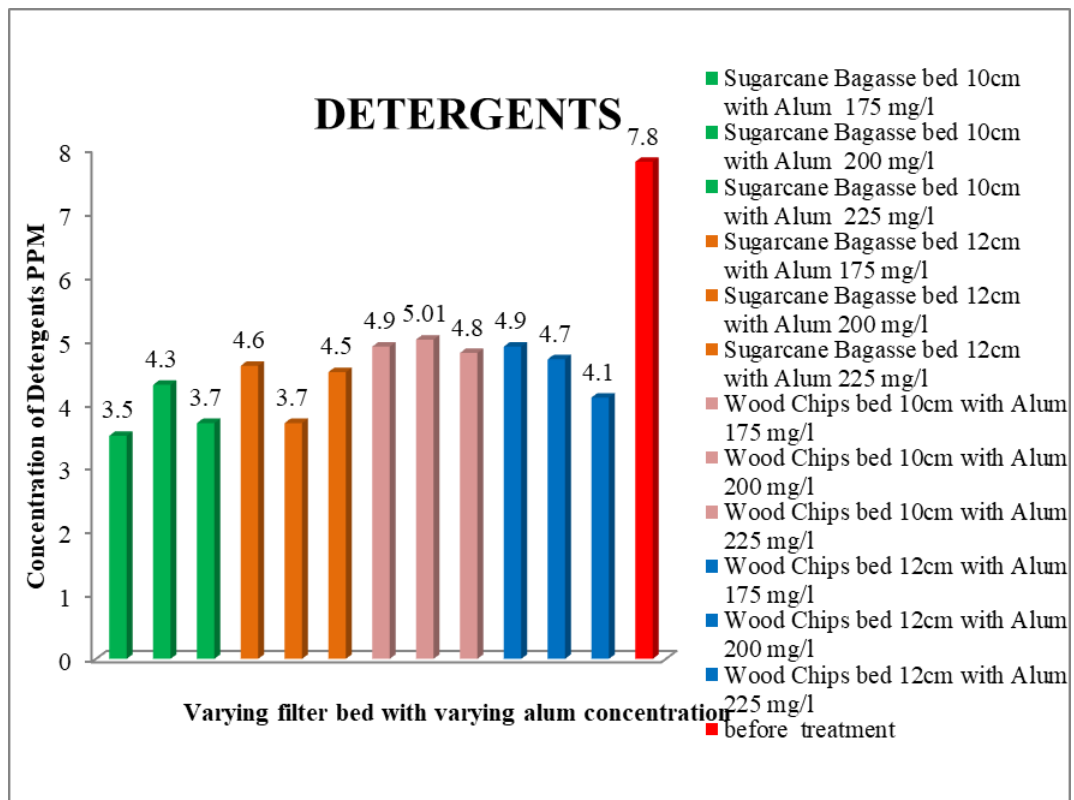


Fig 6: The results of Detergents

Table8. Analysis of waste water sample⁵

S.No.	Parameters	Before Treatment	After Treatment											
			Sugarcane Bagasse bed 10cm with Alum % (mg/l)			Sugarcane Bagasse bed 12cm with Alum% (mg/l)			Wood Chips bed 10cm with Alum% (mg/l)			Wood Chips bed 12cm with Alum% (mg/l)		
			175	200	225	175	200	225	175	200	225	175	200	225
1	pH	9.07	6.02	4.86	5.61	6.00	5.33	6.45	6.33	6.23	6.32	6.42	5.85	6.43
2	Turbidity	8	1.15	1.12	1.16	1.57	2.2	2.68	1.2	1.18	1.67	1.85	1.9	1.95
3	Total Hardness	941.60	80.42	51	86.3	96.1	88.3	97.1	179.5	117.0	219	108	117	162
4	Total Dissolved Solids	740	710	700	686	723	696	689	683	695	690	692	684	701
5	Oil and Grease	9	2.86	2.17	3.6	3.5	2.17	2.13	0.98	2.17	3.6	3.5	2.17	2.13
6	Detergents	7.8	3.5	4.3	3.7	4.6	3.7	4.5	4.9	5.01	4.8	4.9	4.7	4.1

NOTE: All the units of parameters are in mg/l, except pH

CONCLUSION

It was reasoned that the water test gathered from the vehicle service station in P.M. Palem. Treated water can be reused for first period of wash of next vehicle wash. In this examination Oil, grease and Detergents were taken as the essential parameters in the car washing. Utilization of chemical and physical techniques for treatment utilizing sugarcane bagasse and wood chips for various thickness of channel bed was investigated. From the examination it is presumed that. Employments of bio adsorbents (sugarcane bagasse and wood chips) are locally accessible and it has low consumption. High measurement of alum concentration (225mg/l) gives great outcomes for evacuation of oil, grease and detergents. By the instrument of adsorption the level of expelling dissolved solids will be higher. We inferred that wood chips were more viable than the sugarcane bagasse by our investigation.

Annexure-1



cting of waste water

Photo 2: Sample collection Bottle



Photo 3: Sugarcane Bagasse



Photo 4: Woodchips



Photo 5: Model of materials



Photo 6: Sample Bottles

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