EXPERIMENTAL INVESTIGATION ON VARIOUS WASTE WATER TREATEMENT WITH PRODUCTION OF FERTILIZER

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***Abstract*: Drinking water is a vital resource for all human beings and the access to safe and clean drinking water is a major concern throughout the world. The water resources all around the world contaminated by industrial waste disposal so it need of water treatment process. Treatment of water is so important that we can avoid many possible water borne diseases like cholera, typhoid jaundice and so on.It is true that water borne infections are responsible for more than 80% of the diseases in all over the world. Whenever there is contamination of drinking water sources and water logging after rain there is in an outbreak infection. Hence there is a need for inexpensive and effective methods to purify drinking water. Waste water treatment is gaining much importance in recent years with the intension of reusing it. This study investigates about the various waste waters such as Sago industries, waste water, Die waste water, Domestic waste water. The characteristics of the various waste waters are analysed and compared based on water quality parameters such as Turbidity, Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Total Suspended Solids (TSS), Nitrates, Phosphates, and Total Nitrogen (TN), Calcium (Ca). The water quality parameters permissible limits are compared with IS10500:2012, ISI10500:1991, WHO standards. The waste water are analysed and find out in which contend is higher for fertilizer production. That waste water sludge is used for fertilizer production. Finally the sludge is converted into natural fertilizer for growth of the plants.Results are tabulated and compared with Indian Standards.**

***Keywords*: Treatment, BOD, Total suspended solids, Nitrates, Phosphates, TotalNitrogen, calcium**

1 INTRODUCTION

Growing population, increased economic activity and in- dustrialization has not only created an increased demand for fresh water but also resulted in severe misuse of this natural resource. Water resources all over the world are threatened not only by over exploitation and poor management but also by ecological degradation. Indiscriminate dumping of untreated wastewater and chemical wastes directly into rivers, lakes and drains have made these water bodies unable to cope up with the pollutant load. The steady increase in the amount of water used and wastewater pro- duced by urban communities and industries throughout the world also poses potential health and environmental problems. The con- taminated water disrupts the aquatic life and reduces their repro- ductive capability.

Water covers 70.9% of the earth's surface and is vital for all known forms of life.On earth 96.5%of the planets water is found mostly in oceans 1.7% in ground water 1.7% in glaciers and the ice caps of Antarctica and Greenland; a small fraction in other large water bodies and 0.001% in the air was vapor, clouds (formed of solid and liquid water particles suspended in air),and precipitation. Only 2.5%of the earth's water is fresh water and 98.8% of that water is in ice and ground water. Less than 0.3% of all freshwater is in rivers, lakes and the atmosphere, and an even smaller amount of the earth's freshwater (0.003%) is contained within biological bodies and manufactured products.

Dairy industrial generate large quantities of wastewater which originates from various operations during the production of milk and milk products. The main wastes from these industries are chemically modified liquid wastes. The dairy wastewater may contain protein, salts, fatty substance, lactose and various kinds of cleaning chemical. The presence of detergents and their addi- tives in dairy wastewater hardly influence the total COD in con- trast to milk, cream or whey, the high COD of which are likely to have a dominating effect. Thought the dairy wastewater is biode- gradable, it is strong in nature.

Sago waste water is naturally contains starch. So the sago waste water sludge is used to conversion of fertilizer. Now a days sago industries plays a important role in production of much waste waters. In this study investigates about the waste water is after treating used for agriculture purpose and the sludge is used for fertilizer.

Domestic waste waters plays a vital role in production of waste waters. It contains chemicals, detergents and etc. And also the waste water contains some useful nutrients like calcium, phosphate and etc. So the waste water requires treatment for re- moval of hardness. After treatment it is used for other purposes.

Dye waste water collected from the chemical industries. It contains many toxic contaminates. So it requires treatment. After treatment it may be used for the any other purposes. The sludge of the die waste water contains some useful nutrients so it may be used for fertilizer conversion.

2. EFFECTS OF CONTAMINATED WATER

Water-borne diseases are infectious diseases spread primarily through contaminated water. Through these diseases are spread either directly or through flies or filth, water is the chief medium for spread of these diseases and hence they are termed as water- borne diseases.

Most intestinal diseases are infectious and are transmitted through faecal waste. Pathogens –which include virus, protozoa, and parasitic worms – are diseases producing agents found in the feaces of infected persons. These diseases are more prevalent in areas with poor sanitary conditions. These pathogens travel through water sources and interfuses directly through persons handling food and water. Since these diseases are highly infec- tious, extreme care and hygiene should be maintained by people looking after an infected patient.

3. LITRATURE REVIEW

Arya Krishnan et.al (2013) As many research works are going on in the field of wastewater treatment, a newly developed wastewater treatment by algae is gaining much importance. The algae selected for the study was Oedogonium and Chara sp. Various parameters like Biological oxygen demand (BOD), Chemical oxygen demand (COD), Ammonia Nitrogen and Phosphate were observed after the treatment. Percentage reduction rate of 59.61(BOD), 53.97 (COD) were observed. This is an environmentally safe alternative for treating wastewater.

4. METHODOLOGY

The samples were collected from in and around Salem. The various waste water such as Domestic, Dye, Diary, Sago waste waters collected from the following locations,

- Domestic waste (Nangavalli home)
- Dye waste (Jalagandapuram, VBT Factory)
- Diary waste (Salem Aavin)
- Sago waste(Sri venkateshwara sago indus- tries,Salem)

This is to determine the variation in water quality parameter. The waste water samples were collected by method of sampling techniques.
The samples were collected in the period of January 2018. In each location there should be 10 samples. The waste water samples containers should be thoroughly washed and completely filled with the sample. There should not be any gap above samples in the container. The interaction with gas phase and agitation transport of the samples is hence avoided.
A one litre sample is normally sufficient for most physical and chemical analysis. However, it depends up- on the type of analysis, method used etc. So one litre sample were collected which is sufficient for the tests conducted for the project.
The treatments of waste water samples are using coagulation process. Because other techniques are does not produce the sledges. In our project the sludge are important because they are converted into fertilizers.

Organic fertilizers are fertilizers derived from animal matter, animal excreta (manure), human excreta, and vegetable matter (e.g. compost and crop residues).Naturally occurring organic fertilizers include animal wastes from meat processing, peat, manure, slur- ry, and guano. In contrast, the majority of fertilizers used in commercial farming are extracted from minerals (e.g., phosphate rock) or produced industrially (e.g., ammonia). Organic agriculture, a system of farming, allows for certain fertilizers and amendments and disallows others.

5. EXPERIMENTAL RESULTS

DOMESTIC WASTE WATER SAMPLE CHARACTERISTICS

In the Domestic waste water contains the many chemical and detergents. The Total Dissolved Solids are exceeding limit of 500 mg/l in this area. The results obtained are mentioned in Table 4.1.

CHARACTERISTISCS	DOMESTIC WASTE WATER SAMPLE	UNITS
PH	8.8	
Turbidity	35.6	NTU
Colour	Light ash colour	
Temperature	25°C	°C
Ammonium nitrogen	116.2	mg/l
Calcium	86.16	mg/l
Total Dissolved solids	5800	mg/l
Total suspended solids	10600	mg/l
BOD	281	mg/l

Table 4.1 Characteristics of Domestic waste water sample.

DIARY WASTE WATER SAMPLE CHARACTERISTICS

Due to the diary waste water sample contains Hardness, Total Dissolved Solids; Sulphates are more than the standard levels. The characteristics of diary waste water sample given below the Table 4.2.

CHARACTERISTISCS	DIARY WASTE WATER VALUES	UNITS
pH	7.9	
Turbidity	31.9	NTU
Colour	Milk White color	
Temperature	26	°C
Ammonium nitrogen	47.04	mg/l
Calcium	116.94	mg/l
Total Dissolved solids	5800	mg/l
Total suspended solids	18200	mg/l
BOD	490	mg/l

Table 4.2 Characteristics of dairy waste water sample

DYE WASTE WATER SAMPLE CHARACTERISTICS

The characteristics of the die waste water sample are given in the Table 4.3 such as PH, Turbidity etc., The characteristics of the water sample are before coagulation process.

CHARACTERISTISCS	DYE WASTE WATER VALUES	UNITS
PH	4.2	
Turbidity	17.2	NTU
Colour	Pink colour	
Temperature	25.4	°C
Ammonium nitrogen	98	mg/l
Calcium	98.19	mg/l
Total Dissolved solids	5600	mg/l
Total suspended solids	6400	mg/l
BOD	324	mg/l

SAGO WASTE WATER SAMPLE CHARACTERISTICS

Table 4.4 shows that sago waste water characteristics such as PH, Turbidity, Colour and etc are to be determined and the waste is then allowed to the treatment process.

CHARACTERISTISCS	SAGO WASTE WATER VAL-UES	UNITS
PH	8.18	
Turbidity	28.2	NTU
Colour	Light white colour	
Temperature	26.5	°C
Ammonium nitrogen	126	mg/l
Calcium	94.18	mg/l
Total Dissolved solids	3600	mg/l
Total suspended solids	11800	mg/l
BOD	396	mg/l

Table 4.4 Characteristics of Sago wastewater sample

COAGULATION PROCESS RESULT:

After the coagulation process the turbidity of the waste water are treated. And the sludge is collected for the further process. The treated waste water is now used for the agriculture purpose. The turbidity level of the coagulated water is given below in table 4.5

S.NO	SAMPLE TAKEN (ml)	DOSAGE OF CO-AGULAT (g)	DOMESTIC WASTE WATER RESIDUE (NTU)	DIARY WASTE WATER RESIDUE (NTU)	DYE WASTE WATER RESIDUE (NTU)	SAGO WASTE WATER RESIDUE (NTU)
1	200	0	35.6	31.9	17.2	28.2
2	200	1	30.3	28.7	16.5	27.2
3	200	2	28.1	26.3	14.5	25.4
4	200	3	25.8	22.4	**14.4**	25.2
5	200	4	20.4	**18.3**	20.4	**23.2**
6	200	5	**17.5**	20.8	17.5	26.2
7	200	6	20.5	19.5	20.5	20.5

Table 4.5 Characteristics of treated wastewater sample

CHARACTERISTICS OF THE COAGULATED WATER:

S.NO	WASTE WATER SAMPLE	PH	TURBIDITY
1	Domestic waste water sample	7.4	17.3
2	Diary waste water sample	7.2	18.3
3	Sago waste water sample	6.7	23.2
4	Dye waste water sample	7.9	14.4

Table 4.6 Waste water characteristics after treatment

6. GRAPICAL REPRESENTAION OF THE CHATERICTICS OF WASTE WATER:

The charts are represents the characteristics of the waste water before and after the coagulation process. The limits of the waste water are not in the permissible limit. After treatment process it will be reduced certain level.

BEFORE COAGULATION

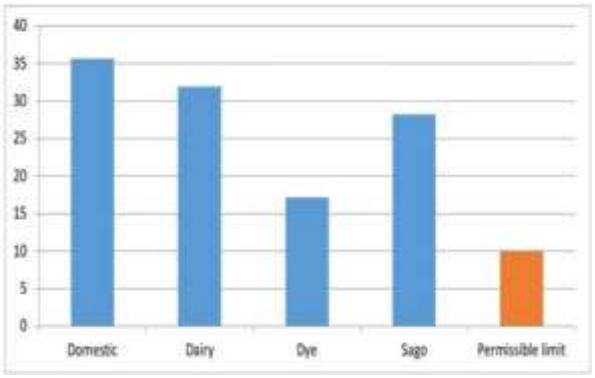

Fig.1 **TURBIDITY VALUES**

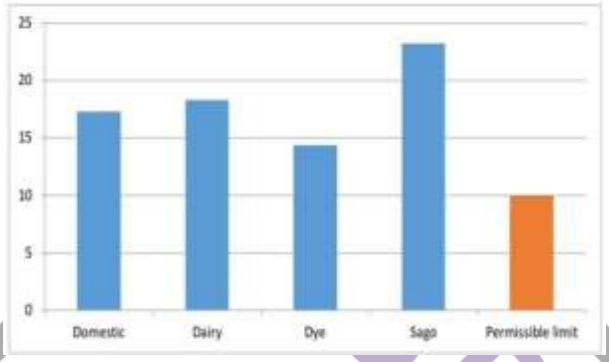

Fig 2. **PH VALUES AFTER COAGULATION**

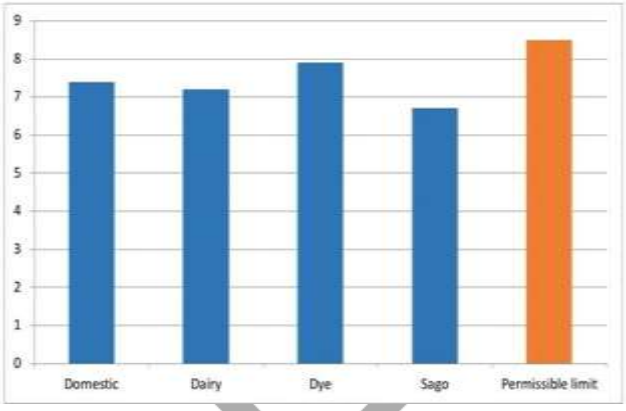

Fig. 3 **TURBIDITY VALUES**

PH (Presence of Hydrogen concentration):

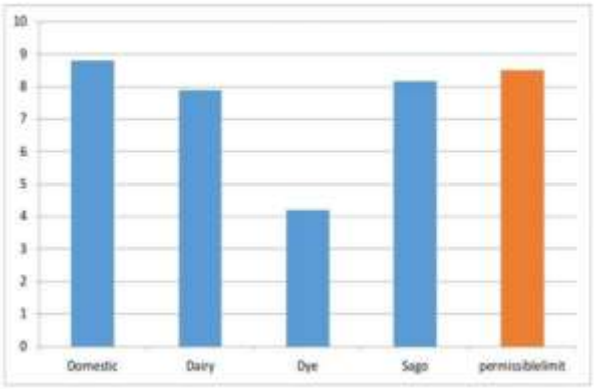

Fig.4 **PH VALUES**

CONCLUSION

The waste water samples characteristics are completely analysed. The water samples are then allowed to the coagulation process. After coagulation process the turbidity of the waste water are reduced certain level. It may be suitable for agriculture. The total dissolved solids are exceeding the standard values as per the Indian norms of Manual of specification for drinking water quality standards in all the locations. Presence of dissolved solids in the waste water increases the sludge. The sludges are used for fertilizer production. The treated or coagulated waste water is suitable for the agriculture purpose. After coagulation process the turbidity of the waste water sample is reduced in certain level. So it may be used for the any other purposed except drinking. The waste water sludges are collected and some amount of natural organic fertilizer is added into the sludges. Then the fertilizer is used for the growth of the plant. The domestic, die, dairy and sago waste water fertilizers are compared in growth of the plant. Compared to the other fertilizers the dairy waste water fertilizer is increasing growth of the plant. So it is most suitable for growth of the plant.

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