

DOMESTIC WASTEWATER MANAGEMENT IN RURAL AREAS THROUGH MODIFIED STABILIZATION TANK

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ABSTRACT

Due to the increase in population and industrialization, the natural stream is getting polluted. Many a times the wastewater generated from the houses, commercial sectors, industrial sectors etc. is directly disposed in the rivers and lakes without any treatment. This directly impact on increase in water pollution which directly affects the aquatic life and the environment. In urban areas there are many methods for treatment of domestic wastewater. Many wastewater treatment plants are present in urban areas. But in rural areas, wastewater from houses is directly disposed into the rivers. Due to lack of funds and technology there are less treatment plants in rural areas. So providing a reliable and affordable treatment plant in rural areas and periurban areas is a challenging part.

In our project we are demonstrating an onsite wastewater treatment plant, which will be reliable and affordable in rural and periurban areas. In this the domestic wastewater is treated by using modified stabilization tank. The modified stabilization tank is totally non-mechanized method for treating the wastewater. BOD, COD, pH, TDS, TSS analysis is conducted.

Keywords: *BOD, COD, Non-Mechanized, Onsite Wastewater Treatment Plant, Ph, Rural Areas, TS.*

I. INTRODUCTION

India is a developing country, day by day the population is increasing. As there is rapid increase in population and industrialization there is a heavy demand of fresh water and the other aspect of this industrialization & urbanization is natural sources are getting polluted. There is need to find other ways to conserve the water. Since the wastewater collection system is not well defined in periurban and rural areas, people dispose their wastewater wherever possible, mostly in river banks or in open place. This has led to environmental pollution, deteriorating the health of mankind and other living things due to lack of knowledge of disposing the wastewater, people dispose the wastewater in a way they want, without realizing that it is affecting their own health and polluting the environment.

Domestic wastewater is the water that generated from household activities such as water from kitchen basin, washing of cloths, toilets, bathrooms, vegetable washing and laundry.

This paper demonstrates the feasibility of modified stabilization tank and to conduct various tests on treated sample. The modified stabilization tank is totally non-mechanized method for treating the wastewater. Total five tanks are provided. Each tank has a detention time of 24 hrs. The tanks are alternatively connected at the topmost side and at the bottom most side. As result of this alternative flow, the heavy particles get settled down. The treated water can be discharged in rivers, lakes which will reduce load of pollution. This treated water can be use for fire fighting, gardening purpose, street washing etc.

II. OBJECTIVES

- To study different types of non-mechanized system.
- Study of modified stabilization tank and it's working.
- To study the characteristics of domestic wastewater.
- To understand the benefits of modified stabilization tank.
- The treated water will help to reduce the water pollution load.

III. EXPERIMENTAL SETUP

3.1 MATERIAL DETAILS

- Five circular tank
- One inlet tank
- One outlet tank
- Interconnecting PVC pipes
- One valve
- PVC vent pipes



Fig. 1 Circular Tank



Fig. 2 Interconnecting PVC Pipes

3.2 SAMPLING SITE

Sample for project has collected from Nasardi River, Near Nagaji Circle, Nashik, (MS) India

3.3 PROCEDURE

In the modified stabilization tank the whole arrangement consist of one outlet tank, one inlet tank and five stabilization tank. All the five tanks are connected by the interconnecting pipe. The tanks are placed with equal distance from each other. Two vent pipes are provided for each tank to provide fresh oxygen in the tank and to remove all the foul gases. All the five tanks are provided with the alternative up and down flow.



Fig. 3 Actual working model

The process of decomposition of organic waste is done by aerobic bacteria. The waste water passes from the inlet tank to the first tank and further on. A long detention time of 24 hours is given for all five tanks. Due to long detention time heavy particles gets settle down in first two tanks. The dissolved organic matters with the help of oxygen are degraded by the bacteria which are already present in wastewater. Thus by giving alternative up and down flow, with long detention time the wastewater is treated to a desirable limit. This treated water sample is taken and different analysis are done like COD, BOD, pH and Total Solids.

| Sr. no | Parameter | Permissible limit |
|--------|-----------|-------------------|
| 1 | pH | 6.5-8.5 |
| 2 | BOD | 30 mg/lit |
| 3 | COD | 250 mg/lit |

Table 1 Standard Permissible Limit

IV. RESULTS

3.4 BIOCHEMICAL OXYGEN DEMAND

Untreated sewage has BOD value which varies from 140 mg/lit to 170 mg/lit. After sample is passed through the stabilization tank BOD was reduced upto 12 mg/lit to 18 mg/lit.

3.5 CHEMICAL OXYGEN DEMAND

Untreated sewage has COD value which varies from 300 mg/lit to 340 mg/lit. After sample is passed through the stabilization tank COD was reduced upto 110 mg/lit to 140 mg/lit.

3.6 pH VALUE

Untreated sewage has pH value which varies from 6.5 to 7.5. After sample is passed through the stabilization tank pH was found upto 7.36.

3.7 TOTAL SOLIDS

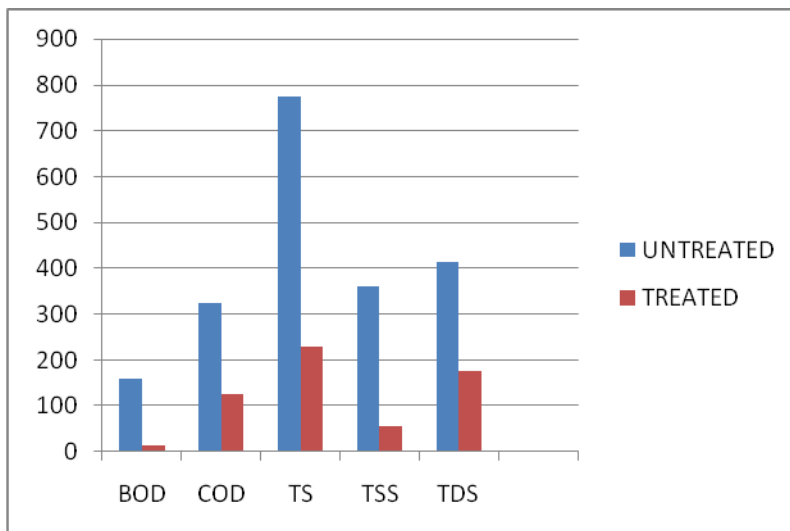
Untreated sewage contains total solids upto 600 mg/lit to 1100 mg/lit. After sample is passed through the stabilization tank total solids was reduced upto 320 mg/lit to 400 mg/lit.

3.8 TOTAL SUSPENDED SOLIDS

Untreated sewage contains total suspended solids upto 250 mg/lit to 380 mg/lit. After sample is passed through the stabilization tank total suspended solids were reduced upto 35 mg/lit to 70 mg/lit.

3.9 TOTAL DISSOLVED SOLIDS

Untreated sewage contains total dissolved solids upto 300 mg/lit to 450 mg/lit. After sample is passed through the stabilization tank total dissolved solids were reduced upto 145 mg/lit to 240 mg/lit.



| TEST | UNTREA- TED | TREAT- ED |
|------|----------------|--------------|
| BOD | 160 | 14 |
| COD | 325 | 125 |
| TS | 775 | 230 |
| TSS | 360 | 55 |
| TDS | 415 | 175 |

Fig. 4 Results

V. CONCLUSIONS

The modified stabilization tank can be used in the areas:

- Where there is lack of technology and funds,
- Or rural and periurban areas,
- It is totally non-mechanized system,
- It does not require power for its operation.

The treated water will help to:

- Reduce water pollution load
- And can be use for gardening, car and street washing, as it is odour less.

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