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A Review on Waste Water Management Techniques

[1]Dr. K. Chandramouli, [2]J. Sree Naga Chaitanya, [3]N.V. Mahesh

[1]*Professor & HOD, Department of Civil Engineering, NRI Institute of Technology, Visadala (V), Medikonduru (M), Guntur, Andhra Pradesh, INDIA:*
[2]Assistant Professor, Department of Civil Engineering, NRI Institute of Technology, Visadala (V), Medikonduru (M), Guntur, Andhra Pradesh, INDIA:
[2]*B. Tech Scholar Department of Civil Engineering, NRI Institute of Technology, Visadala (V), Medikonduru (M), Guntur, Andhra Pradesh, INDIA*

A B S T R A C T

Wastewater is the water that comes from domestic sources, such as homes, businesses, restaurants, and farms. 80% or more of all wastewater is dumped into waterways around the world, posing risks to human health, the ecosystem, and the climate. Wastewater contains both dissolved and suspended organic materials that are "putrescible" or degradable. Before releasing the effluent, it must be treated. It is crucial to apply diverse treatment techniques to lessen the impact that wastewater has and to repurpose the cleaned water for multiple uses. The focus of the current study is on several contemporary wastewater treatment technologies and how effectively they compare to more conventional treatment approaches. It also identifies potential uses for treated water.

Keywords:Waste water, Ecosystem, Domestic sources, and Modern waste water treatment technologies.

1. INTRODUCTION

Water makes up 65% of our bodies and covers 71% of the earth's surface. We use clean water for a variety of activities including cooking, cleaning, gardening, etc. before it becomes wastewater. When water is contaminated, it loses its value economically and aesthetically, endangers our health, and threatens the survival of marine life that depends on it. According to estimates, between 70 and 80 percent of the entire amount of water delivered is wasted. The generated effluent is discharged into a natural water stream. The only way to avoid these problems and harm to people's health from wastewater disposal into surface water sources is to treat the wastewater according to the regulations. Numerous pathogenic bacteria, germs, suspended particles, nutrients, minerals, poisonous metals, etc. are present in the wastewater. For several years, reducing the number of suspended solids, oxygen-demanding substances, dangerous microorganisms, and dissolved inorganic compounds was the main objective of wastewater treatment.

2. METHODOLOGY

Even though water covers more than 75% of the world, there is a shortage of pure water. In some areas of India, people struggle to get access to clean water for daily necessities. Therefore, it is crucial that we use what we have wisely. The usual approach to wastewater treatment aids in decreasing the negative effects it has on the environment and human health, but the quality of the treated water falls short of that of clean water. Emerging pollutants are novel contaminants in wastewater that have been produced by diverse human activities.

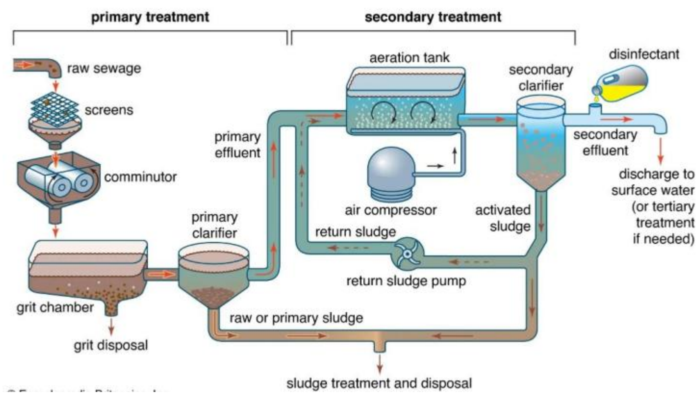

Fig 1 Sludge Treatment and Disposal

3.CONVENTIONAL METHODS FOR WASTEWATER TREATMENT

Solids, organic matter, and nutrients are removed from wastewater using physical, chemical, and biological techniques in traditional wastewater treatment. The different are stages includes: Preliminary, Primary, Secondary, and tertiary treatments.

1.1. Preliminary treatment:

Removal of waste water constituents such as rages, sticks, floatable grit, and grease that may cause maintenance or operational problem with the treatment operations, processes and ancillary systems.

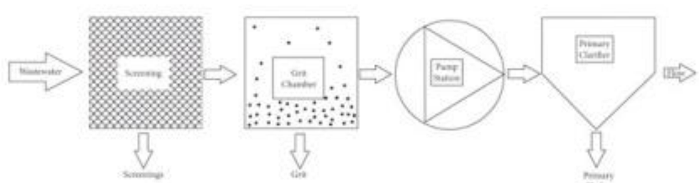

Fig 2Preliminary or Primary treatment

- **Screening:** For removal of floating matter.
- **Grit chamber:** For removal of sand and grits.
- **Comminutors:** For grinding large size suspended soil.
- **Floatation units:** For removal of oil and grease.
- Skimming tanks
- Flow measuring units such as partial flume.
- Pumps
- Pre-aeration units.

1.2. Primary treatment:

This treatment consists of following:

- **Sedimentation:**

It is a primary treatment process. It is a physical water treatment process used to settle out suspended soils in water under the influence of gravity. Sedimentation tanks or clarifiers may be round or rectangular basins, typically 3 to 5 m deep, with hydraulic retention time between 2 and 3 hours. Settled solids (primary sludge) are normally removed from the bottom of tanks by sludge rakes that scrape the sludge to a central well from which it is pumped to sludge processing units. Scum is swept across the tank surface by water jets or mechanical means from which it is also pumped to sludge processing units.

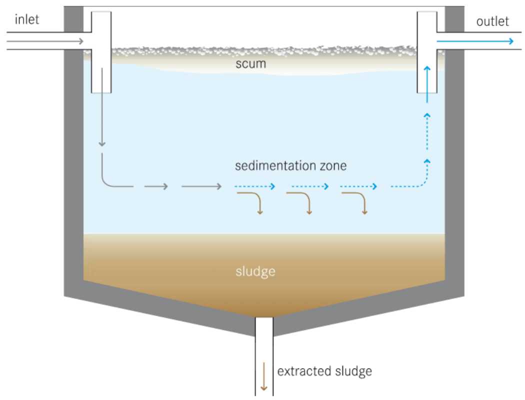

Fig 3sedimentation

1.3. Secondary treatment:

This treatment consists of following methods. They are:

➢ **Stabilization of ponds and lagoons:**

These are open flow through basins specially designed and constructed to treat sewage and biodegradable industrial wastes. They provide long detention periods extending from a few to several days. Pond systems, in which oxygen is provided through mechanical aeration rather than algal photosynthesis are called aerated lagoons. Lightly loaded ponds used as tertiary step in waste treatment for polishing of secondary effluents and removal of bacteria are called maturation ponds. The stabilization ponds may be aerobic, anaerobic, and facultative ponds.

a. Aerobic pond:

These are shallow ponds with depth less than 0.5m. To maximize the penetration of light throughout the liquid depth. Such ponds develop intense algal growth.

b. An-aerobic Pond:

These are used as pretreatment of high strength wastes. Such ponds are constructed with a depth of 2.5-5m as light penetration is un-important.

c. Facultative pond:

It functions aerobically at the surface while anaerobic conditions prevail at the bottom. They are often about 1 to 2 m in depth. The aerobic layer acts as a good check against odour evolution from the pond.

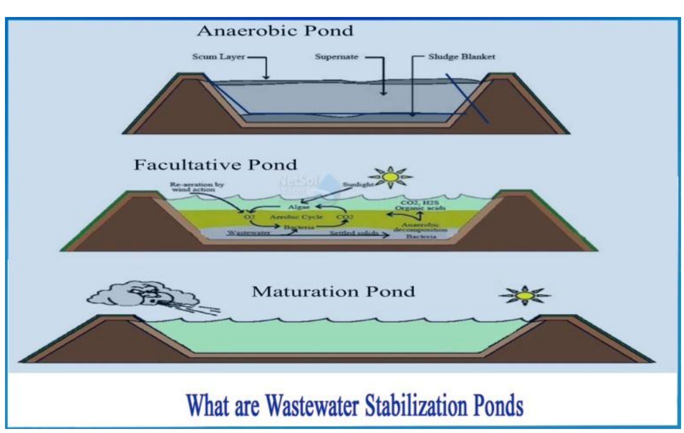

Fig 4 Wastewater Stabilization Ponds

- **Activated sludge process:**

In the dynamic slime treatment framework, an optional clarifier is placed before an air circulation tank. Filled with settled sewage mixed with fresh slop recycled from the optional clarifier, the air circulation tank is full.The mixture is then sucked through permeable diffusers at the tank's edge with packed air. The masked air gives out oxygen and mixes quickly as it floats to the surface. It is also possible to add air using the churning motion of mechanical blenders resembling propellers that are located at the surface of the tank. Figure 5 shows a straightforward representation of activated sludge.

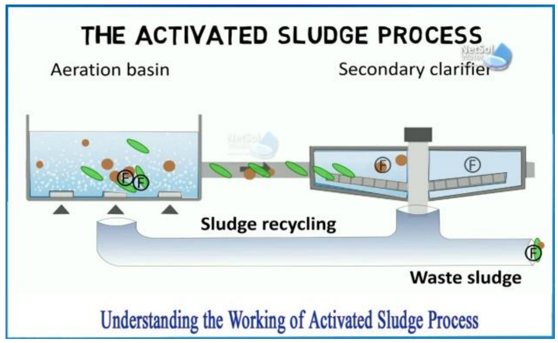

Fig 5 Activated Sludge Process

- **Trickling filter:**

Simply said, a streaming channel is nothing more than a tank with several stones piled on top of it.Settle sewage is continuously poured from absurdly high peaks, trickling down to the base, where it is stored for further treatment. As the wastewater flows down the stones, microbes assemble and reproduce. The constant flow of sewage over these developments allows microorganisms to hold broken-down organics, reducing the biochemical oxygen interest of the sewage (BOD). In order to provide the necessary amount of oxygen for the metabolic cycles, air is circling vertically via the crevices between the stones.

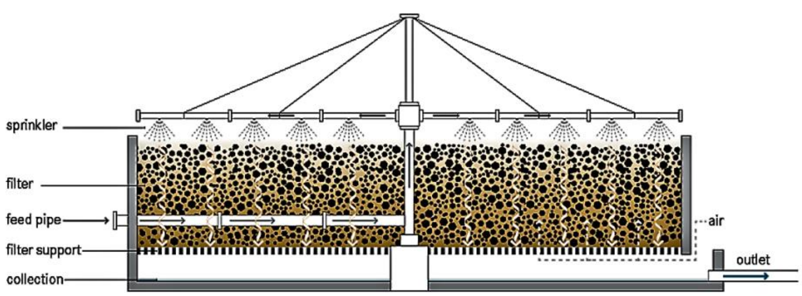

Fig 6 Trickling Filter

- **Oxidation pond:**

It is a modified form of "extended aeration" of activated sludge process. The ditch consists of a long continuous channel oval in shape with two surface rotors placed across the channel

Fig 7 Oxidation pond

1.4. Tertiary treatment:

If any solids that were not removed by primary and secondary wastewater treatment to group so they can be removed by filters. They are:

- **Disinfection:**

Chlorine addition to the final effluent before to discharge is a crucial step in the treatment of wastewater. Through this procedure, chlorine is injected into a serpentine effluent detention chamber's headworks. Chlorination in wastewater treatment destroys bacteria and viruses and gets rid of parasites that can lead to highly dangerous illnesses like Giardia and Cryptosporidium. In conclusion, this procedure makes water safe for recycling or reusing by disinfecting it.

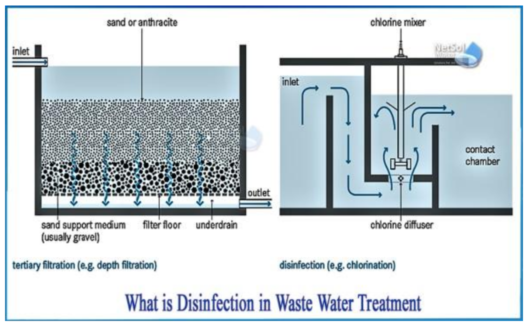

Fig 8 Disinefection

- **Dichlorination:**

The final stage of the tertiary wastewater treatment process involves removing the chlorine that was used to disinfect the water. This step is very important because chlorine is harmful to aquatic life. Chlorine also reduces biological water quality when it is present in high concentrations. To remove the chlorine, a compound called sodium bisulphite is added to the water. Chlorine ions in the water react with this chemical and are removed. Once the chlorine concentration has been reduced to a safe level, the treated water is now considered clean enough to be safely released into the environment.

Fig 9 **Dichlorination**

4. CONCLUSION

Although the production of waste water cannot be prevented, it can be effectively treated to reduce its negative effects on the environment. Due to industrialization, new pollutants with complicated chemical makeups that are dangerous were added to products like cosmetics, medications, and insecticides. Even though water covers 75% of the earth's surface, there is only 1% of it available for human consumption. Putting this water in danger will put us at even greater risk. In this case, treating the wastewater is necessary to meet drinking water regulations. There are numerous new treatment techniques for ultra-purifying wastewater.

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