

Waste Water Treatment Through the Aerobic Process

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Abstract: Water is a natural resource available on earth and is like an elixir for humans, animals, plants, microorganism and aquatic life. A lot of wastes are produced from the domestic and industrial medium, if it gets disposed into the water resources it affects the human and aquatic life adversely. Waste water have many wastes in it in form of organic materials, heavy materials and inorganic materials. Waste water is treated by employing various technique so that its disposal is safe for environment. Waste water is treated in many stages, first stage is comprised of removal of bulky organic material like plants branches, leaves, cloths, plastic materials etc. by screening method. In screening methods certain shapes of bars are arranged in parallel way to a specified distance in an order so that it can stops these bulky materials. The shape, size and distance between the objects depends upon the amount of waste water treatment capacity and source of waste generation. Grits suspended into the water also removed by employing suitable grit removal technique. Second method known as secondary treatment method the waste water is brought into aeration tank and by supplying enough amount of oxygen and maintaining suitable temperature the biodegradation of the organic material is achieved. Oxygen supply is ascertained by using air compressor and centrifugal pump is also used to achieve desirable results. Third stage is known as tertiary stage, in this stage harmful bacteria presents into the water removed by using proper technique like chlorination of water and by UV treatment. Waste water treatment studies shows that by suitable temperature and enough supply of oxygen organic wastes can be biodegraded properly. Use of air compressor maintains the supply of oxygen to the micro-organism present into the water resource for biodegradation. Proper selection of instrument, land and technology improved the water treatment result. This study concludes that waste water treatment protects the environment, aquatic life, ground water and protects the human from many diseases.

Keywords: Screening, grit removal, Chlorination, Biodegradation.

I. INTRODUCTION

Water is very important natural resource available on earth. It is consumed by humans, animals, plants, aquatic lives and micro-organism for its growth and survival. Many kind of wastes produced due to various activities of human being like domestic and industrial wastes. Some wastes are occurred naturally like leaves, broken plants etc. Domestic wastes and broken plants are collected by municipal authorities and dumped to the proper land for further treatment. But some wastes are dumped into sewer line, some bulky materials like plants, cloths and plastic materials come to the sewer line due to strong air. Likewise industrial waste water also consist of organic and inorganic wastes so before dumping these water to the natural resource of water its proper treatment is very important so that waste water don't have any harmful effect on environment. These waste water comes to the sewer line through the various sources of waste generation and collects at a main point where its treatment is done and desired results are achieved.

Waste water is treated by aerobic process mainly in three stages-

1. Primary Treatment-

In this method the bulky materials like plants branches, cloths, plastic parts and larger stones are stopped by employing suitable screening method-

Screening-Screening expels all materials that can be effortlessly gathered from the sewage before they damage or plug up the siphons and sewage lines of essential treatment. Things normally expelled during treatment incorporate waste, tree appendages, leaves, branches, and different colossal articles. It is of three types-

Coarse Screen- Coarse screens are the type of bars of measurement 10-25mm having opening of 6 mm (0.25) or bigger. Coarse screens contains equal bars, poles or wires which have openings by and large of roundabout or rectangular shapes.

Medium Screen- The Medium screen is the littlest sort of screening in wastewater treatment. These screens have low-speed opening screens. These sifting textures have openings of 6 to 40mm. They have point of tendency between 30 to 60.

Fine Screen- The Fine Screens in water treatment plants uses screens that have a wire work of size 10mm. Fine Screens are for the most part maintained a strategic distance from in the treatment plants as it gets stopping up without any problem.

Grit Removal- Grit includes sand, gravel, cinders, and other heavy materials, etc. It can also consists organic matter such as eggshell, bone chip, seeds, and coffee grounds. Pretreatment is used to remove heavy materials that are collected easily so that clogging doesn't happen in sewage lines. Grit removal is used to remove heavy materials in aeration tanks, aerobic digesters, pipelines and channels.

2. Secondary Treatment-

Secondary treatment is a treatment process that removes dissolved organic material from wastewater. After getting partially treated wastewater from the settling tank flows by gravity into aeration tank. The mixing of water to solids containing the use of oxygen to consume the organic matter in the wastewater as a food supply. In Biological oxidation processes, temperature lies between 0C to 40C. Then liquid mixture is flown to the final clarifier. The rate of biological reactions increases with the rate of increase in temperature. To maintain the proper supply of oxygen to the aeration tank air compressor is used externally so that micro- organism present into the water resource get enough supply of oxygen for the proper biodegradation of organic materials. Return sludge pump can be incorporated to re-treatment of waste water coming out of aeration tank to again send it into the aeration tank to ensure proper treatment of waste water.

3. Tertiary Treatment-

In tertiary treatment of waste water the harmful bacteria still present into the water is removed by employing suitable method and technique. Chlorination of water is done to remove the harmful bacteria present into the waste water. Also the Ultra- Violet (UV) radiation technique is used to remove the harmful bacteria from the waste water.

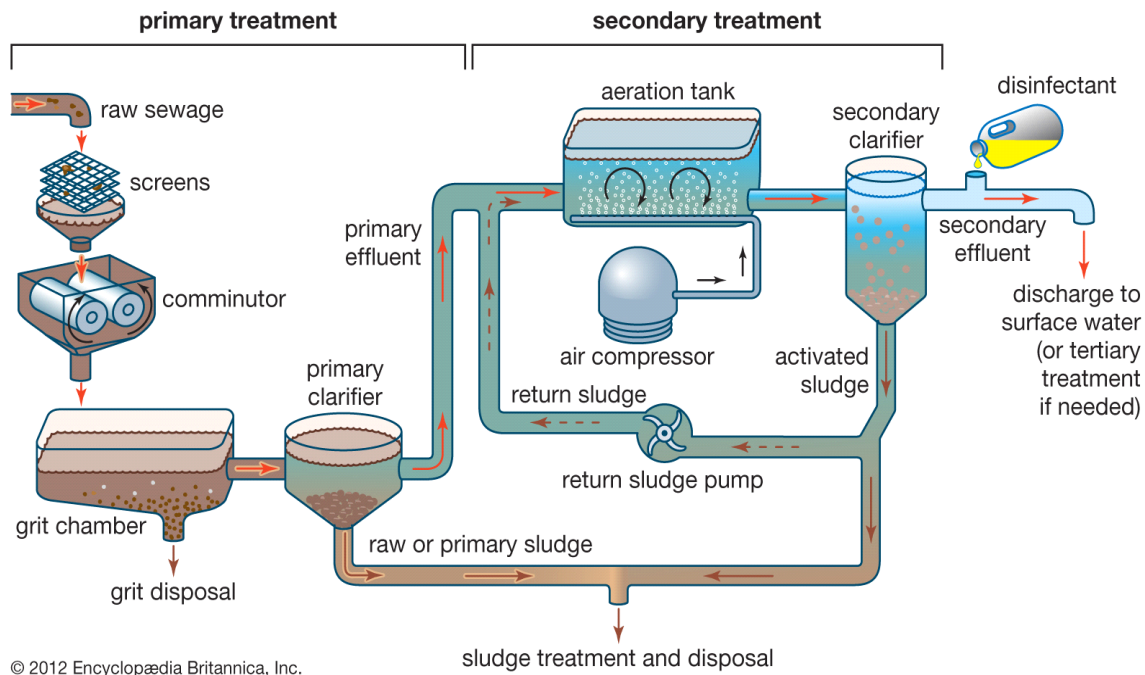


Fig 1 – Schematic of waste water treatment by aerobic process.

II. LITERATURE REVIEW

Keiji Hirano et. al. [1] -Photolithography contain toxic tetramethyl ammoniumhydroxide (TMAH) and in this manner it give off an impression of being an issue of how to treat a wastewater. By building up a TMAH wastewater treatment procedure that comprise of a blend of two novel rot forms: paralyzing TMAH to TMA and disintegration of TMA to N2, H2O, and CO2 by techniques for a particular oxidation impetus for nitrogenous mixes. The expense of the treatment for

utilizing this strategy is one-ninth of arranged wastewater as a modern waste about 2.3 occasions that of natural treatment. Contrasting and natural treatment strategy is appropriate to numerous conditions and its operational administration is likewise simpler. Plus, it includes just 1/6 of a natural treatment framework.

ZHU Lingfenget. al. [2] - Utilizing stockpiling of standard actuated ooze as a vaccinated ooze, stable granular slop was incited effectively in sequencing clump reactor, and applied to metropolitan sewage removal region. At room temperature, compound oxygen request and $\text{NH}_4\text{-N}$ expulsion is looked into. Results exhibited that concoction oxygen request and $\text{NH}_4\text{-N}$ normal evacuation came to 80% and 82% individually. At the point when convergence of natural granular ooze go lie between 2700 to 3600 mg/L, vigorous granular ooze settling is high and better, and compound oxygen request and $\text{NH}_4\text{-N}$ evacuation rate is higher than the ordinary initiated ooze.

HongxiaoGuoet. al [3]-Aerobic granular sludge innovation under the trade name Nereda has been used for municipal, as a modern wastewater treatment. Due to operational reactor procedures, two types of waste aerobic granular sludge can be obviously recognized as: 1) oxygen consuming granular selection choice release (AGS-SD) and 2) high-impact granular sludge blend (AGS-RTC).

ShrirangVrushali and Chatterjee Kaustav [4] - Water are the principle component which is unfavorably influenced by anthropogenic fluid squanders. The sewage from provinces just as the fluid squanders from businesses are the primary driver for water contamination the nation over. Sewage is a water conveying waste that must be expelled. It nearly contains more prominent than 99% of water that is described by pace of stream, states of being, synthetic profluent and bacterial life forms.

III. METHODOLOGY

Construction of sewers and its appurtenances, sewage siphoning stations and sewage treatment plant will be done utilizing automated development apparatuses and gear to accomplish greatest yield. Utilization of pre-assembled material is urged to improve nature of works, at the same time improving proficiency of development plan. Agreement reports for the task are surrounded with the end goal that, it would be mandatory for the imminent bidders/contractual workers to introduce a detail review and oral introduction on the accompanying parts of development.

- Methodology of Construction (Method Statement)
- Site Management
- Construction Schedule
- Environment & Traffic Management
- Cash Flow Projections
- Schedule of Deployment of Machinery & Equipment
- Schedule of Labor Deployment
- Deployment of Technical Staff with Qualification & Experience
- Quality Assurance Program
- Time & Cost Saving devices

Excavation -Trenches shall be excavated to the predefined profundity underneath the barrel of the funnel. The excavation of channels for pipelines will be done precisely utilizing proper supplies. The proposed unearthing at any one time will be restricted to such lengths, which doesn't make bother encompassing occupants and street traffic. All unearthing left unattended will be sufficiently ensured with endorsed fencing and blockades and with blazing lights where required.

Bedding -Granular bedding for pipes will be put by spreading and compacting granular sheet material over the total width of the funnel channel. Where funnels are jointed, ringer gaps of abundant measurements will be shaped in the bedding to guarantee that each channel is consistently bolstered all through the length of its barrel and to empower the joint to be made and investigated during testing.

Trenchless Technology -Trenchless innovation, as the name suggests, represents subsurface development works where less channels or no persistent channels are required to be burrowed. It is a quickly developing division of the development and structural designing industry. It very well may be characterized as "A group of strategies, materials, and gear fit for being utilized for the establishment of new or substitution or recovery of existing underground foundation with insignificant disturbance to surface traffic, business, and different exercises.

IV. RESULTS AND DISCUSSION

Customary observing and assessment of the undertaking exercises ought to be completed to pass judgment on its prosperity or any holes. Certain key parameters can be taken as the benchmark for observing and assessment of the undertaking dependent on the recognized advancement results. A portion of the pointers are recorded beneath-

- Increment in sewer get to (number of family units connected to the sewer arrange)
- Lessening in profluent release into the Ganga (water quality appraisal of the stream)
- Appropriate locales for businesses, building and so on.
- Availability of the administration to in reverse and more fragile segments of the general public
- Increase in public toilet
- Increment in the land rate (property gratefulness esteem)

Decanting Process - Decanting is the division of blends in the tank. Decanting is only a procedure, in which the procedure is primarily done by the assistance of gravity. In this a blend of solids and fluids which is being settled in the base and isolated by gravity. This procedure can be delayed without the utilization of outward powers. At the point when the blends gets isolated, the lighter medium is poured off deserting the heavier medium. In fact, a modest quantity of the lighter fluid is deserted.



Fig 2-Decanting Process

Chlorination- Chlorine is an in number oxidizing agents, so it helps in the oxidation of natural atoms with the goal that it gets devastated. Chlorine and hydrolysis to shape hydrochloric corrosive which are impartially charged thus they effectively neutralize the contrarily charged surface of pathogens. This procedure is done to break down the lipids that make the cell divider to respond with intra cellular proteins and enzymes making them nonfunctional. Microorganisms then not ready to duplicate and will kick the bucket soon.

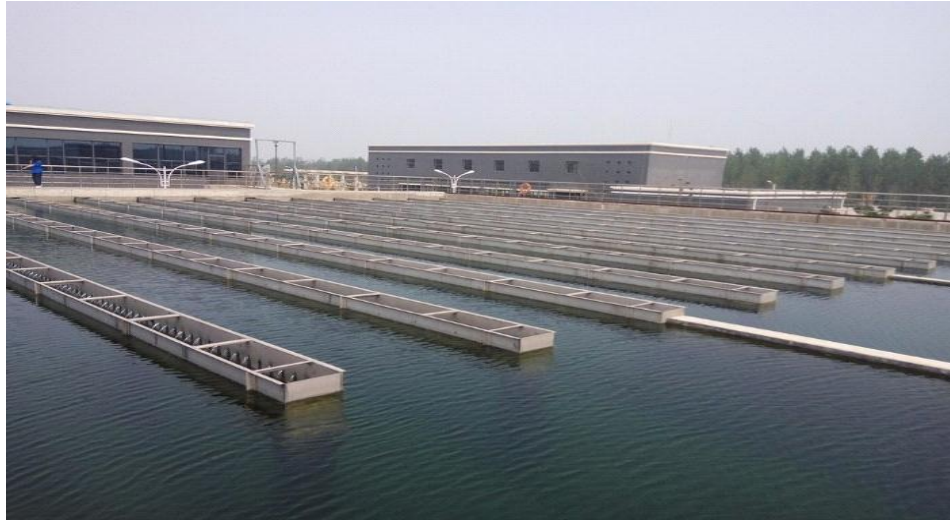


Fig 3 -Chlorination

V. CONCLUSION

This study concludes that waste water treatment protects the environment, aquatic life, ground water and protects the human from many diseases. Untreated waste water seriously damages the ground water and therefore it drinking of these water can harm the health of human by diseases cholera, malaria, dengue, diarrhea etc. Waste water also damages the microbial properties of the land. Waste water treated through the aerobic condition balances the aquatic life. Because the micro-organism present into the water requires oxygen for the biodegradation of organic wastes. External help of air compressor and return sludge centrifugal pump improves the quality of waste water significantly and also maintains the pH, DO, COD, BOD, Alkalinity, Total Hardness and other physical properties of the water. So the people and environment into the vicinity where the waste water are dumped are protected and enjoys healthier growth.

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