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REVIEWARTICLE

**BIOLOGICAL TREATMENT OF WASTEWATER- A STUDY  
REVIEW**

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**ABSTRACT**

Water contamination is one of the issues confronted by the mankind. There are different strategies accessible for waste water treatment. The customary and mechanical techniques for treatment of waste water are very costly and are subsequently uneconomical for businesses of lower turnover rate. Natural medicines, which use life forms to separate natural substances in wastewater, and are broadly utilized the world over. Not at all like other wastewater medicines, which use mechanical or synthetic procedures, natural medications incorporate the utilization of microbes, nematodes, or other little life forms. Natural treatment of wastewater is the auxiliary treatment which is utilized to treat water after the essential treatment.

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**INTRODUCTION**

Biological treatment utilizing oxygen consuming enacted ooze process has been by and by for well over a century. Expanding weight to meet more stringent release principles or not being permitted to release treated emanating has prompted execution of an assortment of cutting edge organic treatment forms as of late. There are a few procedures in natural treatment of wastewater. The greater part of natural medicines are set up on adding microbes to the water to process the natural matter in the water. In the long run, this will diminish the measure of organic oxygen request in the water. In the consequent phase of natural wastewater treatment, the microscopic organisms breakdown natural substances changing it into a perceptible arrangement that aggregates at the base of the tank or changes into slime. After the substance has solidified, it can be removed and water is more purged.

**LITERATURE REVIEW**

Microalgae can be utilized to treat both of civil and mechanical wastewater. Notwithstanding, microalgae can be developed in wastewater to expulsion all poisons and concoction dangerous substances from wastewater, for example, nitrogen, phosphorous, nitrite, silica, iron, magnesium and other unsafe chemicals. Microalgae have colossal ability to aggregate the overwhelming metals and substantial dangerous mixes to shape microalgae biomass. The different study directed to recognize the treatment of wastewater utilizing microalgae talked about underneath; The work directed by (Dalrymple et al, 2013) demonstrated that there are imperative advantages to be gotten from incorporating algal generation frameworks with supplement rich waste streams. The vitality coming about because of green growth will assume a noteworthy part in giving vitality security while vital administrations, for example, water treatment can be fundamentally accomplished by these

frameworks. It additionally demonstrates that before 14-day's over clump society was expelled 94% smelling salts, 89% TN and 81% TP with the assistance of green growth [5].

(Mahapatra et al, 2013) explore the treatment efficiencies of the Algae based sewage treatment plant situated in Mysore. The study indicated moderate treatment levels with 60% aggregate COD expulsion, 50 % of filterable COD evacuation, 82% of aggregate BOD expulsion, and 70% of filterable BOD expulsion. The nitrogen expulsion productivity was less. Be that as it may, a quick decrease in the suspended solids after a higher euglenoid development demonstrates particulate carbon evacuation by algal ingestion [13]. (Sekaran et al 2013), concentrated on Integrated Bacillus sp. immobilized cell reactor and Synechocystis sp. algal reactor for the treatment of tannery wastewater with CAACO reactor. The profluent after treatment through essential clarifier, chemo autotrophs immobilized cell reactor known as CAACO reactor and evacuated BOD<sub>5</sub>, COD, TOC, VFA and sulfide, individually, by 96 %, 87 %, 83 %, 71 %, and 100 %. The remaining organics in treated tannery wastewater was further treated in Synechocystis sp. immunized algal bunch reactor. The algal lake could release treated wastewater of attributes BOD<sub>5</sub>, 20± 7 mg/l; COD, 167±79 mg/l; and TOC, 78±16 mg/l fitting in with the releasing benchmarks recommended by contamination control organizations. The total rate evacuation of BOD<sub>5</sub>, COD, TOC, VFA, and sulfide in the present examination were 98 %, 95 %, 93 %, 86 %, and 100 %, separately [3]. Wang et al (2010) led a study to assess the development of green growth Chlorella sp. on wastewaters tested from four unique purposes of the treatment procedure stream of a neighborhood civil wastewater treatment plant and how well the algal development expelled nitrogen, Phosphorus, concoction oxygen request (COD), and metal particles from the wastewaters. The study demonstrated normal particular development rates in the exponential time

frame were 0.412, 0.429, 0.343, and 0.948 day<sup>-1</sup> and expulsion rates of NH<sub>4</sub>-N were 74-82 %, phosphorus 83-90% and 50-83.0 % COD were expelled for four distinct sorts of wastewater. It was additionally found that metal particles, particularly Al, Ca, Fe, Mg, and MN in centrate, were expelled proficiently. [10].

(Chen et al, 2003) explore Nutrient evacuation by the incorporated utilization of high rate algal lakes and macrophyte frameworks in China. The study indicated rate evacuations for COD were 54.5% in "winter" (8 days) and 44.5% in "summer" (4 days). The mean yearly evacuation of COD was just around half. Be that as it may, the rate expulsion of broke down COD contrasted with the aggregate COD in the influent was around 73%. For sure, the HRAP delivered a gushing with a low convergence of broke down COD (around 60 mg/l), however the aggregate COD might be high because of algal biomass. The mean expulsion exhibitions were around half for COD and phosphorus, 75% for TKN and 90% for NH<sub>4</sub>-N. This framework was particularly proficient in expelling smelling salts from wastewater [14]. Gupta (1985) contemplated on nitrogenous wastewater treatment

**Disadvantages of Biological Treatment of Wastewater**

High-affect assimilation requires air dissemination, which uses a ton of electrical imperativeness. Electrical imperativeness is frequently made by bursting of fossil fills, which produce nursery gasses. High-affect osmosis moreover achieves a considerable measure of bio-solids, or sludge, which require exchange. Wrong landing of the supplement rich slop into streams or lakes can achieve green development overabundance, or eutrophication, which murders fish and other maritime life. Essentialness use and excess sludge era can be reduced by treating wastewater first with anaerobic microorganisms.

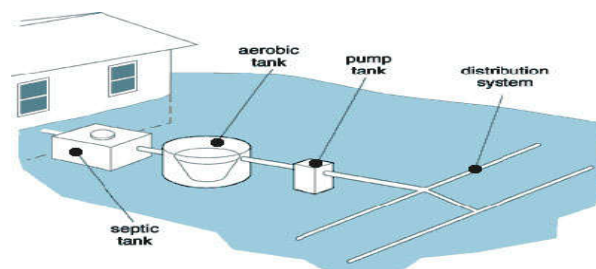
**Methods of Biological Treatment of Wastewater**

*There are two types of biological treatment process; aerobic and anaerobic.*

**Aerobic Treatment**

The element hampering oxygen consuming wastewater biotechnology is the moderately low thickness of the microbial biomass in the reactor. Because of the settling issues, the measure of biomass in the blended fluid was to be kept in the extent 3 - 5 kg unstable suspended solids/m<sup>3</sup>. The most clear answer for this issue is to permit the biomass to stay to an overwhelming bearer, for example, sand particles, and to work the reactor as an up stream fluidized bed. Phenomenal work has been done in this appreciation both in the USA and Europe (Shieh et al. 1979; Heijnen 1984). Biomass densities up to 30 kg/m<sup>3</sup> can be achieved and volumetric stacking rates surpassing those of customary initiated slime by an element of 10 can be come to as needs be. However hone does not yet acknowledge this achievement. The purposes behind this are presumably two-fold. To begin with, liquid bed innovation builds the multifaceted nature of the treatment and includes the requirement for serious control: traditional frameworks are entirely basic and just controlled broadly. Second, liquid bed innovation concentrates on rate of expulsion per unit reactor volume: the real component in vigorous treatment is nature of the final item. A noteworthy resource of the oxygen

consuming frameworks is their ability to handle a wide range of wastewaters, particularly those with to a great degree variable sythesis and even, now and again, dangerous heartbeats. However, albeit vigorous, these frameworks can't adapt to everything. Berthouex and Fan (1986) reported that even very much went to oxygen consuming wastewater treatment plants, confronting no significant stuns or lethal heartbeats, are right now not meeting the release guidelines around 20% of the time. Up to now, no on-line huge observing gadgets, fit for measuring the approaching burden and conceivable dangerous heartbeats too, and making an interpretation of this data to the operation control arrangement of the reactor consistently, have been created. It is likely, in any case, that in the coming years, a development thusly can be normal. This will without a doubt enhance the engaging quality of vigorous treatment as a rule and of variable mechanical waste-streams specifically.



**Table 1** Overview of Some Recent Developments in Aerobic

**Wastewater Treatment Enabling Easier and More Economic Design and operation**

Improving oxygen supply	Measuring oxygen uptake rate in bypass reactor Measuring short-term BOD	Matsche et al., '76 Spanjers & Klapwijk 86 Vandebroek 1986 Siepmann 1985
Decreasing sludge	Monitoring NO <sub>3</sub> levels increasing cellular maintenance by imposing pressure cycles in a deep shaft reactor	Kayser 1986 Bolton et al. 1976
Integrated control	Dynamic models relying on on-line measurements	Holmberg, 1982
Decreasing plant surface and/or construction costs	Biotower reactor systems A-B system Unitan	Zlokarnik, 1983 Bohnke, 1984 Eyben et al., 1985

The procedure for the most part comprises of the accompanying stages:

- Pre-treatment stage to expel extensive solids and other undesirable substances from the wastewater; this stage demonstrations much like a septic framework, and an ATS might be added to a current septic tank to further process the essential emanating.
- Aeration stage, where the high-impact microscopic organisms process the natural squanders in the wastewater.
- Settling stage to permit any undigested solids to settle. This structures a muck which must be intermittently expelled from the framework.
- Disinfecting stage, where chlorine or comparable disinfectant is blended with the water, to deliver a germ-free yield.

### **Types of Aerobic Systems**

Little scale vigorous frameworks for the most part utilize one of two plans, altered film frameworks, or ceaseless stream, suspended development oxygen consuming frameworks (CFSGAS). The pre-treatment and gushing taking care of are comparative for both sorts of frameworks, and the distinction lies in the air circulation stage.

#### **Fixed Film System**

Fixed film frameworks utilize a permeable medium which gives a bed to bolster the biomass film that processes the waste material in the wastewater. Outlines for settled film frameworks shift broadly, however fall into two fundamental classifications (however a few frameworks may join both strategies). The first is a framework where the media is moved in respect to the wastewater, on the other hand drenching the film and presenting it to air, while the second uses a stationary media, and fluctuates the wastewater stream so the film is then again submerged and presented to AIR.

#### **Continuous Flow, Suspended Growth Aerobic Systems**

CFSGAS frameworks, as the name suggests, are intended to handle nonstop stream, and don't give a bed to a bacterial film, depending rather on microscopic organisms suspended in the wastewater. The suspension and air circulation are commonly given by a vacuum apparatus, which pumps air through the air circulation chamber, giving a steady blending of the wastewater notwithstanding the oxygenation.

#### **Retrofit or Portable Aerobic Systems**

Another inexorably regular utilization of oxygen consuming treatment is for the remediation of falling flat or fizzled anaerobic septic frameworks, by retrofitting a current framework with a vigorous component. This class of item, known as oxygen consuming remediation, is intended to remediate organically fizzled and coming up short anaerobic appropriation frameworks by fundamentally diminishing the biochemical (BOD5) and aggregate suspended solids (TSS) of the emanating.

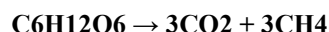
#### **Composting Toilets**

Composite toilets are intended to treat just latrine waste, as opposed to general private waste water, and are normally utilized with sans water toilets instead of the toilets connected with the above sorts of vigorous treatment frameworks. These frameworks regard the waste as a sodden strong, instead of in fluid suspension, and along these lines separate pee from excrement amid treatment to keep up the right dampness content in the framework.

#### **Anerobic Wastewater Treatment**

Anaerobic wastewater treatment varies from ordinary oxygen consuming treatment. The nonappearance of oxygen prompts controlled change of complex natural contaminations, for the most part to carbon dioxide and methane. Anaerobic treatment has positive impacts like evacuation of higher natural stacking, low slime creation, high pathogen expulsion, biogas gas generation and low vitality utilization. Psychrophilic anaerobic treatment can be an alluring alternative to routine anaerobic processing for civil sewage and mechanical wastewaters that are released at moderate to low temperature. The four key phases of anaerobic absorption include hydrolysis, acidogenesis, acetogenesis and

methanogenesis.[17] The general procedure can be depicted by the substance response, where natural material, for example, glucose is biochemically processed into carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>) by the anaerobic microorganisms.



#### **Hydrolysis**

Much of the time, biomass is comprised of huge natural polymers. For the microscopic organisms in anaerobic digesters to get to the vitality capability of the material, these chains should first be separated into their littler constituent parts. These constituent parts, or monomers, for example, sugars, are promptly accessible to other microscopic organisms. The way toward breaking these chains and dissolving the littler atoms into arrangement is called hydrolysis. Thusly, hydrolysis of these high-sub-atomic weight polymeric segments is the important initial phase in anaerobic digestion.[18] Through hydrolysis the mind bogging natural particles are separated into straightforward sugars, amino acids, and unsaturated fats.

Acetic acid derivation and hydrogen delivered in the primary stages can be utilized specifically by methanogens. Different particles, for example, unpredictable unsaturated fats (VFAs) with a chain length more noteworthy than that of acetic acid derivation should first be catabolized into aggravates that can be straightforwardly utilized by methanogens.[19]

#### **Acidogenesis**

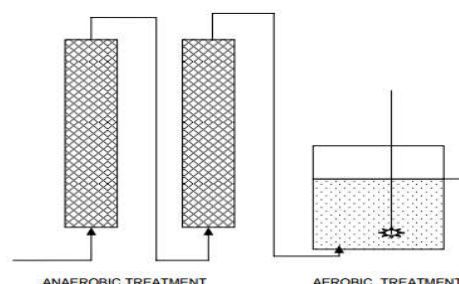
The natural procedure of abiogenesis results in further breakdown of the rest of the segments by acidogenic (fermentative) microscopic organisms. Here, VFAs are made, alongside alkali, carbon dioxide, and hydrogen sulfide, and other byproducts.[20] The procedure of acidogenesis is like the way drain sours.

#### **Acetogenesis**

The third phase of anaerobic absorption is acetogenesis. Here, basic particles made through the acidogenesis stage are further processed by acetogens to deliver to a great extent acidic corrosive, and carbon dioxide and hydrogen.[21]

#### **Methanogenesis**

The terminal phase of anaerobic absorption is the organic procedure of methanogenesis. Here, methanogens utilize the middle results of the first stages and change over them into methane, carbon dioxide, and water. These parts make up most of the biogas radiated from the framework. Methanogenesis is touchy to both high and low PHS and happens between pH 6.5 and pH 8. The staying, toxic material the organisms can't utilize and any dead bacterial remains constitute the digestate.



## **RESULT**

Biological treatment frames the premise of numerous treatment forms as an initial phase in the recuperation of water, while frequently displaying the likelihood of recuperation of different materials. Two Types of strange waste water treatment were talked about quickly

## **CONCLUSION**

People are extraordinary purchasers and wasters of water. We utilize unfathomable amounts to inundate horticultural products. Also vast volumes are utilized for sanitation as a part of First World family units - can flushing, showering and garments washing. Industry has critical requests for cooling, washing, steam raising, weakening and in transport of materials. All water utilization dirties and treatment is required before transfer to the earth. In this manner organic treatment of wastewater and sor.ts of wastewater treatment is concentrated on. It is comprehended that organic treatment of wastewater is Ecofriendly

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