



# **iJRASET**

International Journal For Research in  
Applied Science and Engineering Technology



---

# **INTERNATIONAL JOURNAL FOR RESEARCH**

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

---

**Volume: 7      Issue: IV      Month of publication: April 2019**

**DOI: <https://doi.org/10.22214/ijraset.2019.4584>**

**[www.ijraset.com](http://www.ijraset.com)**

**Call:  08813907089**

**E-mail ID: [ijraset@gmail.com](mailto:ijraset@gmail.com)**

# Sewage Treatment by Up flow Packed Bed Aerated Reactor

Neeta Waghmare<sup>1</sup>, Nikita Warade<sup>2</sup>, Chirag Rane<sup>3</sup>, Abhishek shinde<sup>4</sup>, Dinesh Rathod<sup>5</sup>, Prof. Dilendra Jasutkar<sup>6</sup>

<sup>6</sup>Professor of, <sup>1, 2, 3, 4, 5</sup>Department of Civil Engineering, The Shetkari Shikshan Mandal's Pd. Vasantdada Patil Institute of Technology Bavdhan, Pune 411021

**Abstract:** *There are various processes in waste water treatment which protect the environment and human health through cleansing water pollutants. The aerobic process requires bacteria that require oxygen, so the air circulates in the entire treatment tank. These aerobic bacteria break the waste inside the waste. An upstream pack bed aerated reactor can be widely used for the treatment of domestic waste water or gray water. The height of the reactor is 4 feet. It can be used at home.*

**Keywords:** *Aerated reactor, household waste, gray trash, up-flooded bed aerated reactor.*

## I. INTRODUCTION

Waste water is any water that is affected by human use. Waste Water “Water is used by any combination of domestic, industrial, commercial or agricultural activities, surface runoff or storm water, and any sewer flow or sewer infiltration, waste water, domestic, industrial, commercial or agricultural activities. There is a by-product, the characteristics of wastewater vary depending on the source. In the type of wastewater, domestic wastewater from homes, municipal waste from communities Ltd. (which may sewage are also called) or industrial wastewater from industrial activities. Physical, chemical and biological waste in wastewater.

Waste water can be generated from flush toilets, sinks, dishwashers, washing machines, bath tubs and shower in homes. In homes using dry toilets, less waste is produced than those who use flush toilets. Waste water can be transported to a sanitary sewer, which only transmits sewage. Alternatively, it can be moved to a joint sewer, which includes stormwater runoff and industrial wastewater. After treatment in a wastewater

Treatment Plant, Treated Wastewater (also called Influent), is discharged into the receiving water body. If treatment waste is used for any other purpose, the word “reuse of waste water” or “water extraction” applies. Waste water is discharged into the environment without proper treatment. (Bharti et al., 2017) International Journal of Applied Environmental Science ISSN-0973-6077 Dairy industries discharged waste water, which is characterized by high COD, body, nutrients and organic and inorganic materials. The main objective of this research paper is to find biogas generation and factors that affect biogas generation such as pH, temporary, alkalinity etc. To improve biogas release by organic fragmentation with dairy waste water. (Rakesh Singh Asiwal et al., 2014) SSRG International Journal of Civil Engineering (SSRG – IJCE) – 2016. Most of the river valleys are brought or stopped by the impact of severe water scarcity, agricultural development, industrialization and urbanization. The treatment of state-owned sewage treatment plants is not following the prescribed standards for treatment of wastewater treatment of municipality and for the treatment of waste from small industries, for general waste treatment plants. Thus, treatment plants are not often suitable for domestic purpose, and the reuse of wastewater is mostly restricted for agricultural and industrial purposes. (Hina et al., 2018,) Journal of Chemistry. In comparison with Uflow, the properties of drainage anabolic sludge blanket reactor technology, aerobic and anaerobic bacteria and other sewage treatment technologies are compared. The runoff accumulation soil blanket (UASB) reactor has been recognized as an important waste water treatment technology among anaerobic methods. The purpose of this study was to use the UASB reactor to review the literature on the treatment of domestic sewage as a main component and to identify future areas of research. Properties of anaerobic and aerobic bioreactors. The properties of anaerobic and aerobic bioreactor are Highlights and other sewage treatment techniques are compared compared to UASB, depending on performance and processing capacity and cost. Comparison supports UASB as a suitable option on the basis of performance, green energy production, minimum space requirement and low capital, operational and maintenance cost. (Sunil J. Kulkarni et al., 2015,) International Journal of Research and Review ([www.gkpublication.in](http://www.gkpublication.in)) 508 Vol.2; Issue: 8; 2015 Advanced organic waste treatment can be researched in various biological, physical and chemical ways. Physical therapy techniques are used to remove thick substances with water after biological and chemical remedies. Removing many biological cases is usually done in biological ways. Biological therapies can be either attached development or suspended development. Selection of biological treatment depends on the quality of the flow and the removal of the required percentage. Biological treatment is used for selective removal of many heavy metals, phosphorus and other pollutants. Current review summarizes research and progress in biological treatment. (Charles R Taylor et al., 2014) International Journal of

Research in Advertising Technology, 2014, INNS – 2321- 9637, Comparative Study of Batch and Continuous Pack Bed Bioreactors for Dairy Waste Water Treatment. The purpose of this research paper is to use packed bed bioreactors in the form of packing material with interlock saddle. This experiment continues in the batch and the process is continuing. In the batch process, the effect of the action on the efficiency of COD removal, the continuous process of continuous wasting time, pH and temperature with three different flow cod cones, the ability to remove the cot was considered with different values of HRT. (Dabholkar et al.) International Journal of Research in Management, Science and Technology, a review on the anabolic sludge blanket reactor used in waste water treatment. The upflow anabolic mud blanket reactor is a widely used technique which is suitable for wastewater treatment, whose purpose is to generate electricity or energy in the form of biogas, this biological anaerobic treatment technique is very practical. Due to this unique feature, basic exploration has been done on eAUSB, anaerobic treatment techniques i. (sunilet.al), International Journal of Engineering Science and Management Research, ISSN 2349 – 6193, Sunil et.al, he studied on the Anabolic Mud reactor for domestic wastewater treatment at low temperatures. His conclusion is that the classical UASB reactor and hybrid UASB-filter reactor can be a good option for domestic waste water treatment. Anaerobic treatment process is widely used for the treatment of wastewater, but this process partially reduces wastewater containing fats and nutrients (Baogang et al.), On the basis of science, from 1983 to 2012 A bibliographic analysis of research on an anaerobic sludge blanket in the study. Csc index database was organized To evaluate publications on UASB research from 1 to 1983. It was known that in the last 30 years, a total of 2363 UASB-related outputs were published in 220 journals. (AnandVashi etc.), Anabolic Sewage Treatment using the UASB Reactors: Engineering and Operational Aspects, 2010, provides a number of benefits for home sewage using anaerobic pre-treatment UASB reactor system, e.g. System Compactness, Negligible or Energy Consumption, Additional Sludge Production, Energy Recovery Capability, Access to Low Cost Sewage for Agricultural Reuse. Research on static rate anaerobic accumulation treatment began with 64 meters at the beginning of the 1980s. 3 UASB pilot plant in Kaili, Columbia and other different initiatives in Brazil. (Ewaag et al.) (Swiss Federal Institute of Aquatic Science and Technology) Upflow Anabolic Sludge Blanket Reactor (UASB), runoff anabolic soil blanket reactor is a single process process. It enters the reactor from the bottom, and flows upwards. Treats a suspended sludge filter and wastewater because waste water flows through it. (AH Malik et al.) UASB, was used to reduce the startup time of runoff anabolic mud blanket (UASB) reactor in the current study. During the UASB start-up period, two different nutrients were used, which were to reduce the hydraulic retention time (HRT) from 48 to 24 and from 12 to 6 o'clock at an average temperature of 25-34 temperature C Was designed for. Done. In the first stage, it was started with glucose for 14 days and then the reactor was fed a synthetic with macro and micro nutrients.

## II. AEROBIC TREATMENT SYSTEM

An aerobic treatment system or ATS, often called an aerobic septic system, is a small-scale sewage treatment system similar to a septic tank system, but an anaerobic for digestion rather than the anaerobic procedure used in septic systems. Uses the process. These systems are usually found in rural areas where public sewers are not available, and they can be used for a single home or a small group of homes.

Unlike traditional septic systems, the aerobic treatment system produces a high quality secondary flow, which can be sterilized and used for surface irrigation. This gives greater flexibility in leach field placement, as well as cuts the required size of the leach field by more than half.

Aerobic digestion is a process in the treatment of sewage treatment to reduce the amount of sewage and to make it suitable for later use. More recently, the technology has been developed which allows the treatment and reduction of other organic waste such as food, cardboard and horticultural waste. It is a bacterial process in the presence of oxygen. Bacteria consume faster organic matter and convert it to carbon dioxide, water and less molecular weight organic compounds. Since there is no new supply of organic substances from sewage, therefore active mud biotens start to die and it is used as a food by saproporic bacteria. This phase of the process is known as endogenous respiration and is a process that reduces solid concentration in sludge.

### A. Types of Aerobic Treatment Systems

Small-scale aerobic systems generally use one of the two designs, fixed-film systems or continuous flows, suspended development aerobic systems (CFSGAS). Both appearances and effective handles are similar to the system, and are contained in the inter-step phase. The flow of ATS is relatively more odorless; A well operating system will consolidate the flow, which smells the musty, but not like sewage. Aerobic treatment is so effective in reducing the odor, that it is the preferred method for reducing the odor from the compost produced by the fields.



- 1) *Fixed film Method:* Fixed film systems use a porous medium, which provides a bed to support the biomass film, which digests the waste in the waste material. Designs for fixed film systems vary widely, but fall into two basic categories (though some systems can add both methods). The first is a system, where the media is taken relative to the waste water, alternatively the film is immersed and it is exposed in the air, while the other uses a stable media, and the waste water The flow changes, so the film is alternately lowered and highlighted in the air. In both cases, biomass should be exposed to both wastewater and air so that aerobic digestion can occur. The film itself can be made of any suitable porous material, such as formed plastic or peat moss. Simple systems use stable media, and dependent on intermittent, gravitational driven waste water flow to provide periodic risk to air and waste water. A normal moving media system is rotating biological contact (RBC), which uses a slowly rotating disk on a horizontal shaft. About 40 percent discs are drowned anytime, and the shaft rotates at the rate of one or two revolutions per minute.
- 2) *Continuous flow, Suspended Growth Aerobic System:* CFSGAS system, as it is known by name, is designed to handle continuous flow, and instead of relying on suspended bacteria in waste water, provide a bed for a bacterial film does not do. Suspension and aeration are usually provided by an air pump, which pumps the air through the aeration chamber, which leads to continuous stirring of wastewater besides oxygen. In some systems designed to handle more than normal levels of biomass in waste materials, a medium can be added to promote the development of certain film bacteria.
- 3) *Retrofit or Portable Aerobic Systems:* With an aerobic facility, an existing rapidly utilizing aerobic facility is to rebuild the existing system, to fail or to protect the anaerobic septic system. This class of product known as aerobic treatment is biologically unsuccessful and is designed to fail the anabolic distribution system, reducing the demand of biochemical oxygen (BOD 5) and the total suspended solids (TSS) bod 5 and reverse the lack of TSS. Developed bio mat. In addition, the flow with high dissolved oxygen and aerobic bacteria flows into the distribution component and digests bio-matte. Doing this on single tank systems where concrete is not anywhere to settle down, or there is no clear area [explanation is required] area can damage the lines as the solids tank is stirred.

#### B. Materials Required

PVC pipe, air compressor, 35 liter drum, cylindrical pipe, valve, stand, wire scrub.

- 1) *Collection Tank:* This is a 35 liter cylindrical drum. The height of the drum is about 2 feet. In this drum we collect waste water or gray water.
- 2) *PVC Pipe:* These pipes are used to add collection tank and filtration tank. Used for back wash and outlet purpose too.
- 3) *Air Compressor:* This compressor is used to distill through the filter media. Compressor is of 12V connected to the filtration tank
- 4) *Filtration Tank:* This tank is the main tank in this setup. This tank is of acrylic material, the tank height is 4 feet and 6 inches in diameter. The filtration tank is connected to the collection tank. The filtration tank is full of wire scrub media.

### III. PROCESS

- 1) The first inlet tank was filled with the gray water sample by closing the valve 1.
- 2) The valve was opened and allowed to pass through wire scrub media filter. The filter runs in upstream mode.
- 3) When the water enters the filtration tank, the compressed air passes through the water for aeration.
- 4) After the aeration the water from the outlet pipe is released and it is collected in the bucket.

#### A. Preparation of source and gray water feed

The sample of the Grey water was collected from the canteen. Vasantdada Institute of Technology, Bavdhan, Pune, and was diluted before use. Then gray water was used for treatment because the original waste contains high organic concentrations. For sampling, gray of different olr, HLR and HRT water. To apply the necessary organic load, the gray water is washed with tap water.

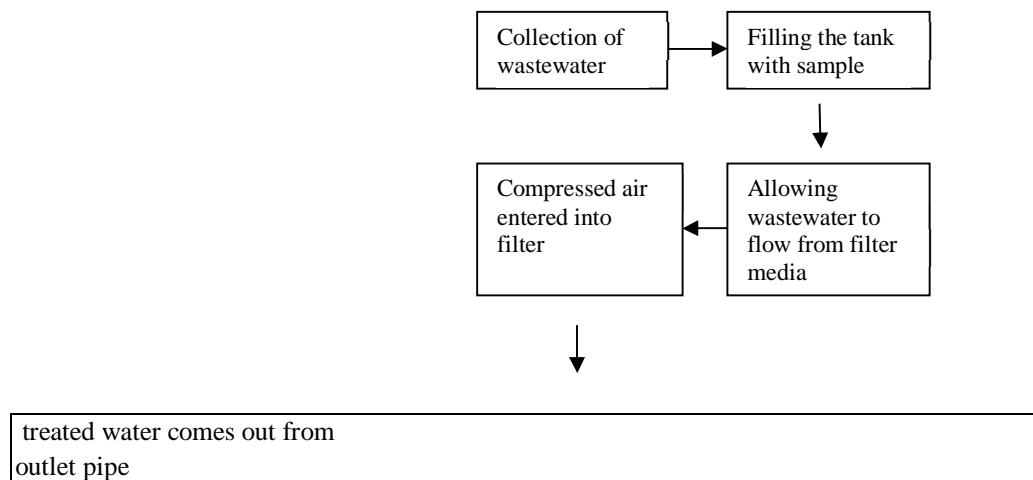


Fig. no. 1 flow diagram

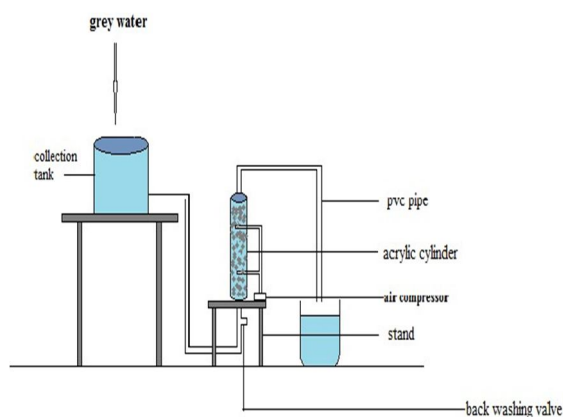


Fig 2 upflow packed bed aerated reactor

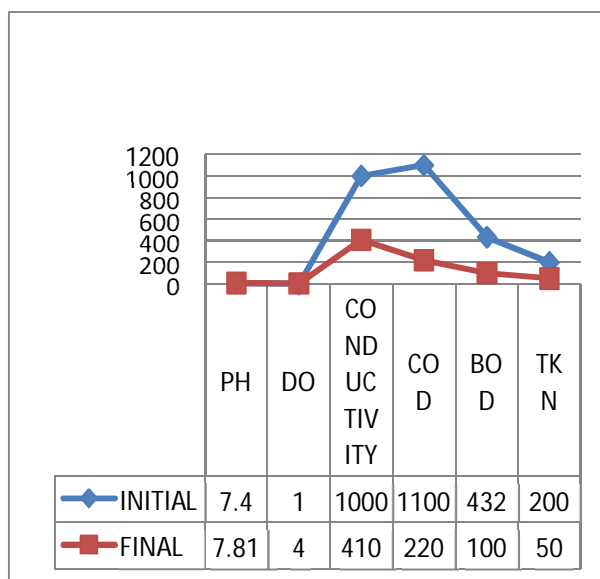


Fig 3 upflow packed bed aerated reactor actual setup

#### IV. RESULTS & DISCUSSION

- 1) *Ph*: Grey water's pH value was observed from 6.1 to 7.5
- 2) *DO*: Grey water's used in experimental setup was found to be 5.6 mg / L to 6.7 mg / l.
- 3) *COD*: The GWR COD used in the pilot setup ranges from 37.33 mg / L to 171.11 mg / L.
- 4) *Conductivity and TDS*: Conductivity and TDS were another parameter. Monitored during experiments. TDS values were determined using the conductivity values. The value of greywater sampling values varies from 641.42 mg / L to 928.57 mg / L

TEST CONDUCTED	Initial	Final
PH	7.40	7.81
DO	1mg/l	4 mg/l
CONDUCTIVITY	1000	410
COD	1100 mg/l	220 mg/l
BOD	432 mg/l	100 mg/l
TKN	200 mg/l	50mg/l



#### V. CONCLUSION

- A. In the current study, the performance of aerated CW is separated into a compact system of grey water treatment. Compact systems are evaluated for various and HLR. The following findings have been concluded on the study.
- B. Wire scrub filter is effective for the removal of turbidity
- C. This model helps reduce the burden of the burden on centralized waste treatment plant.



#### REFERENCES

- [1] Mrs. Bharat sunil Shete and Dr. N.P. Shinkar, International Journal of Applied Environmental Science ISSN- 0973-6077, Vol.12, pg.no.1117 to 1130.
- [2] International Journal of Research in Advertising Technology Segment 2, no.3, 2014, INNS – 2321-9637 Batch and continuous packed bed bioreactor study.
- [3] International Journal of Research in Management, Science and Technology, vol.4, no. 3, 2016, pg. No. 6 to 8, ISSN-2321 – 3264.
- [4] International Journal of Engineering Science and Management Research ISSN 2349 – 6193, 2016 section 3, no. 2
- [5] A bibliographic analysis of research on anaerobic sludge blanket from 1983 to 2012, was conducted in a bipartisan analysis to evaluate publications on UASB research from 1983 to 2012.
- [6] Rakesh et al. (2016). “Waste treatment by waste water treatment, recycling, reuse of water and sludge from steel industry”, section 3 digit 12.
- [7] Sunil J. Kulkarni, Pallavi M. Khedde, August 2015, research on advanced bio-scientific treatment: a review, research and progress in biological treatment.
- [8] Hina et al., Mohammed at et., Shafqat, Jan. 2018, Upflow Anabolic Sludge blanket reactor technology, properties of aerobic and anaerobic bacteria and other sewage treatment techniques are compared to UASB.
- [9] RW.Gaikwad and S.R.Kadam, August 2015 Anaubic Sludge Blanket Reactor Diary Waste Water Treatment using UASB.
- [10] Sunil Jayant Kulkarni, Feb. 2017, Methods of aerobic composting, aerobic treatment.
- [11] Sunil Jayant Kulkarni and Ajayagiri Goswami, September 2014, the importance of membrane technology, application and advancement in the treatment of waste water by membrane technology.





10.22214/IJRASET



45.98



IMPACT FACTOR:  
7.129



IMPACT FACTOR:  
7.429



# INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089  (24\*7 Support on Whatsapp)