

GENERATION OF ELECTRICITY BY SEWAGE WATER

Rajeev Singh, Pradeep Kumar Mishra, Satyam Verma,
Rakesh Vishwakarma, Pushpendrakumar Singh

*"Department of Mechanical Engineering"
United Institute Of Technology Naini Allahabad (U.P)*

Abstract-

We are surrounded by Technology and Innovation. Electricity is one of the greatest technological innovations of mankind. This study is concerned with the feasibility of Power generation using the sewage water. The main purpose of this, study is to generate electricity within the minimum cost and minimum investment. In this entire study we generally focus on the two Areas first is how to clean the sewage and second is that how to maintain the flow and rotate the turbine with a high speed to get more power output. The Purification of water takes place in various stage place in various stage such as sedimentation process for collecting sand particles, Skimming process for the removal of oil and the degasser tower for the removal of gases present in the waste water. Pump is used at the exit of the degasser tank for increase in the Pressure to Achieve more rotation of turbine.

Introduction-

Electricity is one of the most important blessings that science has given to mankind. It has also become a part of modern life and one cannot think of a world without it. Electricity has many uses in our day to day life. Electricity is obtained from various Power stations such as solar power, wind power, natural gas, Thermal Power etc. These are the universal Areas through which we obtain the required amount of Electricity. But these Power stations needs large investment in land, their infrastructure and their complete setup for the smooth run.

In our study, we just focus to generate the electricity easily, without disturbing the environmental activities. We will use sewage water for the Power generation. There were some impurities present in this waste water like debris human excreta which were cleaned through various Purification stages. The cleaned water get used for the Power generation. The total wastewater produced is 16652.5 MLD from 299 Class-1 cities. Out of this, about 59% is generated by 23 Metro Cities. Maharashtra alone contributes about 23%, while the Ganga river basin contributes about 31% of the total waste water generated in class-I Cities. Out of 299 class-I Cities, 160 Cities have sewage system for more than 75 percent of population and 92 Cities have more than 50 percent of population coverage. The type of sewage system is either open or closed or piped. The main objective of this study was to perform a review of the treatment of domestic sewage to ensure effective discharge and/or re-use / recycling.

Sources of sewage water-

There are various sources of sewage water.

1. Human Excreta-

Human excreta means human waste type usually to refer to by product of digestion such as feces and urine. It is the Point source of human fecal Pollution. Point source pollution remains a major cause of water contamination. Example of source of human fecal pollution include discharges from the municipal sewage treatment plant or storm sewer drains, leaking sewage Pipe. The laundry waste is one of the most major water.

2. Agricultural Waste-

In Agriculture waste water, nitrogen and Phosphorus are the key Pollutant found in runoff, and they are applied to farmland in several ways such in the form of commercial fertilizer, animal manure or municipal or industrial waste water effluent or sludge.

3. Industrial Waste-

Industrial waste is the waste produced by industrial activity which includes various type of material that is rendered useless during manufacturing process such as factories industries, mills, and mining operations. It has existed since of the industrial revolution. Some examples of Industrial wastes are metal, ash, paints, sludge, sand paper, and radioactive wastes.

Need of Sewage Treatment-

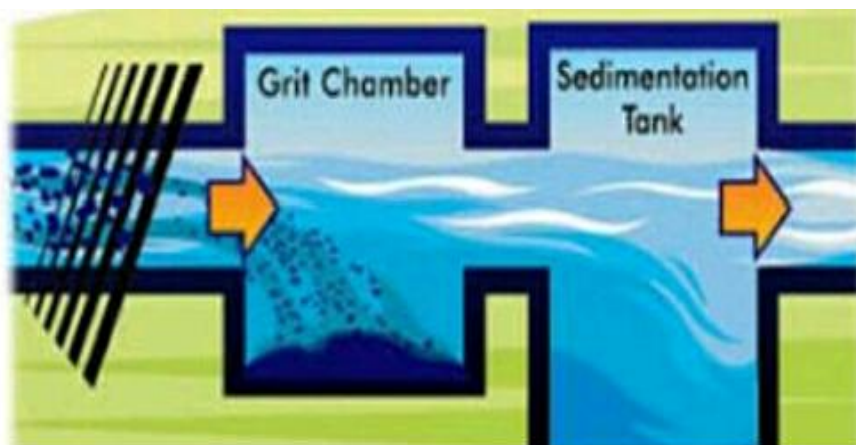
Sewage Treatment is also called as Wastewater treatment i.e., it also includes treatment of wastewater from Industries. In Many cities, the sewer carries a Proportion of Industrial Wastewater to the Sewage water treatment Plant which has already undergone a treatment in the factories for reducing the Pollutant. If it is combined sewer it will also carry storm water along with it. The adverse environment impact to be discharged in ground water or surface water bodies and or lands are as follows:

1. Sewage water containing a large amount of organic matter. If this organic matter is discharged into the river or stream, it can consume the dissolved Oxygen for satisfying the Biochemical oxygen demand of water and thus deplete the dissolved oxygen of the stream, thereby it will cause fish kills and other undesirable effects.
2. The decomposition of organic materials contained in waste water results in the production of large quantities of Malodorous Gases.
3. Untreated waste water contains Large amount of pathogenic, or disease causing microorganisms and toxic compounds. These may contaminate the land or the water body, where such sewage is disposed.
4. When Untreated waste water directly strikes to the blades of turbine, it affect its life.

Water Purification Processes-

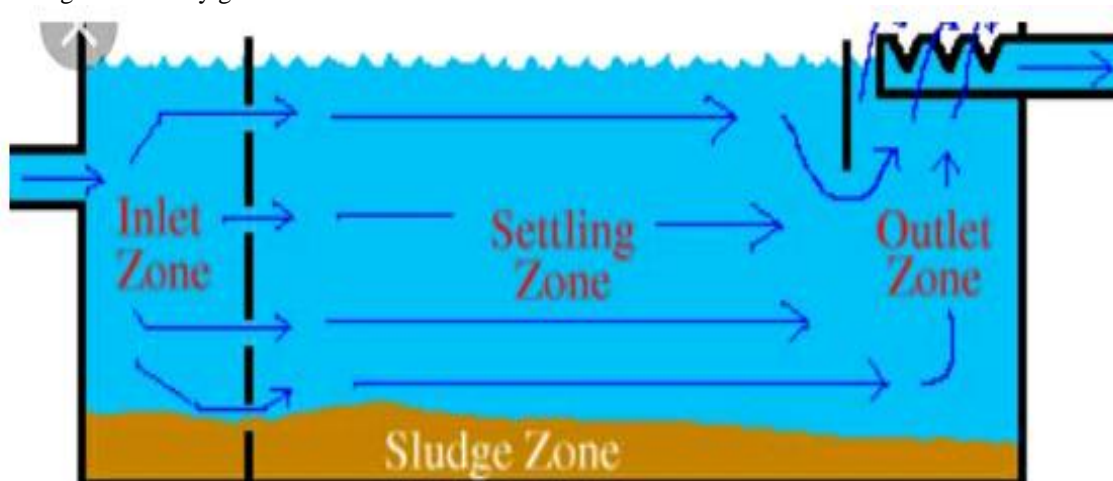
1. Water filtration by strainer-

For reducing the harmful effect of sewage water, the water should be purified to some extent. In this Process we separate heavy debris, Plastic, garbage and macro Constituent which float in the sewage water by Physical effort in which we will use strainer .Strainer filter is a device used for separating solids from liquid and to catch dirt and debris. Filters remove Particulates that are smaller than 40 microns, strainers remove, particulates that are large than 40 microns.



2. Sedimentation Process-

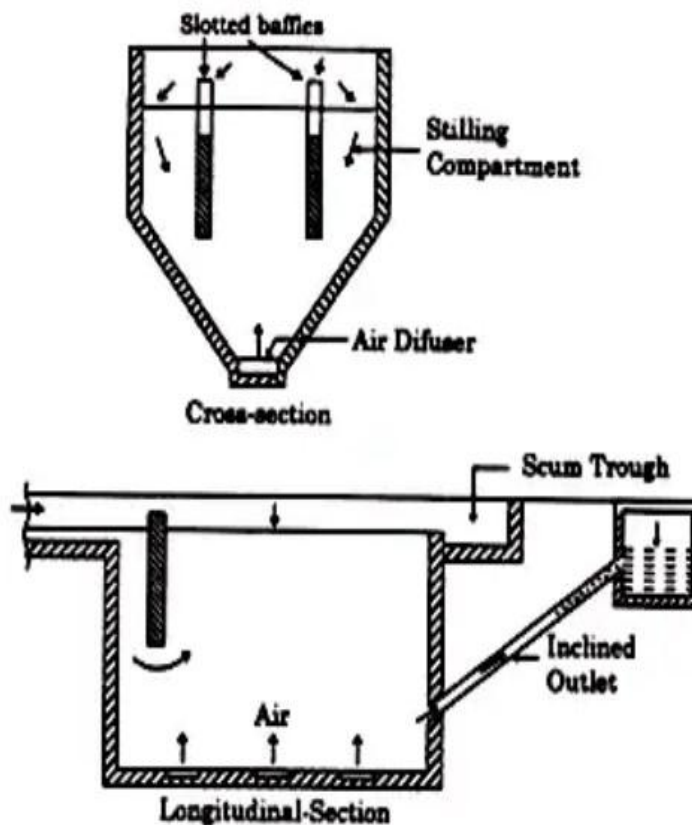
Sedimentation is the Process of allowing particles in suspension in water to settle out of the suspension under the effect of gravity. The Particles that settle out from the suspension become sediment, and in water treatment is known as sludge. This Process is used after the separating debris by strainer. After the filtration some affected impurities and organism present in the water which is separated by sedimentation or gravity separation method. In this method, wasted organic Particle is gone down by gravitation force.



2. Skimming Process-

A skimming tank is a chamber so arranged that the floating matter like oil, grease, fat etc., rise and remain on the surface of the waste water (sewage) until removed, while the liquid flows out continuously under Partitions or baffles.

It is necessary to remove the floating matter from sewage otherwise it may appear in the form of unsightly scum on the surface of the settling tanks or interfere with the activated sludge process of sewage treatment. It is mostly present in the industrial sewage. In ordinary sanitary sewage, its amount is usually too small.



Skimming Tank

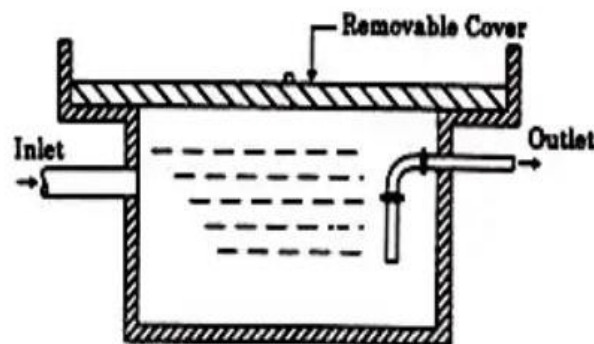
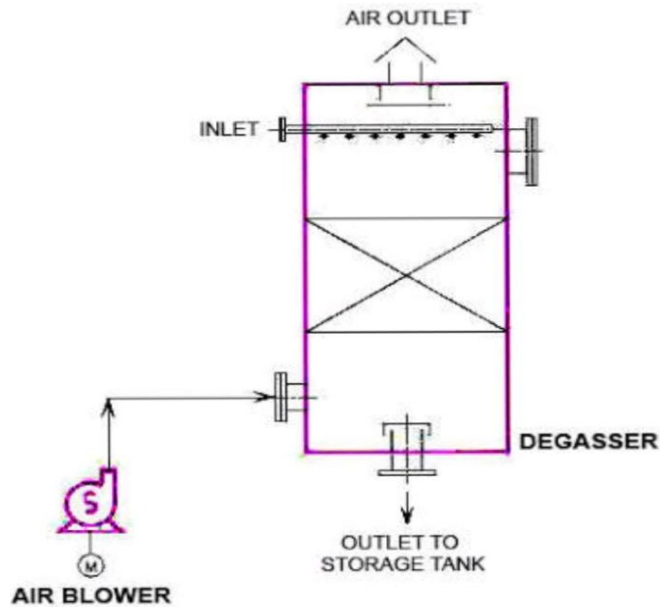


Fig. 5.12. Grease Trap

3. Degasification-

A Degasser is a device which is used for the removal of gases present in water. It is a cylindrical shaped Tower which consists of blades inside arranged in Zik-Zak form. The water is injected from the upper side and strikes with the blades and moves in such a Zik-Zak Position as same as the blade position. It results in the removal of all unwanted gases present in the water.



After the cleaning of water, a pump is situated at the outlet of the degasser tower to increase in the pressure. The pressurized water then strikes with the turbine blade results in the rotation of shaft and hence electricity is generated.

Advantages-

1. Power generation within a very low cost as compared to other Energy sources.
2. There is no pollution during power generation so it is eco-friendly.
3. Sewage water use in power generation as well as irrigation process.

Conclusion-

This report is a review of best usage and handling of the waste water. Thus, the combination of waste water treatment along with electricity production paved a great way in compensating the cost of waste water treatment, thus making it sustainable. It may be possible to increase Power generation and reduce production and operating cost.

Acknowledgement

- I. Firstly, we will like to thanks our college **UNITED INSTITUTE OF TECHNOLOGY ALLAHABAD** for providing all resources which are necessary to complete our project.
- II. We will like to thank **Prof B K PANDEY H.O.D OF DEPARTMENT OF MECH ENGINNERING** for guiding us continuously throughout the project.
- III. We will like to thank **Asst. Prof PRADEEP KUMAR MISHRA DEPARTMENT OF MECH ENGINNERING** for guiding us continuously throughout the project.
- IV. We will also thanks our parents for there continues morals and material support throughout the course of project.
- V. We will thank all those peoples who have contributed their precious time and worked to accomplish our project

BIOGRAPHY

Rajeev Singh is persuing bachelor of technology with mechanical engineering. Moreover he is constantly looking to upgrade his knowledge in different fields of Mechanical engineering.

Asst. Prof Pradeep Kumar Mishra has completed Master of Technology From MNNIT Allahabad. He is currently working in United Institute of Technology Allahabad as Assistant Professor

Satyam verma is persuing Bachelor of Technology with Mechanical Engineering. moreover he is constantly looking to upgrade his knowledge in different fields of production engineering

Rakeshvishwakarma is persuing bachelor of technology with mech engineering. moreover he is constantly looking to upgrade his knowledge in different fields of automobile engineering.

Pushpendra Kumar Singh is persuing bachelor of technology with mech engineering. moreover he is constantly looking to upgrade his knowledge in different fields of designing engineering.

REFERENCES

1. Research Paper on utilization of waste water and production of Electricity using Non-MediatedMicrobialfuel cell by Prof.RatiRanjanSabat, Mr. Manoj Kumar Swain, Mr. JibanJyoti, Garnik,Mrs.SudhodharaSwangi.

2. Research paper on Generation of bioelectricity using waste water by B.M Mali, C.C. Govi math, V.R. Hooli, A.B. Patil, D.P. Gaddi, C.R. Ternikar and B.E. Ravishankera.
3. Research paper on using sewerage system to generate Electricity by JaleesAsgharZafar Industries Ltd., D/139 SITE, Karachi, Pakistan.
4. Asano, T. and A.D. Leving (1996). Wastewater reclamation, recycling and reuse: Past, Present and future.
5. Chow, V.T.R. Eliasion and R.K. linsley (1972). Development and trends in waste water Engineering.
6. E.W. Steel and Trence J. McGhee "Water supply and sewage".