



**A Review on DESIGN OF SEQUENTIAL BATCH BIO-FILM GRANULAR REACTOR (SBBGR) FOR
REDUCTION OF THE SLUDGE**

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Abstract- *There are various method have been used for the treatment of the waste water uptill now. There are different techniques for the treatment of theeach problem of waste water like COD, BOD, Ammonical Nitrogen etc for resolving these issues different technology like ASP, RBC, Trickling Filter, SBR and many other are used similarly the todays main issue is the sludge generated from the waste water. The SBBGR is removing the sludge at its own level as compared to other technique. From our study of literature survey SBBGR removes 80%[Sequencing Batch Biofilter Granular Reactor (SBBGR) for wastewater treatment and reuse water research institute] of the sludge it means it reduces the load from the secondary clarifier and it also save the cost of an additional clarifier which could be very big achievement for a field of treatment of waste water industry. So, uptill now in this paper only theoretical aspect are considered. SBBGR is similar to SBR but the granules make it more efficient and effective.*

Keyword- COD, BOD, Activated Sludge process, Sequential Batch Reactor, Trickling filter.

I. Introduction

The Sequential batch bio-film granular reactor (SBBGR) is a used for the secondary treatment of water/wastewater in place of the Activated Sludge process, Trickling Filter, Rotating biological contractor. Mainly until now this method has been used for the treatment of the water purification, wastewater treatment of textile industry and municipal sewage. And we are using for the treatment of the wastewater of the chemical industry, our main aim is to reduce the sludge generated from the ASP. SBBGR is quiet similar to the SBR, in sequential batch reactor is a fill-and-draw activated sludge treatment system. Although the process involved in the SBR is identical to the conventional ASP.

But it is a compact and time oriented system, and all the processes are carried out especially in the same tank. And our main aim is to reduce the sludge generated in the ASP and with the use of the SBBGR it can be achieved and better treatment can be provided as compare to other conventional method. By using the granules in the reactor all the sludge will be easily collected and a better efficiency would be provided. About 80% of the sludge can be easily removed and it also replaces the additional secondary clarifier by implanting it we would not have to set a clarifier. [Operational Considerations Sequencing Batch Reactor Design and Operational considerations]

The sequencing batch reactor (SBBGR) is a fill-and draw activated sludge system for wastewater treatment. In this system, wastewater is added to a single “batch” reactor, treated to remove undesirable components, and then discharged. Equalization, aeration, and clarification can all be achieved using a single batch reactor. To optimize the performance of the system, two or more batch reactors are used in a predetermined sequence of operations. SBBGR systems have been successfully used to treat both municipal and industrial wastewater.

II. Other Conventional Methods

2.1 Activated Sludge Process

Primary wastewater mixed with bacteria-rich (activated) sludge and air or oxygen is pumped into the mixture. It promotes bacterial growth and decomposition of organic matter. Last step is a settling tank where sludge settles out and then the treated wastewater moves on for tertiary treatment. Here some settled sludge is used to inoculate incoming primary effluent. [wikipedia Activated sludge process]

BOD removal is approximately 85% Microbial removal by activated sludge 80-99% removal of bacteria (sunlight, temperature, antagonistic microorganism, predation by ciliated protozoans, competition from other bacteria, adsorption to sludge solids) 90-99% removal of viruses (mostly through solids settling, but also bacterial antiviral products and predation)

2.2 Rotating Biological Contractor (RBC)

Rotating biological contactors (RBCs) serves as a superior alternative for biodegradable material, BOD removal rate and COD removal, less area requirement, less energy consumption, with very short start-up, with low cost of operating, less maintenance cost and treatment efficiency. RBC focus on parameters that affect performance like rotational speed, detention time, influent and effluent wastewater characteristics. RBC consists of parallel circular discs attached perpendicular to a horizontal shaft which passes through their centers.

The entire assembly is placed into tank with the shaft slightly above the surface of liquid so that the disc approximately 40% immersed. Microorganism grows on surface of disc and rotation of the shaft brings them into contact with liquid allowing the digestion of organic matter. [Review Paper on Study of Rotating Biological Contactor for Wastewater Treatment Process]

2.3 Trickling Filter

It is attached growth system i.e. process in which microorganisms responsible for treatment are attached to an inert packing material. Packing material used in attached growth processes include rock, gravel, slag, sand, redwood, and a wide range of plastic and other synthetic materials. The wastewater in trickling filter is distributed over the top area of a vessel containing non-submerged packing material. Air circulation in the void space, by either natural draft or blowers, provides oxygen for the microorganisms growing as an attached biofilm.

During operation, the organic material present in the wastewater is metabolized by the biomass attached to the medium. The biological slime grows in thickness as the organic matter abstracted from the flowing wastewater is synthesized into new cellular material. Treated wastewater are collected by an under drainage which also allows circulation of air through filter. The collected liquid is passed to a settling tank used for solid- liquid separation. [Trickling Filter Technology for Treating Abattoir Wastewater]

2.4 Sequential Batch Reactor (SBR)

The sequencing batch reactor (SBR) is a fill-and draw activated sludge system for wastewater treatment. In this system, wastewater is added to a single “batch” reactor, treated to remove undesirable components, and then discharged. Equalization, aeration, and clarification can all be achieved using a single batch reactor. To optimize the performance of

the system, two or more batch reactors are used in a predetermined sequence of operations. SBR systems have been successfully used to treat both municipal and industrial wastewater. [EPA 932-F-99-073 September 1999]

2.5 Sequential Batch Biofilter Granular Filter (SBBGR)

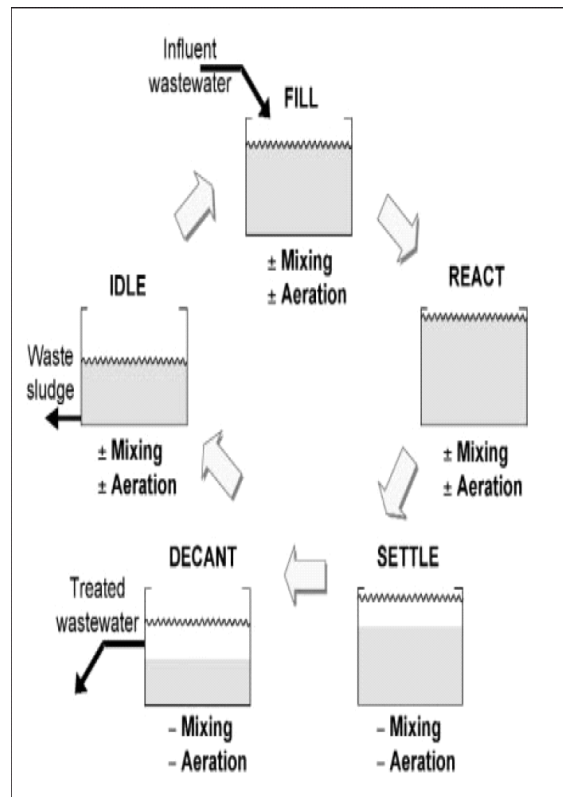


Fig: The operation of an SBBGR is based on a fill-and-draw principle, which consists of five Steps-fill reacts, settle, decant, and idle. [Operational Considerations Sequencing Batch Reactor Design and Operational considerations]

The SBBGR is the new technique for the treatment of the industrial or municipal wastewater. This is most effective method for the treatment for the sludge production in the biological treatment by the microbes. In this method, the packing of the granules after the react phase which accumulate or retain all the sludge in the packing so the water moved into the secondary clarifier do not have the sludge in it so by applying this method we can even the eliminate the use of the clarifier, thus the cost incurred for the secondary clarifier is also saved and we will receive better treated water as compared to the other treatment method. Further more studies are going on this method.

Result

We have discussed all the conventional method used uptill now in the treatment of the wastewater. All this method are widely used as per their treatment efficiency and mode of operation required but, from all the method above discussed the **Sequential Batch Biofilter Granular** Reactor is the more efficient and suitable for all type of treatment (mode of operation).

Because the SBR:

- To perform in a single stage the entire wastewater treatment train.
- To reduce area requirement.
- To offer higher operational flexibility and robustness.
- To reduce the sludge production (up to 80%).
- To produce an excess sludge already stabilized.
- To produce a high-quality effluent.
- It is combination of both the suspended and attached growth system.
- Cheaper than other in terms of capital and cost

Conclusion

From our literature survey, we have concluded that the SBBGR is a very good and efficient treatment method for the waste water and it reduces the sludge from about 80 %(as per the literature survey) and it also saves the money of an additional clarifier. In addition to this it also gives the treatment to the other important parameter of waste water such as COD, BOD, and Ammonical Nitrogen.

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