

Sequencing Batch Reactors (SBR)



Activated sludge systems use suspended natural biological and bacterial growth to remove contaminants by sorption and subsequent breakdown. Sequencing Batch Reactors (SBR) are a special form of activated sludge treatment in which all of the treatment process takes place in the reactor tank and clarifiers are not required. This process treats the wastewater in batch mode and each batch is sequenced through a series of treatment stages.

Sequencing Batch Reactors (SBR), or sequential batch reactors, treat wastewater such as sewage in batches. Oxygen is bubbled through the wastewater to reduce both

biochemical and chemical oxygen demand, which in turn makes the effluent suitable for discharge to surface waters or for use on land.

The Process

While there are several configurations of SBRs, the process is similar for all. The basic installation consists of at least two identically equipped tanks with a common inlet, which can alternate the flow between them. The tanks have a "flow through" system, with raw wastewater (influent) coming in at one end and treated water (effluent) flowing out the other. While one tank is in settle/decant mode the other is aerating and filling.

Treatment Stages

1: Filling

The SBR tank is filled with the influent in a rapid, controlled manner in order to maintain suitable food-to-microorganism ratios. This function is similarly to a selector, which encourages the growth of microorganisms that have better settling characteristics. Mixing is provided by mechanical means (no air). This stage is also called the anoxic stage.

2: Reaction

This stage promotes the utilization of biochemical oxygen demand and ammonia nitrogen, where applicable, by microorganisms. The length of the aeration period depends on the strength of the wastewater and the degree of nitrification (conversion of the ammonia to a less toxic form of nitrate or nitrite) required by the treatment. Aeration of the mixed liquor is performed by the use of fixed or floating mechanical pumps or by the injection of air through fine bubble diffusers fixed to the floor of the tank.

3: Settling

Aeration is stopped and the sludge settles, leaving clear, treated effluent above the sludge blanket.

4: Decanting

The "clean" process effluent is removed from the tank through the decanter, without disturbing the settled sludge.

5: Idling

The SBR tank is idle until it is time to commence a new cycle.

