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Aerobic Granular Sludge In Sequencing Batch Reactor

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ABSTRACT

Approximately 100 years old activated sludge technology is the primary method of wastewater treatment. Nowadays, end-users preferred to have compact wastewater treatment plants and the biofilm process is best suited for the same. In biofilm technology, conversion is limited by the surface area where the biofilm is attached. In granular biomass technology, maximum surface area per volume of the reactor can be obtained. Curiosity to understand and experience the aerobic granular sludge leads to the set-up of a pilot plant installed at Muscat. We explored whether granular sludge can be developed to treat domestic sewage under Sultanate of Oman's conditions. Our center of attention was to categorize the key operating parameters to support granular sludge formation.

Within 6 weeks of a startup, improvement was noticed in the settleability of biomass.

INTRODUCTION

Conventional sewage treatment plant technology is based on CAS(Conventional Activated Sludge) process. Ever since the technology formed, this has been undergone several innovative techniques for improving the treatment quality by reducing the cost of treatment.

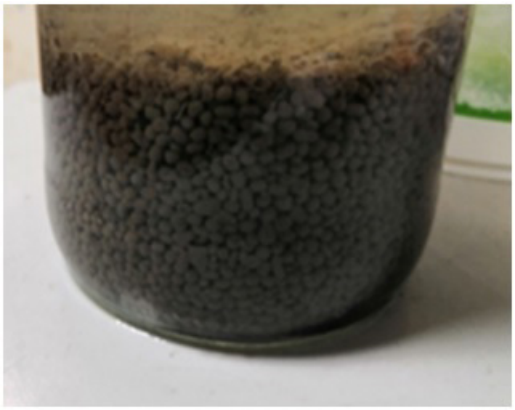
Recently significant research programs conduct on aerobic granular bio mass technology.

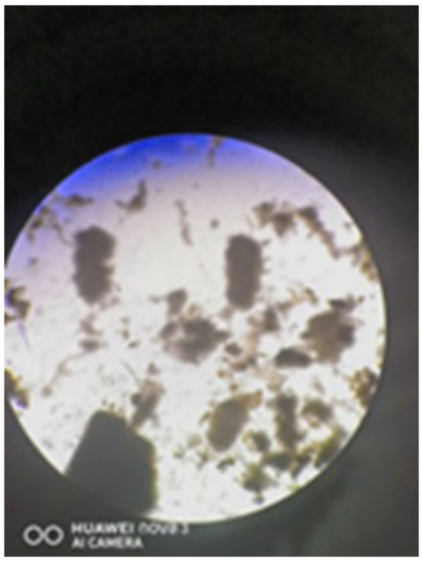
In CAS process biological degradable elements in waste water is treated with the help of biomass (activated sludge). Settling property of the activated sludge is utilized for the solid liquid separation. Objective of this pilot plant is to produce dense sludge having faster settling quality and there by compact waste water treatment design.

Sequencing Batch Reactor process (SBR) is adopted with different process variables. Kinetic analysis of the treatment is based on SBR process with anticipated process variables. To select these variables, literature reviews were carried out.

Aerobic granules were developed in sequencing batch reactor (SBR) with domestic sewage. The aim of this study is to develop a granular sludge process at pilot scale in Sultanate of Oman and to identify the key operational parameters that are required.

Pilot plant is having flexibility to adjust the cyclic timing in PLC. Granular sludge noticed in six weeks of operation. however the effluent quality was not up to the regulations of the land.





Aerobic Granular sludge under microscope

Several factors affect the formation of aerobic granules.

For the formation of aerobic granular sludge, short settling time selected and dense microbial aggregates formed. We did tireless trial and error method to achieve the desired air flow rate and shear force in the plants.

During four months of operation, several combinations of cyclic timing, loading rate and volumetric exchange rate tested and finally reached a convincing cyclic periods for various operations like feed, idle, react, settling & Decant. Sludge settling rate and Effluent quality improved. In fact, the level of ammonia nitrogen reached to less than 1 ppm in treated effluent.

Plant is working on fixed cyclic period, regularly monitoring the effluent quality at site and meets the regulations of land.