

Study of integrative thermal treatments assisted by renewable sources and biological processes for the minimization of the production of sewage sludge with a view to environmental sustainability



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Sewage sludge management

Concept

Nowadays, minimization of excess sludge produced by wastewater treatment plants is one of the most debated topics because of the management and disposal difficulties related to increasing sludge production and more strictly environmental regulations (D.Lgs 152/99 and D. Lgs 152/06) with increasingly strict legal limits on discharges. Therefore, in accordance with the latest European environmental protection policies, it has been necessary to adopt technologies that reduce the production of sludge.

In particular, in the field of biological treatments, activated sludge processes are among the most common for the purification of industrial and civil wastewater. It follows, therefore, that the production of sludge is not random, but rather is an integral part of the management of the plants and their management is one of the most critical and far from resolved problems.

Scientific approach

The research activity is carried out on scale laboratory facilities at the Sanitary-Environmental Engineering Laboratory of the University of Palermo.

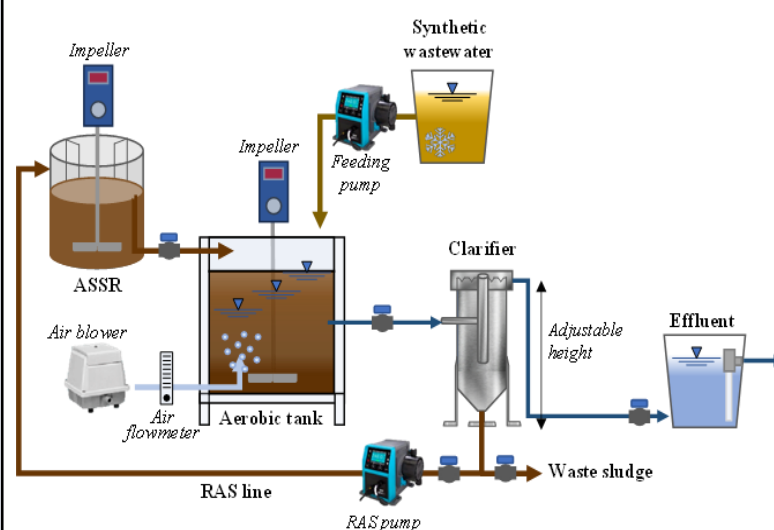
Current research is focusing on the upgrading of conventional activated sludge (CAS) system with the aim to trigger excess sludge minimization, while resulting in low-cost and environmentally friendly technologies. Among these, the anaerobic side-stream reactor (ASSR)-based process for excess sludge minimization involves the insertion of an anaerobic tank in the return activated sludge (RAS) line toward which the entire flux or a portion of the settled sludge is subjected to anaerobic conditions. Therefore, my research project focuses on the anaerobic oxic settling process (OSA), with the aim of identifying the most suitable operating conditions and process parameters to limit the production of sewage sludge by investigating its biological mechanisms, and at the same time, ensuring good pollutant removal performance.

Research objectives

The aim of the research is to optimize and deepen the level of knowledge about a process used to minimize the production of sludge from wastewater treatment plants, in order to reduce the impact on the environment resulting from the disposal of sewage sludge, as well as the management burdens related to its management. In particular, one of the goals is to do a thorough study of the biological mechanisms of the parameters and bacterial communities involved in the OSA process which operates under different conditions and configurations .



Pilot-scale plant
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Layout of the CAS-ASSR lab-scale plant