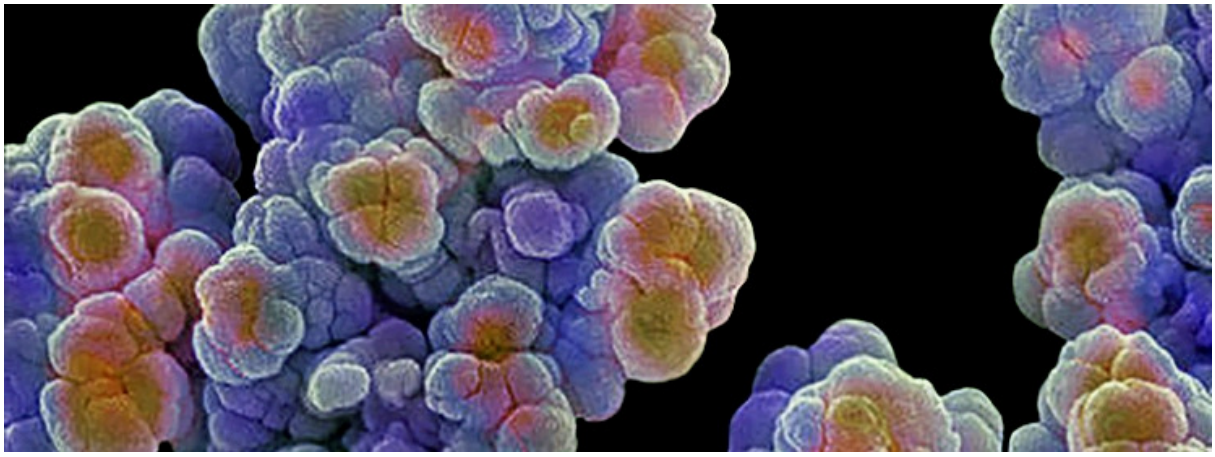

Low Strength & Slowly Biodegradable Wastewater: all that stuff's long since gone.

Abstract:

This essay reports how anaerobic biological treatment could significantly minimize the volume required by overall textile-dye treatment process, if compared to conventional single treatments, regardless of pollutants concentration at inlet and outlet.

Based on pilot-test results, the industrial scale up clearly reflects the same and many advantages introduced.

Keywords:

Aerobic, Anaerobic, Decolorization, Industrial scale, Textile wastewater, Sulfate, Anaerobic Baffled Rector, Activated Sludge Reactor, COD Removal, Sulfide, Sulfate Removal

Introduction:

Treatment of industrial wastewater by microbial degradation is one of the most important waste management processes. However, industrial wastewater frequently exhibits characteristics that adversely affect microbial degradation processes, such as complex components, toxicity, inhibition of biological treatment systems, and refraction to biodegradation. Furthermore, because of industrial production processes, several sources of chemical industrial wastewater are saline, which also adversely affects biological processes.

When it comes to deal with Industrial wastewater, it’s not about compound-specific treatments anymore: rather it is about admixture-specific treatments, often a combination of two or more steps, capable of minimizing interferences among groups and allowing the removal of contaminants.

To resolve problems caused by complex components, toxicity, inhibition, recalcitrant compounds, and salinity, optimal operating conditions such as hydraulic retention time (HRT) and mixed liquor suspended solids (MLSS) concentration should be considered. Designing ETPs for some optimal values of hydraulic retention time (HRT) and biomass concentration (MLSS) can hugely affect the removal of several refractory organic compounds, resulting in improved bioavailability of carbon and energy by microorganisms, thus mitigating the adverse effects of industrial wastewater treatment.

Until recently, when waste segregation was not possible at the source, big and sophisticate systems had to be installed to deal with the complex substrate of unpredictable composition and behavior.

The challenge:

Between 2015 and 2016 a study on pretreatment of a low strength and poorly degradable textile dyeing wastewater was carried out using an anaerobic reactor. Experimental results indicated the anaerobic pretreatment not only was a very feasible process to decolorize and pre-treat the textile dyeing wastewater. Moreover, after the anaerobic pre-treatment, the BOD_5/COD values in the wastewater rose from 0.3 of inflow to 0.46 of outflow, unequivocally assessing the improved biological treatability of the stream.

Anaerobic degradation processes have always been considered to be slow and inefficient, in comparison to aerobic degradation. However, the anaerobic degradation not only decreases the COD and BOD in the waste water; also, the anaerobic bacteria could break down some persistent organic pollutants, such as phenols and high molecular weight PAH, which show little or no reaction to aerobic degradation.

The pilot testing campaign was sponsored by Client to meet environmental limits at discharge with just minor investment on the existing ETP.

More info about tests conducted and BioConversion can be found at http://www.waterengineers.it/R&D.htm.

NOTE FROM THE AUTHOR: *As shown in* https://www.linkedin.com/pulse/eye-textile-wastewater-anaerobic-step-valuable-ally-your-zampollo*, compared with the single anaerobic and aerobic reactors, the combination of the anaerobic and aerobic reactor is more efficient in organic pollutants degradation.*
The advantages of the combined system are as follow:
1) The anaerobic process could get rid of the organic matters and suspended solid from the wastewater, reduce the organic load of the aerobic degradation as well as the production of aerobic sludge, and finally reduce the volume of the reactors;
2) Wastewater pretreated by anaerobic technology is more stable, indicating that anaerobic process could reduce the load fluctuation of the wastewater, and therefore decrease the oxygen requirement of the aerobic degradation;
3) The anaerobic process could modify the biochemical property of the wastewater, making the following aerobic process more efficient. Investigation showed that the wastewater from aerobic-anaerobic combined reactor are more stable and ready for degradation, indicating that this technical have a huge potential for application.