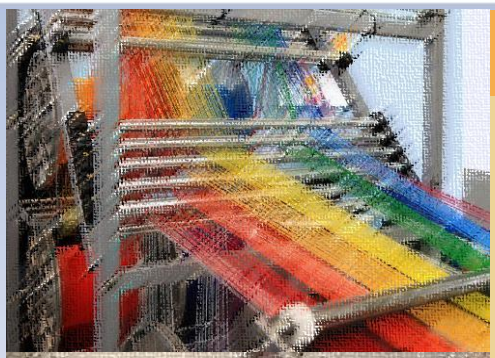
Use of Anaerobic Anoxic Oxic Sequencing Batch Reactor (AnA^2/O^2 SBR) to Treat a Textile Wastewater



Textile Wastewater

The textile industry, apart from being an important contributor to the economy of numerous countries, is also a major source of various liquid, solid and gaseous wastes. This kind of industrial activity can have a negative impact on the environment, both in terms of pollutant discharge as well as of water and energy consumption. The major pollutant types identified in textile wastewater can be summarized as organic load, color, nutrients (nitrogen and phosphorus), pH and salt effects, sulfur, toxicants, and refractory organics.

A Novel Wastewater Treatment Technology; AnA^2/O^2 Sequencing Batch Reactors

Anaerobic Anoxic Oxic Sequencing Batch Reactors (AnA^2/O^2 SBRs) process is one of the most interesting wastewater treatment plant (WWTP) because the SBRs can be operated under the anaerobic, anoxic and aerobic conditions through one-cycle operation without any addition of separate reactors, recycling line or clarifiers, which is capable for organics and nutrients removing from wastewater. Moreover, SBRs are simple, easy to operate, high flexibility, and low construction, and operation costs. While the AnA^2/O^2 SBR process could be operated under anaerobic condition with either anoxic or oxic phases, it could achieve high efficiency of organic matter, nitrogen and phosphorus removal simultaneously.

The Effluent and Removal Efficiencies of Organic Matter, Nutrient, and Color

The study investigated the potential of biological treatment as a single process as well as in association with chemical oxidation to treat a textile wastewater. The experimental part incorporated the following three schemes: biological treatment only (stage 1), chemical oxidation prior to biological treatment (stage 2), and biological treatment followed by chemical oxidation (stage 3). Biodegradation was accomplished employing three identical AnA^2/O^2 SBRs, while chemical treatment involved the addition of Fenton's reagent in the range 25–300 mg/L, in a batch-type operation. Following an acclimation period of approximately 60 days, biological treatment resulted in a high percent reduction in chemical oxygen demand (COD), total Kjeldahl nitrogen (TKN), and total phosphorus (TP), and in a moderate decrease in color. The process was found to be independent of the variations in the anoxic time period studied; however, an increase in solids retention time (SRT) improved COD and color removal, although it reduced the nutrient (TKN and TP) removal efficiency. Furthermore, both combined treatment alternatives resulted in enhanced color reduction, in comparison to stage 1. Overall, chemical oxidation prior to biological treatment (stage 2) appears to be the best option regarding the treatment of the textile wastewater used.