Abstract

Bioaugmented aerobic granular sludge reactor with a dye-decolorizing yeast for dye removal from textile industry wastewater

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Textile industry is a worldwide economic activity that generates high volumes of harmful effluents used in fabric processing that are discharged in the environment causing potential damages to the aquatic ecosystems [1]. These discharged effluents loaded with synthetic dyes, salt and other chemicals, are resistant to biodegradation and persistent in water, and are responsible for toxicity and mutagenic effects on the aquatic life [2]. Biological methods are generally considered more environmentally friendly and of major relevance [3]. Therefore, biological alternatives to aid the decolorization of dyes in textile wastewaters need to be implemented. Aerobic granular sludge (AGS) technology has excellent potential in biodegradation of many pollutants, due to the anoxic/anaerobic zones within granules and their increased tolerance to toxicity [4].

The aim of this study is to assess the effectiveness of decolorization of textile effluents using a bioaugmented aerobic granular sludge reactor. A proved decolorizing yeast, isolated from a textile wastewater treatment plant, was selected for its dye decolorization capacity, and used to bioaugment the bioreactor while forming the granules from activated sludge. The incorporation of the yeast with the granules was followed by plating and following the yeast within the microbial community. A commonly used textile azo dye was added to the reactor to follow the biodegradation by the bioaugmented aerobic granular sludge and the efficiency of the process in decolorizing the effluent at varying operational parameters was followed to assess if this is a solution for a safer discharge of such effluents.

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