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Determination of specific kinetic parameters of activated sludge process for treatment of tannery wastewater

Abstract

Conventional Tannery Wastewater Treatment Plants (CTWTP) are coming under increasing pressure to increase their efficiency of operation, in order to achieve targets for economy, technique, environment. In most cases, Tanning Toxicants is cause of troubles for activated sludge processes. Major increases in efficiency are toxicity management by Tanning Toxicants. This protocol tries to combine and link the state of the art methodologies for different processes in a wastewater treatment plant. For example, hydraulics, biological reactions, chemical, sedimentation processes, etc., and it based on the specific kinetic parameters. In practice, these parameters are related to specific growth rate, the concentration of a substrate, toxicants and characteristics of activated sludge microorganisms. Many fundamental questions about the validity and application of growth kinetics as observed in the laboratory to environmental growth conditions are still unanswered. The problems are the analytical difficulty in measuring substrates at growth-controlling concentrations and specific kinetic parameters depend on batch experiment, microorganisms alter their kinetic properties. The presented overview indicates that many of the environmentally relevant aspects in growth kinetics are still waiting to be discovered, established, and exploited.

This research presents specific kinetic parameters of activated sludge process for tannery wastewater treatment. Those are key parameters to apply for the adequate alternative technologies. Therefore, scale-up experiments were investigated to find the simplest model that evaluates of characteristics of tannery wastewater from the Arzignano and effect of Tanning Toxicant for activated sludge microorganism. The specific kinetic parameters that provide the best fit to the on-line control technical, the computer support systems and some calculation software program. In this research are presented three main objectives. The first is research on the characteristics of tannery wastewater and its troubles for activated sludge processes. The second is determination of specific kinetic parameters of activated sludge processes for treatment of wastewater contaminated by tanning toxicants. In the final part of the research was toxicity assessment of tanning toxicants for activated sludge microorganisms.

Determining specific kinetic parameters of activated sludge processes for treatment of wastewater contaminated by tanning toxicants is important factor for design and control processes. However, while the scale-up experiments did possibly have different inhibition affect that presents in a real condition because of some factors such as using different synthetic materials. In addition, control of pH and Redox Potential (ORP) in the real field could be a difficult treatment for the CTWTP and should be investigated further. In general, these parameters can use to calculate for full-scale system, but they require particular experimental regulation based on their features. Further tests should be needed to provide adequate support for these conclusions. Finally, the sensitivity analysis and accuracy gives information as to the most important parameters to be experimentally determined for the CTWTP. Furthermore only if the researched results have applying in real condition is these completely.