CURRENT RESEARCH AND DEVELOPMENT IN BIOTECHNOLOGY ENGINEERING AT IIUM

VOLUME I

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EVALUATION OF AMMONIA NITROGEN REMOVAL IN AN EXISTING SEQUENTIAL BATCH REACTOR

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ABSTRACT

The aim of this study is to investigate the behavior of process dynamic of nitrogen removal in a Sequencing Batch Reactor (SBR) through Activated Sludge Model No.1 (ASM1) and standard SBR design computation for optimal aeration time, while meeting the treatment requirements. This research also evaluates the performance of ammonia nitrogen removal based on the data obtained from existing SBR. The time profile of process dynamics and the minimum required aeration time with maximum nitrogen removal is proposed and studied while taking account on energy consumption. The simulation results by MATLAB Software suggest the process dynamic of the carbon and nitrogen concentration is 7 hour batch time with one fill and 1.5 hours aeration time. For computation of SBR standard design, total energy reduced by up to 10 percent for reduction from current 1.5 hours to 1.35 hours of aeration for 80% to 93% of ammonia nitrogen removal.

Keywords: simulation, sequential batch reactor, activated sludge model, ammonia nitrogen, matlab

INTRODUCTION

Water covers 70.9 percent of the Earth's surface and is essential for all known forms of life especially in supporting human being through drinking, maintaining households and daily consumption such as bathing, washing and cleaning. Water is also vital in sustaining the growth of plants and animals life. Nevertheless, water sources which are suitable for human consumption only covered less than 1 percent of total global water on Earth including river, lake and groundwater. These water bodies also, serve as wastewater receiving points after treatment process.

According to Hammer (2008), municipal wastewater is a term applied to liquid collected in sanitary sewers and treated in a municipal treatment plant. It also refers to the water discharged from residences, offices building, restaurants, and institutions, manufacturing plants and factories areas (Tchobanoglous *et al.*, 2004). For a treatment system, the major objective is to reduce or eliminate all the potential pollutants in the waste and safely discharge into watercourse. Besides that, it also to prevent human disease as to protect the health of the individual, the family, and the community while to eliminate