

UNIVERSITI TEKNOLOGI MARA

**ENHANCEMENT OF BIOLOGICAL
TREATMENT BY MOVING BED
BIOFILM REACTOR (MBBR) FOR
RUBBER GLOVE WASTEWATER**

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ABSTRACT

Operational parameters and effluent properties are the most important factors affecting the successful rate of biological treatment in wastewater treatment process. The main objective of this study was to access the feasibility of using moving bed biofilm reactor (MBBR) to enhance biological treatment of effluent from rubber glove manufacturing process. The effect of three operational parameters i.e hydraulic retention time (HRT), organic loading rate (OLR) and percent filling towards removal of chemical oxygen demand (COD) was studied. The rubber glove wastewater contains high organic loads and suspended solids that exceed the permissible limits set by the authority. Control test shows that the presence of biomedica increased COD removal. In addition, the higher the percent filling of biomedica in the wastewater, the higher the COD removal as the HRT prolong. The optimum HRT for MBBR is 8 hour with 62.4% of COD removal. The result also shows no trend of increasing organic loading rate with COD removal rate. However, COD removal increased until 62% with optimum HRT is 6 hour regardless of the organic loading rate. In conclusion, MBBR shows promising alternative to enhance COD removal in comparison with conventional biological process in rubber glove wastewater treatment.

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CHAPTER ONE

INTRODUCTION

1.1 RESEARCH BACKGROUND

According to Department of environment, the largest sources of industrial water pollution in Malaysia are contribute by food and beverage producers, chemical based industries, textiles, paper, palm oil and rubber processing (DOE, 2000). Stated that 20 tons of rubber and 410 thousand litres of effluent per day is produced by rubber factory. More quantities of effluent that produced in the rubber glove processing due to this process need to use large amount of water (Leong et al., 2003; Rungruang and Babel, 2008). The example of material that includes in the effluent are wash water, small amounts of uncoagulated latex and serum with small quantities of protein, carbohydrates, lipids, carotenoids and salts (Ramanan, G. et,al 2015).

The high levels of organic matter (COD), Phosphorus (P) and Nitrogen (N) that contains in wastewater can cause oxygen consumption and toxicity as it discharged to the environment. This substances need to be remove to decrease the probability of harming the environment. Biological processes are a cost-effective and environmentally sound in treating the rubber glove wastewater and based upon suspended biomass such as activated sludge processes are better for organic carbon and nutrient removal in wastewater plants. The Moving Bed Biofilm Reactor (MBBR) is an extremely efficient biological treatment process that was developed on the basis of conventional activated sludge process and bio-filter process. It is a completely mixed and continuously operated (Borkar R.P et.al, 2013).

The basic principle of the moving bed process is the growth of the biomass on plastic supports that move in the biological reactor via agitation generated by aeration systems (aerobic reactors) or by mechanical systems (in anoxic or anaerobic reactors). The moving bed processes come from the current trend in waste water treatment, from