UNIVERSITI TEKNOLOGI MARA

BPA DEGRADATION OF ENCAPSULATED *PSEUDOMONAS AERUGINOSA* ON SCOURING PAD, VIABILITY AND SCANNING ELECTRON MICROSCOPE VIEW

KHAIRUL IZWAN BIN AHMAD ROBERT

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ABSTRACT

Pseudomonas aeruginosa strain NR. 22 isolated from a lake in Shah Alam, Malaysia was allowed to degrade BPA. The bacteria was known as laccase enzyme producer that is able to degrade BPA. This study was performed by cultivating the bacteria in medium containing low concentration of BPA which is 5 ppm to observe the BPA degradation ability of the bacteria. The bacteria was able to completely degrade 5 ppm of BPA in 24 hours of fermentation as seen from the result obtained from High Performance Liquid Chromatography (HPLC) analysis. This study was also done to determine the viability of a low cost immobilization alternative in which the bacteria was attached to small pieces of scouring pads through 24 hours fermentation. The viability of the immobilization method was validated through the Scanning Microscope Electron view where the bacteria was seen attached on the surface of scouring pad fibers. The efficiency of the BPA degradation for the immobilized bacteria was also determined by adding the scouring pads attached with bacteria in shake flask fermentation for 24 hours. The result obtained from HPLC analysis shows that the immobilized bacteria was able to degrade BPA from 5 to 1.5 ppm. In conclusion, the study on BPA degradation by *Pseudomonas aeruginosa*, the viability of scouring pads as immobilization alternative and the efficiency of the degradation ability of immobilized bacteria has been successfully achieved.

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TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

1.1 Research Background

Bisphenol A (BPA) is a phenolic compound which was first produced through the condensation process of acetone and phenol with an acid catalyst. According to Gramec Skledar et al. (2016), BPA is one of the most extensively used as it is mainly used as a building block or a monomer to produce plastics and resins. Giulivo et al.(2016) stated that the plastics produced by using BPA as the monomer have high heat resistance and elasticity. This results in the large production of BPA and even increasing every year due to its wide range of application. The large production and extensive use of BPA has the BPA to become ubiquitous and can almost be found in everything that are being used by human. Although the plastic produced by BPA are known for its heat resistance and elasticity, changes in the pH and temperature will cause the ester bonds in the compound to be hydrolysed which results in the BPA leaches into food and beverages.

Gramec Skledar et al. (2016) also mentioned that BPA can be detected from more that 90% of urine samples which showed that human are highly exposed to this particular chemical. Other than urine, BPA has also been detected in blood, milk as well as other biological samples. It is well-known that BPA can cause several different health complications which is why the some countries banned the use of BPA in their production. As there are a lot of uncertainties of what could be caused by BPA, European Food Safety Authority has lowered the tolerable daily intake of BPA to 4μg/kg of body weight per day.

As there are wide application of BPA, it has always been difficult to identify the source of exposure of BPA to human. Therefore, a reliable method to detect BPA in the environment is very important in order to identify as many unexpected sources of BPA as possible to apply the mitigating measures.