## **UNIVERSITI TEKNOLOGI MARA**

#### PERFORMANCE OF LACCASEPs. NR22 IN CRUDE OIL DEGRADING ACTIVITY: KINETIC STUDY

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#### ABSTRACT

Due to the hazardous and toxic chemicals which contaminated soil, ground water, sediments, surface water and air give unfavourable effect to our ecosystem. Therefore, microbial degradation enzyme based is introduced in this study. UV visible and Gas Gravimetric Mass Spectrometry (GC-MS) were used to analyse this research. Also, Michealis Menten is a mathematical model used to prove the objectives. At the end of this study, bacterial laccase has the ability to degrade 70% of hexane, one of the components in the crude oil. As conclusion, performance test of bacterial laccase based on kinetic study and ability are proven. From the results obtained, the reaction velocity for the laccase to degrade crude oil is 1.0986 mole/h in 24 hours. Hence, the objectives were achieved. In future, performance test by using different types of bacterial enzyme on asphaltenes component should be done since asphaltenes were major fraction composition in crude oil.

# CHAPTER ONE INTRODUCTION

#### 1.1 Research Background

Laccase enzyme is a versatile oxidoreductase enzyme produced by *Pseudomonas. aeruginosa* NR22 when degrading crude oil as its alternative carbon source after completing nutrient broth. It catalyses oxidation of phenolic and non-phenolic aromatic compounds [1] which converting oxygen molecule to water followed by four-electron reduction [2]. In terms of performance of laccase, unit activity and laccase ability are parameters will be determined to achieve research of study.

Remediation strategies is a technique to treat water pollution in ocean which affect mainly by oil and gas industries. Remediation strategies are divided into two types, one is bioremediation and another one is phytoremediation. In this study, in-situ bioremediation using microbial enzymes is the main highlight in this study. Bioremediation is a strategy to treat water pollution caused by oil spill by using microorganisms. Microorganisms helps to clean up oil spill in a faster rate by breaking the toxic organic pollutant into non-toxic substances. Therefore, sustainability of the environment can be protected because microorganisms does not cause harm to our environment.

Microorganisms are easy to clone, take a short time to produce enzyme and have substrate specifically. Those advantages of bioremediation which it has become most favourable strategies compare to other strategies such as chemicals formulation and coagulant. Bioremediation also have two classes including in-situ and ex-situ. In situ is defined as the waste is treat on the spot at the origin place while ex-situ the waste is treat after removing contaminant waste to a treatment area.