UNIVERSITI TEKNOLOGI MARA

BIOSORPTION EFFICIENCY OF FE(II), CU(II), PB(II) AND ZN(II) FROM AQUEOUS SOLUTION BY LIVING *PLEUROTUS OSTREATUS*

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of the requirements for the degree of
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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.
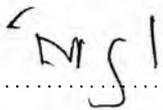
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ABSTRACT

Heavy metal ions such as Fe(II), Cu(II), Pb(II) and Zn(II) are pollutant mostly present in the wastewater and should be removed due to their potential hazards. However, the conventional removals of heavy metals have technical and economical constraints. In this present study, the biosorption using fungus, *Pleurotus ostreatus(P.ostreatus)* was introduced to remove heavy metals from aqueous solution. The objective of the present study was to evaluate and characterize the potential application of *P.ostreatus* as alternative biosorbent in the removal of Fe(II), Cu(II), Pb(II) and Zn(II), to investigate the effect of pH, temperature, agitation speed and *P.ostreatus* dosage on biosorption efficiency and to assess the biosorption efficiency of *P.ostreatus* on multi-metal ion solution and liquid laboratory chemical waste. The scope of this study was set up for pH (2, 3, 4, 5, 6), temperature (20, 25, 30, 35, 40°C), agitation speed (50, 100, 150, 200, 250 rpm) and *P.ostreatus* dosage (2, 4, 6, 8, 10 g/L). The initial and final concentrations of heavy metals in aqueous solution were evaluated using Atomic Absorption Spectroscopy (AAS) and the best operating conditions were achieved at the highest biosorption efficiency, E(%). It was found that, the maximum biosorption efficiency was observed at pH 6 (Fe(II); Cu(II)), pH 5; (Pb(II)) and pH 4 (Zn(II). The best operating conditions were found to be at 25°C, 150 rpm, 8 g/L *P.ostreatus* dosage and one hour contact time. The removal of heavy metal from multi-metal ion solution and chemical waste was lower than single metal ion solution. It was showed that about 69.60, 46.46, 36.81 and 17.38% of Fe(II), Cu(II), Pb(II) and Zn(II) were removed from chemical waste. The Fourier Transform Infrared (FTIR) analysis proved the involvement of carboxylic($-COOH$) and amide($-NH_2$) groups on the cell wall of *P.ostreatus* during the biosorption. The current study validates *P.ostreatus* as a potential and valuable biosorbent in heavy metals removal from aqueous solution.

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CHAPTER THREE: METHODOLOGY