

UNIVERSITI TEKNOLOGI MARA

**COMPARATIVE STUDY ON
BIOSORPTION OF COPPER AND
ALUMINIUM IONS USING APPLE
POMACE, TEA WASTE AND THEIR
COMBINATION IN WATER
SAMPLES OF SUNGAI ARAU,
PERLIS**

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Thesis submitted in partial fulfillment
of the requirements for the degree of
Bachelor in Science (Hons.) Biology
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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 results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has been submitted to any other 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 Undergraduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

Heavy metal pollution in environment is a matter of global concern. This study indicate types and concentration of heavy metal ions in water samples of the study area and compare types of heavy metal in different study area and effectiveness of apple pomace and tea waste as unmodified absorbent which is no addition of chemicals into water samples. Four heavy metals ions such as Cu, Zn, Al and Mg can be observe during initial screening of water samples by using inductively coupled plasma optical emission spectrometry (ICP-OES). Apple pomace and tea waste will dry in oven and different weight of unmodified absorbent will apply into water samples. Combination of absorbent will be observe in this study. Water samples will be rescreening to determine effectiveness of apple pomace, tea and combination of both absorbents. Functional group of absorbent that contribute to absorption of heavy metal will determine by using FTIR analysis. Overall from this study can conclude apple pomace, tea waste and combination of absorbents are effective in reducing heavy metal in freshwater because it contain C=O functional group that corresponding to lignin and hemicellulose components that able to absorb heavy metal. The adsorbents have higher capabilities on adsorbing Cu compared to Al since the range of adsorption percentage of Cu is higher approximately at 24-78% compared to Al approximately at 6-11%. Apple pomace individually performed better with highest percentage adsorption at the range 68-78%. Tea waste is more favourably adsorbed Cu and Al than others as the q_{\max} is greater than 1. Other than that, Langmuir model describes adsorption more successful for Cu and Al by apple pomace and tea waste respectively. However, Freundlich model describes adsorption more successful for Al and Cu by apple pomace and tea waste respectively. Moreover, Freundlich model describes adsorption more successful than Langmuir model for Cu and Al by combination of apple pomace and tea waste. In addition, T-Test results show that only Cu adsorption by apple pomace has no significance differences where p value recorded $p > 0.05$ while other metal ions adsorption has significance differences where p value recorded $p < 0.05$.

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