

**UNIVERSITI TEKNOLOGI MARA**

**REMOVAL OF HEAVY METALS FROM  
ARTIFICIALLY SPIKED WASTEWATER THROUGH  
BIOLOGICALLY ASSISTED SULPHIDE  
PRECIPITATION PROCESS**

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## ABSTRACT

Biological treatment of wastewater containing heavy metals offers an alternative to current conventional methods which still come out with some drawbacks. This biological treatment was able to reduce heavy metal and sulphide concentrations in both industrial and municipal wastewater simultaneously. The purpose of this study is to determine the rate of nickel and zinc removal through biologically assisted sulphide precipitation and to evaluate the effectiveness of the biologically assisted sulphide precipitation process in removing of nickel and zinc under different concentrations. The raw municipal wastewater for laboratory work was taken by grab sampling method from the inlet of Mawar College Wastewater Treatment Plant, UiTM Shah Alam (Mawar College-WTP) and IWK Wastewater Treatment Plant, Section 7, Shah Alam (IWK-WTP). Experiment was conducted in a single 1 litre of conical flask operated for 14 days. Six sets of batch reactors were designed, which are three sets for Nickel-sulphide precipitation and another three sets for Zinc-sulphide precipitation. For each set, three conical flasks were used; one as the control and the other two as precipitation reactors (duplicate). In stage I, municipal wastewater containing sulphate was left under anaerobic condition for eight days for the production of biological sulphide. In stage II, the ability of biologically produced sulphide to precipitate out nickel or zinc from the wastewater spiked under three different concentrations of nickel or zinc (10mg/L, 15mg/L and 20mg/L) was evaluated. The results showed that high percentages of sulphate reduction were achieved in IWK-WTP non-sterilized samples (98.06% to 99.19%) compared to Mawar College-WTP non-sterilized samples (6.47% to 25.31%). The median for the overall percentage removal of nickel in sterilized and non-sterilized samples were 7.21% and 41.81% respectively. The median for the overall percentage removal of zinc in sterilized and non-sterilized samples were 68.49% and 85.28% respectively. Results from this study found that, overall percentage removal of zinc in non-sterilized samples was good compared to removal of nickel in non-sterilized samples. This is due to production of more sulphide in wastewater used for Zinc-sulphide precipitation process.

*Keywords: Anaerobic condition, biologically assisted sulphide precipitation, industrial and municipal wastewater, nickel and zinc sulphide precipitation, removal of nickel and zinc*

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