

TOXICITY OF ZINC (Zn) AND LEAD (Pb) IN *Chironomus* sp. FROM  
ARTIFICIALLY CONTAMINATED SEDIMENT

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**TOXICITY OF ZINC (Zn) AND LEAD (Pb) IN *Chironomus* sp. FROM  
ARTIFICIALLY CONTAMINATED SEDIMENT**

**By**

Noor Aznaini Bt Mohd Daud

**Research Report submitted in partial fulfillment of  
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**JABATAN SAINS MARIN  
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**PENGAKUAN DAN PENGESAHAN LAPORAN  
PROJEK PENYELIDIKAN I DAN II**

Adalah ini diakui bahawa laporan penyelidikan bertajuk:

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## LIST OF ABBREVIATIONS/SYMBOLS

96h LC <sub>50</sub>	-	Concentration that kill 50% of organism in 96 hours toxicity test
ppm	-	part per million
mg/L	-	miligram per liter
mV	-	milivolt
μS/cm	-	microSievert per centimeter
ml	-	mililiter
L	-	liter
mm	-	milimiter
cm	-	centimeter
μm	-	micrometer
Pb	-	Lead
Zn	-	Zinc
AAS	-	Atomic Absorption Spectrometry
ICP-MS	-	Inductively Coupled Plasma Mass Spectrometry
%	-	Percent
°C	-	Degree Celsius

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## ABSTRACT

This study was carried out to determine the toxicity of Zinc (Zn) and Lead (Pb) spiked sediment to *Chironomus* sp. as well as to study the relationship between pore water metal content and toxicity. This experiment involved the use of two types of sediment spiking methodology - unrinsed sediment and rinsed sediment. The toxicants used were Zn and Pb. The chironomids were exposed to spiked sediment of 5 different concentrations (nominal concentration: 0ppm, 3750ppm, 7500ppm, 15000ppm and 30000ppm). The 96 hour LC<sub>50</sub> value for Zn in sediment was 870.32mg/L (1<sup>st</sup> replicate) and 147.444mg/L (2<sup>nd</sup> replicate). For overlying water, the value was 854.92mg/L (1<sup>st</sup> replicate) and 587.38mg/L (2<sup>nd</sup> replicate). The 96 hour LC<sub>50</sub> value for Pb was 2913.56mg/L (1<sup>st</sup> replicate) and 2285.13mg/L (2<sup>nd</sup> replicate) in sediment. The value in overlying water was 17.925mg/L (1<sup>st</sup> replicate) and 22.994mg/L (2<sup>nd</sup> replicate). It was observed that in unrinsed Pb spiked sediment the overlying water was more toxic than the sediment. In Zn spiked sediment, the sediment was more toxic than the overlying water. In rinsed sediment, the 96 hour LC<sub>50</sub> values were calculated for the pore water, overlying water and sediment. For Zn, the 96 hour LC<sub>50</sub> value in overlying water was 31.74mg/L (1<sup>st</sup> replicate) and 92.89mg/L (2<sup>nd</sup> replicate). In sediment, the value was 464.81mg/L (1<sup>st</sup> replicate) and 541.46mg/L (2<sup>nd</sup> replicate) while in pore water, the value was 413.06 mg/L (1<sup>st</sup> replicate) and 372.93 mg/L (2<sup>nd</sup> replicate). For Pb, the 96 hour LC<sub>50</sub> value was 0.079 mg/L (1<sup>st</sup> replicate) and 12.4mg/L (2<sup>nd</sup> replicate) in overlying water; 1312.16mg/L (1<sup>st</sup> replicate) and 2179.00mg/L (2<sup>nd</sup> replicate) in sediment; while 48.119mg/L (1<sup>st</sup> replicate) and 57.758mg/L (2<sup>nd</sup> replicate) in pore water.

Ketoksikan Zink (Zn) dan Plumbum (Pb) Terhadap *Chironomus* sp. Daripada Sedimen  
Buatan Tercemar

**ABSTRAK**

Kajian ini dijalankan untuk menentukan ketoksikan Zink (Zn) dan Plumbum (Pb) terhadap *Chironomus* sp. daripada tanah tercemar buatan dan mengkaji perkaitan antara kandungan logam air dalam liang dengan ketoksikan. Experimen ini melibatkan penggunaan dua jenis kaedah campuran sedimen- sedimen dibilas dan sedimen tidak dibilas. Bahan pencemar adalah Zn dan Pb. Larva-larva chironomid didedahkan kepada 5 tanah tercampur yang berbeza kepekatan (Kepekatan yang dikehendaki: 0ppm, 3750ppm, 7500ppm, 15000ppm and 30000ppm). Nilai median bagi 96 jam LC<sub>50</sub> untuk Zn dalam sedimen ialah 870.32mg/L (Ulangan 1) dan 147.444mg/L (Ulangan 2). Untuk air di atas sedimen, nilainya adalah 854.92mg/L (Ulangan 1) dan 587.38mg/L (Ulangan 2). Nilai median 96 jam LC<sub>50</sub> bagi Pb ialah 2913.56mg/L (Ulangan 1) dan 2285.13mg/L (Ulangan 2) dalam sedimen. Nilai air di atas sedimen ialah 17.925mg/L (Ulangan 1) dan 22.994mg/L (Ulangan 2). Didapati bahawa sedimen tidak dibilas bagi Pb, air di atas sedimen lebih bertoksik berbanding sedimen. Bagi sedimen bercampur Zn, sedimennya lebih bertoksik berbanding air di atasnya. Dalam sedimen Zn yang dibilas, sedimen lebih bertoksik berbanding air di atasnya. Bagi sedimen yang dibilas, nilai 96 jam LC<sub>50</sub> dikira bagi sedimen, air di atasnya dan air dalam liang. Untuk Zn, nilai 96 jam LC<sub>50</sub> bagi air di atas ialah 31.74mg/L (Ulangan 1) dan 92.89mg/L (Ulangan 2). Dalam sedimen, nilainya ialah 464.81mg/L (Ulangan 1) dan 541.46mg/L (Ulangan 2) sementara bagi air dalam



liang, nilainya adalah 413.06 mg/L (Ulangan 1) dan 372.93 mg/L (Ulangan 2). Bagi Pb, nilai 96 jam LC<sub>50</sub> adalah 0.079 mg/L (Ulangan 1) dan 12.4mg/L (Ulangan 2) dalam air di atasnya; 1312.16mg/L (Ulangan 1) dan 2179.00mg/L (Ulangan 2) bagi sedimen; dan 48.119mg/L (Ulangan 1) dan 57.758mg/L (Ulangan 2) bagi air dalam liang.