# DEVELOPMENT OF SEDIMENT COPPER TOXICITY TESTING FOR CHIRONOMID LARVAE

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Development of sediment copper toxicity testing for chironomis larvae / Warrin a/p Ebau.



Lihat sebelah

# DEVELOPMENT OF SEDIMENT COPPER TOXICITY TESTING FOR CHIRONOMID LARVAE

By

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

Adalah ini diakui dan disahkan bahawa laporan penyelidikan bertajuk:
**Development of Sediment Copper Toxicity Testing for Chironomid Larvae** oleh **Warrin A/P Ebau**, No. Matrik **UK 8139** telah diperiksa dan semua pembetulan yang disarankan telah dilakukan. Laporan ini dikemukakan kepada Jabatan Sains Samudera sebagai memenuhi sebahagian daripada keperluan memperolehi Ijazah **Sarjana muda Sains (Sains Samudera)**, Fakulti Sains dan Teknologi, Kolej Universiti Sains dan Teknologi Malaysia.

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| **Abbreviation/symbol** | |
|---|---|
| AAS | Atomic Absorption System |
| ANOVA | Analysis of variance |
| LC50 | Median Lethal Concentration |
| EC50 | Median Effect Concentration |
| NOEC | No Observed Effect Concentration |
| IC50 | Inhibition Concentration |
| LOEC | Lowest Observed Effect Concentration |
| BSAF | Biota-sediment Accumulation Factor |
| GPS | Global Positioning System |
| mg/L | Milligram per Liter |
| µg/L | Microgram per Liter |
| mg/kg | Milligram per Kilogram |
| e.g. | Examples |
| etc. | et cetera |
| Ø | Phi |
| mm | Milimeter |
| cm | Centimeter |
| m | Meter |
| s | Seconds |
| h | Hour |
| min | Minutes |
| mL | mililite |

| | |
|---|---|
| L | Liter |
| $^0C$ | Degree Celsius |
| g | Gram |
| ppm | Part per Million |
| rpm | Revolutions per Minute |
| USEPA | United States Environmental Protection Agency |

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# ABSTRAK

Ujian ketoksikan terhadap 2 sampel sedimen jenis liat berloam dan pasir berloam yang mengandungi kuprum (Cu) dengan menggunakan biassay, *Chironomus tentans* dijalankan. Perbandingan dibuat antara ujian ketoksikan air, ujian ketoksikan sedimen dan ujian ketoksikan air dalam liang sedimen. Eksperimen juga dijalankan untuk menyiasat tentang "bioavailability" dan "bioaccumulation" logam kuprum oleh *Chironomus tentans* dan mengetahui lebih jelas lagi tentang faktor yang mempengaruhi "bioaccumulation" oleh organisma bentik. Ia juga bertujuan untuk menyediakan data-data awal ujian ketoksikan kuprum terhadap larva diptera daripada Malaysia ini. Dalam ujian ketoksikan air, penggunaan logam kuprum berlainan seperti Kuprum Klorida, Kuprum Sulfat dan Kuprum Nitrat menunjukkan tiada perbezaan dalam jumlah kematian. LC50 selepas 96 jam yang dicatatkan ialah 17.20 ppm, 18.55 ppm dan 18.21 ppm. Dalam ujian ketoksikan sedimen, hanya sedimen yang dicampurkan dengan Kuprum Sulfat digunakan dan ketoksikan LC50 96 jam yang diperoleh ialah 47.28 mg/kg untuk sedimen jenis liat berloam dan 46.40 mg/kg untuk sedimen jenis pasir berloam manakala merujuk kepada air liang sedimen, nilai ketoksikan adalah 17.34 ppm dan 18.97 ppm masing-masingnya.

## ABSTRACT

Toxicity of two copper spiked sediments, which is clay loam and sandy loam, were studied in bioassays using a midge, *Chironomus tentans.* Comparisons were made between aquatic test, sediment test and sediment pore water. Experiments were performed to investigate the bioavailability and bioaccumulation of copper by the freshwater bloodworm; *Chironomus tentans* to further understand the controls on bioaccumulation by benthic organisms. It is also to provide early copper toxicity database for this Malaysian Dipterian larvae. In aquatic test, the use of different copper salt, copper chloride, copper sulphate and copper nitrate showed no significant variation in mortality results. The 96h median lethal toxicity was 17.20 ppm, 18.55 ppm, and 18.21 ppm respectively. In sediment toxicity test, only copper sulphate spiked sediment was used and the median lethal concentration was found to be 47.28 mg/kg for clay loam sediment and 46.40 mg/kg for sandy loam sediment. With respect to pore water, the 96 h LC50 was 17.34 ppm and 18.97 ppm for clay loam sediment and sandy loam sediment respectively.