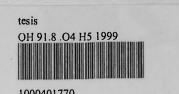
EFFECTS OF PHENANTHRENE ON Isochrysis galbana

HING LEE SLANG

MASTER OF SCIENCE UNIVERSITI PUTRA MALAYSIA 1999

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EFFECTS OF PHENANTHRENE ON Isochrysis galbana

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HING LEE SIANG

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assistants for their hindness, technical assistance and co-operation when I was

Thesis submitted in fulfillment of the requirements for the degree of Master of Science in the Faculty of Applied Science and Technology Universiti Putra Malaysia

December 1999

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(a-single cell; b-group of cells)

The effects of phenathrene on *incohrons solhare* were carried out using batch column and continuous culture techniques. The growth tests were conducted in enriched sea water at 28.0 \pm 1.0 °C, pH of 8.1 \pm 0.5, salinity 30 \pm 2 ppt and under continuous light illumination of 45unol quanta/m²/s. For batch esture, growth was estimated by morease in cell number with time. Extent of growth inhibition was influenced by concentration of phenominens and duration of exposure. These threas concentration of 5 mg/l and 7 mg/l tempotarily ishibited the growth of only and leibal affect was observed for concentrations higher than 7 mg/l. The 10 and indicates galberat relative to control) determined by batch culture technique was backing galberat relative to control) determined by batch culture technique was Abstract of thesis presented to the senate of Universiti Putra Malaysia in fulfillment of the requirements for the degree of Master Science.

EFFECTS OF PHENANTHRENE ON Isochrysis galbana GROWTH

HING LEE SIANG

By

November 1999

Chairman: Professor Dr. Law Ah Theem

Faculty : Applied Science and Technology

The effects of phenanthrene on *Isochrysis galbana* were carried out using batch culture and continuous culture techniques. The growth tests were conducted in enriched sea water at 28.0 ± 1.0 °C, pH of 8.1 ± 0.5 , salinity 30 ± 2 ppt and under continuous light illumination of 45μ mol quanta/m²/s. For batch culture, growth was estimated by increase in cell number with time. Extent of growth inhibition was influenced by concentration of phenanthrene and duration of exposure. Phenanthrene concentration of 5 mg/l and 7 mg/l temporarily inhibited the growth of cells and lethal effect was observed for concentrations higher than 7 mg/l. The IC₅₀ value (the concentration of phenanthrene that causes 50% inhibition in growth of *Isochrysis galbana* relative to control) determined by batch culture technique was 3.58 mg/l.

pH was also observed to influence the toxicity of phenanthrene. At pH 7.5, the lag period was shortened and at pH 8.5 the lag period was prolonged compared to *Isochrysis galbana* exposed to pH 8.1. The productivity of *Isochrysis galbana* decreased with increment of phenanthrene concentrations. At concentration of 1 mg/l, the photosynthetic rate of *Isochrysis galbana* was not significantly affected compared to 5 mg/l and 7 mg/l phenanthrene where the photosynthetic rate was greatly reduced compared to control.

The spiking continuous culture technique was used to estimate the NOEC (No Observed Effect Concentration) and LOEC (Lowest Observed Effect Concentration) values of phenanthrene on the inhibition of *Isochrysis galbana* growth. This method is based on the assumption that the culture at steady state (dilution rate equal to the growth rate) is relatively fragile and more responsive to mild perturbations and subtle influences. In this study, the NOEC value i.e., the concentrations of phenanthrene which had no effect on the steady state was 2.65 mg/l and the LOEC value which is the lowest concentrations of phenanthrene observed to have influenced the steady state was 2.70 mg/l phenanthrene. As such, the recommended safety level of phenanthrene for protecting *Isochrysis galbana* in marine environment is 26.5 μ g/l.

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