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# Tetrabromobisphenol A (TBBPA): Ecotoxicity Assessment and Interactions with Low-Density Polyethylene Microplastics

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## Introduction

- Tetrabromobisphenol A (TBBPA) is a widely used brominated flame retardant linked to health risks, including endocrine disruption and potential carcinogenicity.
- Microplastics (MPs), commonly present pollutants in diverse ecosystems, can interact with other harmful contaminants like TBBPA through sorption processes.
- This study investigates the toxicity of TBBPA on the marine microalgae *Tisochrysis lutea* in various water matrices. Moreover, the interactions of TBBPA with humic acids (HA) and Low-Density Polyethylene (LDPE) microplastics were investigated.

## Methods

- *Tisochrysis lutea*, a sensitive bioindicator, was selected to assess the toxic impacts of TBBPA and its interactions with microplastics in diverse water matrices.
- TBBPA was tested, as a free contaminant and in the presence of LDPE microplastics, to understand the potential differences in toxicity.
- In each matrix, tests were conducted with and without the addition of HA to assess its influence on TBBPA's toxicity when adsorbed onto LDPE.

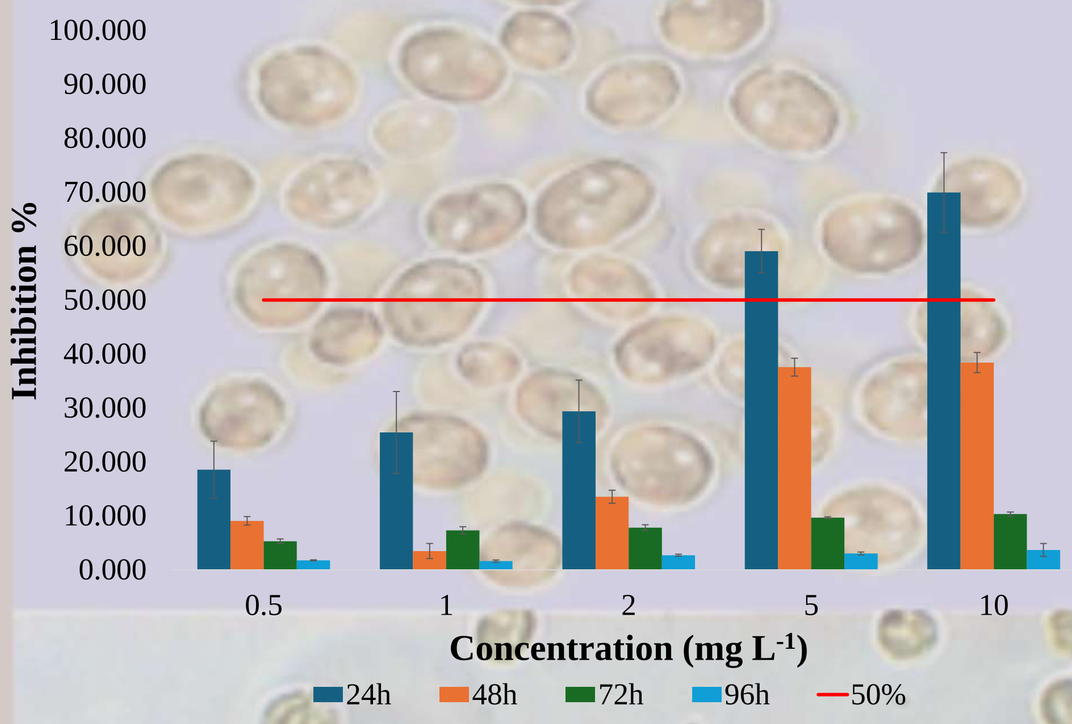


Figure 1: Inhibition rate of *Tisochrysis lutea* after 96h of exposure to TBBPA (0.5, 1, 2, 5 and 10 mg $L^{-1}$ ).

## Results and Discussion

- Algal Growth inhibition (%I) and growth rate (μ) were measured to quantify the toxic effects, focusing on variations across water matrices and presence of HA and LDPE.
- In the presence of TBBPA *Tisochrysis lutea* showed a significant limitation of growth rate, especially in the first 24h but when TBBPA absorbed into LDPE the growth rate was increased. In the presence of HA growth rate was decreased again, signifying that HA can act as an adsorption inhibitor.

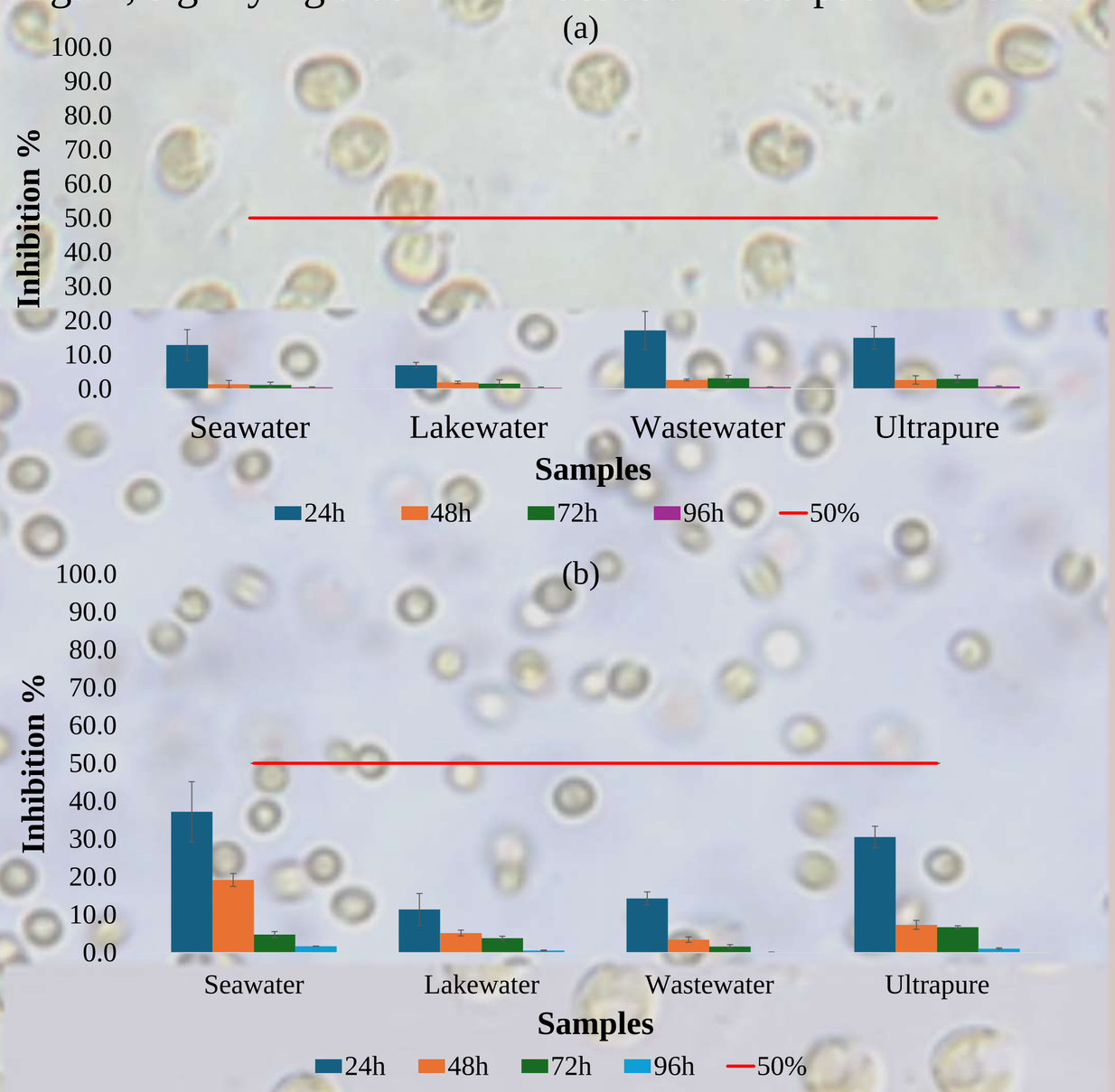


Figure 2: (a) Inhibition rate of *Tisochrysis lutea* after 96h of exposure to TBBPA adsorbed into LDPE microplastics in seawater, lake water, wastewater and ultrapure water matrices, (b) Inhibition rate of *Tisochrysis lutea* after 96h of exposure to TBBPA adsorbed into LDPE matrices in presence of HA in seawater, lake water, wastewater and ultrapure water matrices.

## Conclusions

The study demonstrates that TBBPA can significantly inhibit microalgae growth, with toxicity influenced by LDPE microplastics and humic acids. These findings highlight the complex interactions between pollutants and microplastics, emphasizing the need for further research on their ecological impacts in diverse environmental settings.

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