

Assessing the aquatic toxicity of nanomaterials graphene oxide and zinc oxide using green marine microalga *Tetraselmis* sp.

Introduction

- ✓ Environmental risks
- ✓ Insufficient toxicity data
- ✓ Aquatic ecosystem vulnerability



➤ ODS 6 – Clean water and sanitation
➤ ODS 14 – Life below water

Objectives

Evaluate and elucidate the toxicity of graphene oxide (GO) and zinc oxide (ZnO) on the marine green microalgae *Tetraselmis* sp.

Methodology

1. Cultivation and cell density measurement of *Tetraselmis* sp.



Conway médium ($\leq 29\%$)

pH 8.0 $21 \pm 3^\circ\text{C}$
Min of 4500 lux.



680 nm
UV-VIS



X



Cell counting
Neubauer chamber



2. Toxicity tests



ABNT NBR
16181:2021



24-96 h

GO: 0.5 - 100 mg/L
ZnO NM: 0.1 - 1000 mg/L



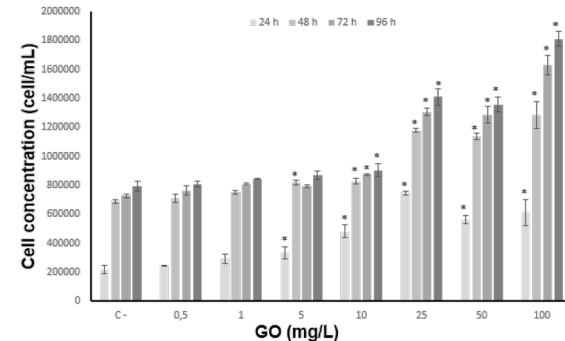
Results and discussion

Suitable methodology to quantify the marine microalgae cell density ($R^2 = 0.996$) in a range of 1×10^5 to 33.6×10^6 cells/mL.

1. Toxicity of GO

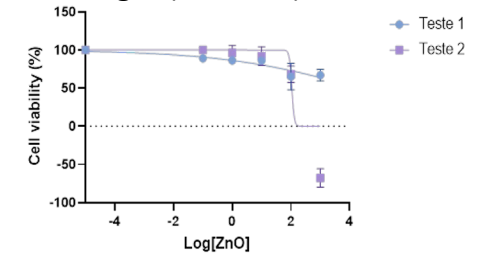
Acute toxicity: No dose-response profile was observed with the exposition of microalgae to GO. Evident stimulation of growing with exposition.

Chronic toxicity: in 24 hours exposure – LOEC of 5 mg/L and NOEC of 1 mg/L ($*p < 0.05$).

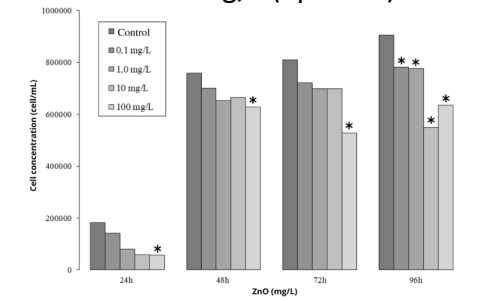


2. Toxicity of ZnO NM

Acute toxicity: dose-response in 72 hours exposure – $EC_{50} = 107.5$ mg/L ($R^2 = 0.77$).



Chronic toxicity: in 72 hours exposure – LOEC of 100 mg/L and NOEC of 10 mg/L ($*p < 0.05$).



Conclusions

Tetraselmis sp.: suitable marine microalgae to be employed in toxicological tests;

GO: Growing stimulation of *Tetraselmis* sp. when exposed; LOEC of 5 mg/L and NOEC of 1 mg/L ($*p < 0.05$).

ZnO NM: EC_{50} 72h = 107.5 mg/L ($R^2 = 0.77$). LOEC of 100 mg/L and NOEC of 10 mg/L ($*p < 0.05$).