TOXICITY OF CARBON-DONOR MATERIALS ASSESSED BY THE *Aliivibrio fischeri* BIOASSAY

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INTRODUCTION: Carbon-donor materials, such as multi-walled carbon nanotubes (MWCNTs) and graphene oxide (GO), raise concerns regarding their environmental toxicity. Studies indicate that these nanostructures can cause adverse effects in aquatic organisms by interfering with cellular and metabolic processes, as well as impacting microbial communities. Toxicity levels vary depending on the concentration and type of material. The *Aliivibrio fischeri* bioassay is a well-established method for assessing the toxicity of nanomaterials, as it allows for the rapid detection of harmful effects through bioluminescence inhibition, reflecting the potential environmental impact of these materials. OBJECTIVE: This study aimed to evaluate the acute toxicity effects of multi-walled carbon nanotubes and graphene oxide on the marine bacterium *Aliivibrio fischeri*. MATERIALS AND METHODS: The assay was performed using *Aliivibrio fischeri* with the MICROTOX® 500 Analyzer (SDI). The tests followed the Brazilian Technical Standard NBR 15411-3 and the protocol recommended by the equipment manufacturer (MICROTOX® Omni software, version 4.1). To determine the effective concentration, the Basic MICROTOX® Test (81.9%) was conducted using nine sample concentrations (81.9%, 40.95%, 20.48%, 10.24%, 5.12%, 2.56%, 1.28%, 0.64%, and 0.32% v/v). Acute toxicity was assessed based on sample dilutions, and bacterial bioluminescence was measured after 30 minutes. Higher light emission by the organisms indicates lower sample toxicity. Toxicity was expressed as the Effective Concentration (EC50), representing the concentration required to affect 50% of the bacterial population. RESULTS AND CONCLUSION: Acute toxicity analysis of multi-walled carbon nanotubes (MWCNTs) and graphene oxide (GO) using the Microtox ecotoxicological test revealed that both nanomaterials exhibited toxicity to the bioluminescent marine bacterium *Aliivibrio fischeri*. The exposure results showed significant toxicity, with EC50 values after 30 minutes of exposure being 45.44% (moderate toxicity) for MWCNTs and 3.95% (severe toxicity) for GO. This study demonstrated the toxicity of carbon-donor materials through the bioluminescence response of *A. fischeri*. The marine bacterial test indicated moderate toxicity for MWCNTs and high toxicity for GO.

Keywords: Ecotoxicity; Multi-walled carbon nanotubes; Graphene oxide.

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