

Assessment of heavy metal toxicity using a luminescent bacterial test based on Photobacterium sp. strain MIE

ABSTRACT

Toxicity evaluation of wastewater, polluted sediment and water streams is a very crucial aspect of environmental pollution monitoring. In this work, a newly developed luminescent bacterial test using a tropical luminescent bacterium, *Photobacterium* sp. strain MIE was used to assess the toxicity of several heavy metals using a 15-min assay format. The assessment was carried out by exposing strain MIE to different concentrations of heavy metals ranging from 0.001 to 200 mg/L in a DTX microplate 96 wells. The toxicity result based on the inhibitory concentration (IC₅₀) was Hg (0.053 mg/L) > Ag (0.12 mg/L) > Cu (0.85 mg/L) > Ni (12.32 mg/L) > Zn (18.72 mg/L) > Cr (26.02 mg/L). Principal Component Analysis (PCA) and Agglomerative Hierarchical Clustering (AHC) analyses showed the sensitivity (IC₅₀) of strain MIE to several toxic heavy metals are comparable to the commercial luminescent assay, Microtox™ as both clusters together making it a good choice for an alternative near-real-time monitoring of heavy metals. The sensitivity of strain MIE towards heavy metals was proven through field trial works on several heavy metal-polluted sites in Malaysia. Thus, it is a good candidate as an early detection system for heavy metals in aquatic bodies in tropical countries.