Development of a bacterial-based tetrazolium dye (MTT) assay for monitoring of heavy metals

Abstract

An inhibitive assay for metals using a bacterial respiratory assay system is presented. The assay is based on the ability of bacteria to reduce the water soluble tetrazolium dye (MTT). The isolate was tentatively identified as Bacillus sp. strain Khayat. The Bacillus sp based MTT assay is sensitive towards Hg2+, Cu2+, Ag2+, Cd2+ and Zn2+ with concentration of toxicant giving 50% inhibition (IC50) values at 0.046, 0.057, 0.044, 0.857 and 1.716 mg/L, respectively. A Limit of Detection (LOD) value was 0.001 mg/L for Hg2+ and Cu2+ while 0.003, 0.067 and 0.201 mg/L, respectively for Ag2+, Cd2+ and Zn2+. This assay is xenobiotics and pesticide tolerance and can be completed within 20 min. Field test on identify polluted water sample from Bukit Tinggi Industrial Estate, Penang and Bukit Tinggi Industrial Estate, Penang proved that Bacillus sp-based MTT assay was sensitive in toxic response.

Keyword: Bacillus sp.; Limit of detection; IC50; Toxic sensitive; Reduction activity