Immobilizing the Leached Manganese Using Marine Bacteria

Anmol Verma*, Maria Judith Gonsalves

CSIR-National Institute of Oceanography, Donal Paula, Goa, 403004

*Corresponding author

ABSTRACT

Manganese is an essential micronutrient for life and a critical element for the production of steel and lithium-ion batteries. However, industrial discharge and mining activities lead to Manganese pollution, which has adverse impacts on human health, including respiratory diseases and neurological disorders such as manganism. Moreover, the mobilisation of manganese in water bodies threatens aquatic organisms and can promote harmful algal blooms. Methods to combat manganese pollution generally include physical wastewater treatment, chemical oxidizing agents and electrochemical methods but, these methods are not sustainable and are expensive. This study explores the use of extremophilic bacteria from the marine ecosystem for bioremediation of Manganese. Initially, the isolates were screened for Manganese tolerance activity by subjecting them to 10, 15, 20 and 30 mM concentrations of Manganese chloride. Further, focusing on the conversion of mobile Mn (II) to immobile Mn (IV), the bacterial isolates were tested for their Manganese oxidation potential. Sequentially, the Manganese oxidising activity was determined using spectrophotometry. Out of 19 potential isolates, 74% were tolerant to 30mM of manganese and 1 isolate was capable of oxidising Manganese. This isolate showed manganese oxidation activity of 1.716 ± 0.1 µM/h. This study highlights the capability of marine bacteria in bioremediating the discharged Manganese back into insoluble form reducing its bioavailability and accessibility by the aquatic ecosystem.

Keywords: Manganese pollution, Extremophilic bacteria, Manganese bioremediation

How to Cite

Anmol Verma, Maria Judith Gonsalves, “Immobilizing the Leached Manganese Using Marine Bacteria”, *AIJR Abstracts*, p. 42, Mar. 2025.

DOI: 10.21467/abstracts.177 ISBN: 978-81-984081-3-6 (eBook), 978-81-984081-9-8 (Paperback)