Evaluation of the feasibility for biodegradation of phenol by Antarctic isolate at low temperature in the presence of heavy metals

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The once considered pristine continent is now threatened with multiple anthropogenic pollution despite the strict rules provided in the Protocol of Environmental Protection to the Antarctic Treaty. Marine accidents, crowding research stations and tourism contributed a major part in the human mess in Antarctica. These activities resulted in phenol pollution, which causes significant risk to the aquatic as well as terrestrial lives due to its highly toxic and persistence properties. Environment polluted by aromatic compounds like phenol often receives discharges from non-hydrocarbon co-contaminants like heavy metals. These heavy metals are incapable of decomposing and may affect the competence of phenol degradation by microorganisms, thus becoming a great challenge to bioremediation process. Therefore, this study emphasised on the tolerance level of indigenous bacteria *Arthrobacter* sp. strain AQ5-15 towards different heavy metals that can be found abundantly in Antarctica. This phenol-degrading strain was exposed to heavy metals namely Arsenic (As), Cadmium (Cd), Lead (Pb), Zinc (Zn) and Mercury (Hg) with the initial concentration 1.0 ppm and only Cd and Hg were proven to inhibit the phenol-degrading process. The IC_{50} calculated for both heavy metals exhibited that Hg had halved the phenol degradation at concentration of 0.141 ppm and Cd at the concentration of 0.086 ppm. The tolerance to most of the heavy metals proved that this strain could be a potential inoculant for phenol bioremediation in Antarctica.

References

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