

Bioremediation Of Heavy Metal By Microorganism

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Abstract : *Heavy metals in the environments are of major threat to the entire civilization at present time as they are highly toxic even at low concentration. The state of the art methods to remove the heavy metals form food and water etc. is bio remediation techniques. The traditional method of physico-chemical separation technique is expensive and creates lots of chemical wastes and thereby causing environmental pollutions. This article reviews how microorganism can be utilized to purify a solution contaminated with heavy metal.*

Introduction:

Heavy metal pollutions has become a challenging threat to the man kind as the concentrations of the heavy metals in the environments had crossed far beyond the recommended limits [1-4]. They are highly toxic even at very low concentrations and undergo bio accumulations thereby enters into the food chain. Bio magnifications of these heavy metals become fetal for the life. Because of their non-biodegradable nature, the heavy metals cannot be destroyed simple by bio degradation. Hence it is required to remove the toxic heavy metals from the environment.

There are numerous techniques available to remove heavy metals from aqueous solutions [5]. Some of the techniques, for example, precipitation, and electrochemical processes donot work well when the concentration level of the pollutant is in ppm unit. Some other processes like membrane based methods viz. reverse osmosis, ion exchange methods are highly costly and is economically not suitable for treating huge amount of wastewater. Other than these, the problem of the conventional physico-chemical treatment methods is that there are the formations of huge amount of slug. Some of these chemical wastes, formed after treating the water, are hazards in nature and causes further environmental problems [6]. Bioremediation is the state of the art technique to clean the polluted sites [4].

Bioremediation

Microorganism lie bacteria fungi are generally used for bioremediation purpose. The activity of the microorganism can be catalyzed by adding nutrients like phosphates and nitrates or by adding oxygen or by sometime by external addition of new microorganism [7-8]. Both in situ and ex situ bioremediation technologies are utilized to depollute the pollutants.

The success of bioremediation depends on the nature and number of microorganism participated to the cleaning processes, whether sufficient nutrient be present for the microorganism, whether the physical environment like pH of the medium, temperature etc. is suitable for microorganism growth and how much time the microorganism is allowed to work[9-11].

Heavy Metal Removal by Microorganisms

Bioremediations by microorganism to treat the heavy metal pollutions is a hot topic at this contemporary time. Different bacteria act differently to different metals. This mechanism can be categorized as exclusion, extrusion, accommodations, biotransformation and methylation-demethylation [12-14].

Siderophores, an ion chelating substances, produced by some bacteria e.g. *Desulfovibrio desulfuricans* reduces the bioavailability of metals from the environments and thereby cleans the heavy metal problems. The negatively charged function group of biomolecules attracts the positively charged heavy metal and forms ionic compounds and thereby these microns can act as cationic exchanger to clean the heavy metal pollutions [15-19]. The active sites of bacteria also act as ligands and binds to the metal ion [20]. Biosorption is the another crucial phenomena of bio remediation. Biosorption capacity is different for different microorganism and for different metals [21-22]. Both bacteria and algae can act as good biosorbents.

Conclusion:

This review briefly highlights the heavy metal pollutions and the usefulness of the bioremediation. The various processes and bio action taken by the microorganism are also discussed.

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