



Heavy Metal Pollution: Chemistry is the Solution?

Mohan C^{1*} and Kumari S²

¹School of Basic & Applied Sciences, KR. Mangalam University, India

²Department of Chemistry, S. P. C. Government College, India

***Corresponding author:** Chandra Mohan, Assistant Professor, School of Basic & Applied Sciences, KR Mangalam University, Gurgaon-122103, India, Email: gurgaonmohan@yahoo.co.in

Editorial

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Editorial

Presence of heavy metals in the environment due to various reasons and their effect on ecosystem and human health has been of great concern. The problem associated with heavy metals in the environment is their accumulation in the food chain and their persistence in nature, resulting in serious health hazards. Heavy metals released by number of industrial processes are major pollutants in marine, ground, industrial and even treated wastewaters. Heavy metal cations such as Pb²⁺, Cd²⁺ and Hg²⁺ are harmful to all living organisms at all concentrations. They damage nerves, liver, kidneys, and bones and also block functional groups of vital enzymes. The harmful effects of metal ion are due to their ability to bind with protein molecules and influencing replication of DNA and thus subsequent cell division. Several diseases arise due to heavy metal cations so it gives direct indication towards interference caused by these pollutants in metabolic activities.

Heavy metal cations with incompletely filled d-orbitals are able to form complex compounds. Thus, heavy metal cations [Cu²⁺, Zn²⁺, Cr³⁺ and Ni²⁺] play an important role in sophisticated biochemical reactions such as nitrogen fixation, water cleavage during oxygenic photosynthesis, respiration with oxygen or nitrate, rearrangement of C-C bonds, hydrogen assimilation, and cleavage of urea and transcription of genes into mRNA.

These heavy metals compete with essential metals and occupy metal binding-sites in plasma membrane. These may interact with physiological ions such as Cd²⁺ with Zn²⁺ or Ca²⁺, Ni²⁺ and Co²⁺ with Fe²⁺, Zn²⁺ with Mg²⁺, thereby inhibiting the function of the respective cation. Heavy metal oxy-anions

interfere with the metabolism of the structurally important nonmetals such as chromate with sulphate and arsenate with phosphate. These heavy metals may be removed from the environment by some physical and chemical methods such as: ion exchange, reverse osmosis, electrolysis, precipitation and reduction.

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