Application of Radiotracer Technique for Treatment of Heavy Metal Pollution

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Keywords: heavy metal pollution, radiotracer technique, biosorption, zinc toxicity, green chemistry

Heavy metal pollution, caused due to anthropogenic activity, poses a serious environmental problem which endangers human health and environment. The present research focuses on the uptake of heavy metal Zn(II) from aqueous solution by employing a green technique, called biosorption, as opposed to conventional chemical processes. Various natural materials have been explored for the uptake of metal ions, where most of them are physically or chemically enhanced. The real solution for metal pollution and effluent treatment is not just in the technological advances but also in maximizing the applicability and efficiency of naturally available resources. Dry cowdung powder has therefore been utilized as a low-cost, environmental friendly humiresin without any pre-treatment, thus demonstrating the concept of Green Chemistry. The idea of it being green is that excessive chemicals were not used to treat the waste, thereby minimizing the chemical/biological sludge. Batch biosorption studies using ^{65}Zn(II) tracer were performed and the impact of different experimental parameters was studied. Results revealed that at pH 6, 94±2 % of Zn(II) was effectively biosorbed in 5 min, at 303 K. The process was spontaneous and exothermic, following pseudo-second-order reaction. Thus, the mechanism of heavy metal biosorption using eco-friendly humiresin was established to identify best possible technique for the removal of heavy metal ions. It is also notable that all sorption experiments carried out in this research have been optimized at a contact time of 5 mins. Thus, shorter reaction time, in addition to the easy availability of dry cowdung powder makes the process efficient and green. Also, its rapid adsorption capacity and cost effective nature provides a promising technique for industrial wastewater cleanup and can be useful for optimizing the operating conditions for a large-scale, economical process.

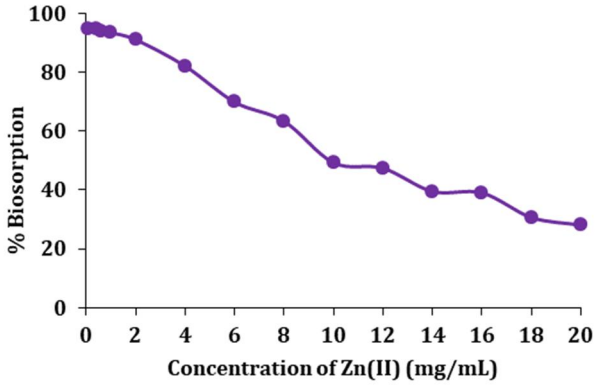

Fig. 1. Effect of Zn(II) concentration on DCP.

Acknowledgments
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중성자·동위원소응용연구부/2020-11-11 15:05