

Evaluation of bioaccumulation of lead metal pollutant in two biotic and abiotic compartments of the Caspian Sea coastal sediments

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Abstract

Bioaccumulation of heavy metals in food chains is one of the most important environmental and health problems of aquatic ecosystems. The aim of the present study was to evaluate the amount of lead metal uptake by Gammarus sp. And sedimentation took place in the coastal region of Sisangan in the Caspian Sea. In this study Gammarus sp. As the predominant benthic in soft sediments as a biological indicator of lead contamination in 2015 was examined. In this experiment, the concentration of lead was lower than its lethal concentration for Gammarus. The lead metal solution was passed through containers (mesocum) containing gammarus and sediment and sampling was performed at zero contact times (control sample), 30, 60, 90, 150, 210 and 270 minutes, respectively. After preparing the samples, ICP-OES device was used to determine the lead concentration. According to the results of one-way analysis of variance, the mean amount of lead metal adsorption between different times of this experiment were significant compared to each other ($P < 0.005$). The maximum amount of lead accumulated in the body of this organism in a period of 150 minutes was equal to $21.693 \mu\text{g} / \text{g}$. The highest absorption rate was obtained in a period of 150 minutes equal to $0.211 \mu\text{g} / \text{g}$. Also, the lowest amount of lead absorbed was observed in a period of 30 minutes with a value of $0.052 \mu\text{g} / \text{g}$. The highest rate of lead uptake in sediment was observed in a period of 30 minutes. The maximum and minimum rates of lead metal adsorption by deposition at 30 and 210 minutes were equal to 0.0219 and $0.0001 \mu\text{g} / \text{g}$, respectively. The results obtained in this study well show the high power of Gammarus sp. Was in the absorption of lead metal. The results obtained in this study well indicated the high potency of Gammarus sp. in the metal absorption was lead. The results showed that the amount of lead metal increased during the experiment in the body of Gammarus, so it can be deduced that this organism has no mechanism to control the entry or adjustment of the metal and, given the results regarding the amount of metal absorbed. In conclusion, the present study indicated that the Gammarus have a higher ability to absorb and accumulate lead metal.

Keywords: Bioaccumulation, Lead, Gammarus, Caspian Sea, Sisangan coast.