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Adsorption and Transformation of Lead in Coimbatore Urban Soils

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Abstract : Heavy metal pollution originating from industrial wastes is becoming a serious problem in many urban environments. These heavy metals, if not properly managed, could enter into the food chain and cause a serious health hazards in animals and humans. Industrial wastes, sewage sludge, and automobile emissions also contribute to heavy metal like Pb pollution in the urban environment. However, information is scarce on the heavy metal pollution in Coimbatore urban environment. Therefore, the current study was carried out to examine the extent of lead pollution in Coimbatore urban environment the maximum Pb concentration in Coimbatore urban environment was found in ukkadam, whose concentration in soils 352 mg kg-1. In many places, the Pb concentration was found exceeded the permissible limit of 100 mg kg-1. In laboratory, closed incubation experiment showed that the concentration of different species of Pb viz., water soluble Pb(H2O-Pb), exchangeable Pb(KNO3-Pb), organic-Pb(NaOH-Pb), and organic plus metal (Fe & Al) oxides bound-Pb(Na2 EDTA-Pb) was found significantly increased during the 15 days incubation, mainly due to biotransformation processes. Both the moisture content of soil and ambient temperature exerted a profound influence on the transformation of Pb. The results of a batch experiment has shown that the sorption data was adequately described by the Freundlich equation as indicated by the high correlation coefficients (R2= 0.64) than the Langmuir equation (R2 = 0.33). A maximum of 86 mg of Pb was found adsorbed per kilogram of soil. Consistently, a soil column experiment result had shown that only a small amount of Pb(< 1.0 µg g-1 soil) alone was found leached from the soil. This might be due to greater potential of the soil towards Pb adsorption.

Keywords : lead pollution, adsorption, transformation, heavy metal pollution
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