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Rule of Natural Synthetic Chemical on Lead Immobilization in Polluted Sandy Soils

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Abstract : Soil contamination can have dire consequences, such as loss of ecosystem and agricultural productivity, diminished food chain quality, tainted water resources, economic loss, and human and animal illness. In recent years, attention has focused on the development of in situ immobilization methods that are generally less expensive and disruptive to the natural landscape, hydrology, and ecosystems than are conventional excavation treatments, and disposal methods. Soft, inexpensive, and efficient agents were used in the present research to immobilize Pb in polluted sandy soil. Five agents, either naturally occurring or chemically prepared, were used for this purpose. These agents include; iron ore (72% Fe2O3), cement, a mixture of calcite and shale rich in aluminum (CASH), and two chemically prepared amorphous materials of Al- and Fe-gel. These agents were selected due to their ability to specifically adsorb heavy metals onto their surface OH functional groups, which provide permanent immobilization of metal pollutants and reduce the fraction that is potentially mobile or bioavailable. The efficiency of these agents in immobilizing Pb were examined in a laboratory experiment, in which two rates (0.5 and 1.0 %) of tested agents were added to the polluted soils containing total contents of Pb ranging from 17.4-49.8 mg/kg. The results show that all immobilizing agents were succeed in minimizing the mobile form of Pb as extracted by 0.5 N HNO3. The extracted Pb decreased with increasing addition rate of immobilizing agents. At addition rate of 0.5%, HNO3 extractable-Pb varied widely depending on the agents type and were found to represent 21-67% of the initial values. All agents were able to reduce mobile Pb to levels lower than that (2.0 mg/kg) reported for non polluted soil, particularly for soils had initials of mobile Pb less than 10 mg/kg. Both iron oxide and CASH had the highest efficiency in immobilizing Pb, followed by cement, then amorphous materials of Fe and Al hydroxides.

Keywords : soil, synthetic chemical, lead, immobilization, polluted
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