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DISTRIBUTION OF SOME HEAVY METALS AMONG THE DIFFERENT FRACTIONS OF SOME POLLUTED SOILS IN EGYPT.

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ABSTRACT

A sequential extraction study was conducted according to Tessier *et al.* (1979) on Cd, Co, Pb, Cu and Zn to assess their distribution among different fractions of soils polluted due to different anthropogenic activities. It was thought that such a study will be helpful for determining the metal ion pools in the more labile forms which are of potentially toxic hazards. Results showed that the distribution of the metal ions among the different soil components varied from an element to another and also from a soil to another. However, the summations of soluble and exchangeable fractions of these metal ions which are considered the most biologically active fractions were rather low. In this concern, Cd and Co showed the highest percentages of soluble plus exchangeable fractions in spite of their low total contents in soils. Percentages of carbonate bound fractions of the metal ions were relatively higher than the corresponding exchangeable ones. Generally, the Fe-Mn oxides bound- fractions exceeded the corresponding carbonate bound ones (except in Arab Abou-Saed calcareous soil, where the opposite was sometimes true). However, percentages of metal ions bound to Fe-Mn oxides differed from one metal ion to another and from one soil to another. The organically-bound metal fractions seemed generally of obviously higher percentages than the other corresponding fractions except for the residual ones. According to values of the mobility index, the metal ions followed the descending order: Co > Cd > Pb > Zn > Cu. This sequence indicates that Co and Cd may have greater environmental risk than the other studied metal ions in spite of their low total contents.

INTRODUCION

Metalliferous mining and smelting, electroplating, industrial wastes, chemical and other manufacturing industries, chemical fertilizers, pesticides, vehicle exhausts and irrigation with industrial waste waters are the most important anthropogenic sources of soil pollution (Atia, 2005 and Abbas, 2007). Land application represents an economically desirable outlet for the producers of a waste and a potential cheap source of organic matter and fertilizer elements for landowners (Iwegbue *et al.*, 2006). In addition to the potential beneficial components, some waste materials may also contain non-essential elements, persistent organic compounds and microorganisms that may be harmful to plants (Mullin and Mitchell, 1994 and Lwegbue *et al.*, 2005).

The chemical forms of the heavy metals affect their mobility and bioavailability and accordingly their absorption by plant, therefore remediation of the soils polluted with heavy metals is dependent, to a large extent, on recognition of distribution of the heavy metals among the different soil fractions (Sánchez- Martin *et al.*, 2007).

Sequential extraction technique was adopted by many investigators to assess reactivity of the different species of various heavy metals in soils. El-Gendi (2003) in a fractionation study on Cd, Co, Cu, Pb and Zn in Al-Gabal Al-Asfar soil, Qalyoubia Governorate, Egypt found that these metals were distributed among the different soil fractions