Establishment of the Toxicity Ranking Order of Heavy Metals and Sensitivity Scale of Benthic Animals Inhabiting the Lagos Lagoon

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Abstract

A toxicity ranking order/scale for some pertinent metals (zinc, cadmium, lead, copper and mercury) in the Lagos lagoon was established by testing metallic salts against three typical lagoon animal species. Within limits of slight variations, Hg was found to be most toxic of the test metal compounds followed by Cd, Cu, Zn and Pb in a decreasing order of toxicity against *Tympanotonus fuscatus, Clibanarius africanus* and *Sesarma huzardi.* On the basis of the computed toxicity factors (96 h LC_{50} ratios), Hg was found to be 5-3810 times more toxic than the other test metals against the exposed animals. The establishment of the sensitivity scale for the test animals revealed that, generally, *C. africanus* was the most sensitive animal followed by *T. fuscatus* and *S. huzardi* in a decreasing order of sensitivity. On the other hand, with regards to tests involving the Hg compound, *S. huzardi* was found to be the most sensitive test animal contrary to the sensitivity ranking order established for other metals tested. The importance of the toxicity ranking order and sensitivity scales in choosing heavy metal based raw materials and establishing safe limits of pollutants is discussed.

Introduction

Due to the high risk of biological damage posed by heavy metals from industrial and domestic sources over long periods in aquatic and terrestrial ecosystems, considerable research on metal pollution has taken place in the industrialized countries of Europe, America and Asia. For example, Krishnaja *et al.* (1987) evaluated the acute toxicity of some heavy metal salts against the intertidal crab, *Scylla serrata,* in India. They observed that phenyl mercuric acetate with the LC_{50} value of 0.54 mg/l was the most toxic and lead nitrate with LC_{50} (370 mg/l) the least toxic. Khangarot *et al.* (1982) also demonstrated that Hg^{2+} was the most toxic where different metallic compounds were tested singly against the freshwater pulmonate snail, *Lymnaea acuminata,* in Indonesia.

However, research work in Nigeria on the toxicity of heavy metals is scanty and recent, with considerable information gaps particularly on the biological effects of these pollutants on local plant and animal species (Oyewo, 1998). Therefore, it is necessary to establish dose-response relationships where locally available animals/plants species are exposed to varying concentrations of heavy metals, in order to extrapolate lethal (LC_{50}/LD_{50} values) and sublethal concentrations. These derived toxicity indices are used as a tool in heavy metal pollution identification, control and