ABSTRACT

This study investigated the interactions of essential and non-essential trace elements when present in binary mixtures and resultant effects on acute toxicity in fish. The effects of four essential trace elements; Zn, Ni, Co and Cr respectively on the acute toxicities of three non-essential trace elements; Cd, Hg and Pb against *Clarias gariepinus* and *Sarotherodon melanotheron* were assessed using laboratory bioassays. The patterns of interaction of the elements affecting toxicity via antagonistic, synergistic or additive reactions were determined using the Synergistic Ratio (RA) and Concentration Addition (CA) joint action toxicity models. Single action toxicity indices showed that Hg was the most toxic element with a 96hr LC_{50} value of 0.0004 and 0.0003 mmol/l and Co the least toxic element with a 96hr LC_{50} value of 0.86 and 1.00 mmol/l, against the two fish species respectively. The SR and CA toxicity models showed that the essential trace elements (Zn, Ni, Cr and Co) reduced the toxicity of Pb against *C.gariepinus* as indicated by SR and RTU values < 1. Both models also showed that Zn reduced the toxicity of Pb and Hg respectively against *S.melanotheron*. However, the SR model showed that only Co reduced the toxicity of Cd against *C.gariepinus*. This study has established the possible beneficial interactions among essential trace elements and hazardous non-essential trace elements. Factors influencing such beneficial interactions including physiological processes in fish species, trace element concentrations and physicochemical parameters of exposure medium should be explored in future studies.