



Environmental geochemistry, chemical speciation, and bioavailability of lead metal pollution in water and surficial bottom sediments of Burullus Lagoon, Egypt

¹Abd El-Monsef Ahmed El- Badry* and ²Ahmad Mohamed El-Kammar

¹National Institute of Oceanography and Fisheries, Aswan Research Station, Egypt

²Geology Department, Faculty of Science, Cairo University, Egypt

Abstract: Burullus Lagoon is a part from of a river Nile valley system. It is located on the northwestern side of Nile Delta. The lagoon has a shallow depth and brackish water and receives drainage water through several drains at its southern and north-eastern sides. Boughaz El-Burullus connects the lagoon with the Mediterranean Sea, which.

Understanding the mobility and bioavailability of lead metal in the bottom sediments of the Burullus Lagoon is substantial for the design of remediation processes and the institution of environmental recommendation for lead metal pollution. Single extractions using fractionation of Pb metal from twenty-one samples into five operationally defined groups: exchangeable (EXC), carbonate (CA), Fe-Mn oxy-hydroxides (FM), organic (OM) and residual (RES) fractions. The chemical analyses preceded using atomic absorption spectrometry after using the digestion technique. Lead distribution patterns in lagoon's water increase toward northeastern directions, possibly due to flocculation processes close to her lagoon inlet while the average content of lead in the studied sediments (156 ppm) is about eight-fold the average earth's crust. Pb was mostly bound to the residual fraction (186 ppm). The next most important fraction for Pb was the exchangeable fraction (100 ppm) followed by the carbonate and organic fractions (45 ppm) then the Fe-Mn hydroxide fraction (13 ppm). The fractions in terms of lead levels was in the order RES > EXC >> OM > CA > FM.

Ecological pollution index for lead and its fractions shows that the metal speciation pattern is above the critical level that indicates that all metal species posed high-risk assessment to surrounding ecosystem in short or medium-term, except for the Fe-Mn hydroxide fraction. Anthropogenic activities count as the main reason for pollution in the lagoon. Bureaucracy program for monitoring the concentrations and apportionment of lead in the water lagoon, sediments, fish and other aqueous organisms related to food chain is recommended to decree.

Keywords : Burullus Lagoon, bottom sediments, pollution, Pb, Egypt.