

Evaluation of urban stream environments from heavy metal concentrations of sediments, Japan

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A Zn- Fe₂O₃ discrimination diagram is proposed to evaluate sedimentary environments using geochemical data from coastal lagoon, tidal flat, lake and fluvial sediments. The concentration of zinc is sensitive to change in redox conditions. Zinc tends to be soluble in a reducing condition with divalent iron, and may accumulate as a sulfide mineral or be adsorbed to organic matter. Bulk geochemical composition, however, is also related to source material, and varies with grain size. Zinc behaves similarly to iron in igneous process and may form compositional trends on Zn-Fe₂O₃ cross plots. Concentrations of Zn and Fe₂O₃ of normal sediments plot above the igneous compositional trend, and have steep inclination, suggesting enrichment of Zn over iron in finer grained sediments. Zn- Fe₂O₃ data from coastal lagoon in cities such as Hiroshima Hakata and Okayama show further enrichment of Zn over that of normal sediments. Data from larger cities such as Osaka city plot significantly above the Hiroshima trend, which identifying pollution from artificial activity, such as vehicle emission and factories. Pb- Fe₂O₃ diagrams are also useful for evaluation of environments. However, considering the greater concentrations of Zn in sediments (80-100 ppm) compared to Pb (20-40ppm), discrimination for different environments by Zn-Fe₂O₃ diagrams is easier than that offered by Pb- Fe₂O₃ cross plots.