

S14: Development of a Reliable and Robust Method for the Detection of Ng/L Concentrations of Lipid - Soluble Metal Complexes in Natural Waters

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In natural waters trace metals are present in a wide range of physico – chemical forms or species. It has been demonstrated that the toxicity of these trace metals to aquatic organisms is related in many cases to the activity of the free metal ion species. However, several studies have shown that the toxicity of lipid - soluble metal complexes, formed by the reaction of metals with synthetic and natural organic ligands may exceed that of the free metal ion. Surprisingly, there have been very few studies conducted that seek to identify and quantify lipid-soluble metal complexes in aquatic systems. A method was developed for the determination of ng/L concentrations of lipid soluble cadmium, copper, nickel, lead and zinc complexes in waters. Waters were extracted under clean room conditions with 1-octanol, followed by metal determination by Graphite Furnace Atomic Absorption Spectrometry and Inductively Coupled Plasma Mass Spectrometry. Neutral inorganic lipid soluble metal complexes that extract into octanol were identified. This is significant as much of the literature deals with complexes that are formed between metals and organic ligands. Neutral inorganic lipid soluble metal complexes may represent a second class of lipid soluble metal species that have as yet to be adequately investigated.

S15: A Comparative Study of Two Digestion Techniques for the Analysis of Heavy Metals in Tropical Estuarine and Coastal Sediments by ICP-OES

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This study describes the utilisation of two fast digestion techniques, closed-vessel microwave-assisted extraction and alkaline fusion method, for the determination of Al, As, Cd, Cr, Co, Cu, Fe, Mn, Ni, Pb and Zn from surface sediments of contaminated estuary and coastal areas in Fiji. The accuracy of the digestion procedures were verified using certified reference sediment (NIST SRM 8704). The results for reference material obtained by the acid digestion method were compared with those by the alkaline fusion digestion method to judge the applicability of both methods for routine heavy metal determination in sediments by inductively coupled plasma optical emission spectrometry (ICP-OES). The results of the analysis were statistically treated by means of students' t-test analysis and correlation analysis. Application the two digestion procedures to Lami estuary sediments showed a significant difference between results achieved by both digestion methods for all the metals studied. However, regression analysis indicated a good correlation between both digestion methods for Al, Cr, Co, Cu, Fe, Mn, Pb and Zn, which suggests that both methods may be equivalent for determining these elements in the study area. Closed-vessel microwave-assisted extraction was highly efficient over alkaline fusion digestion method for minor and volatile elements such as arsenic. The alkaline fusion technique gave good results for Al, Cu, Fe and Mn.