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## AN EVALUATION OF THE DETERMINABILITY OF LOW LEVEL DIOXIN CONCENTRATIONS BY HRGC/LRMS-NCI

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### Abstract

High resolution gas chromatography coupled with high resolution mass spectrometry systems are often used for the analyses of dioxins at low concentrations in environmental sample matrices such as soil, vegetation, sediment, air and food. Since the construction and operation costs of these systems are so expensive, the most of the laboratories in the developing countries haven't the systems with high resolution mass spectrometry. Thus, cheaper systems with similar sensitivity such as high resolution gas chromatography coupled with low resolution mass spectrometry systems in negative chemical ionization mode may be beneficial to assess the dioxin pollution levels in environmental samples before the elaborate studies on dioxin contamination and stochastic risk assessment. In this manuscript, 17 toxic congeners of dioxins were analyzed by a system with low resolution mass spectrometry. The sensitivity, stability and resolution power of the system for the analysis of dioxins were investigated. The calibration experiments in 3 different periods were studied and the minimum detection limits were determined by using the labeled and unlabeled standard solutions. The differences according to operation conditions of the ion source were examined and expounded by using relative response factor and relative standard deviation values obtained from sequential injections. Finally, it was performed a sample analysis program for some local food samples with the aim of observing the feasibility of the system on food samples that have very low level dioxin concentrations such as egg and cow's milk. It was found that the systems with low resolution mass spectrometry in negative chemical ionization mode are capable to fulfill the requirements for the environmental analyses of dioxins at ppt levels, with the exception of 2,3,7,8-TCDD showing lower sensitivity in negative chemical ionization. Thus, using the systems with low resolution mass spectrometry in negative chemical ionization mode may be recommended for the some environmental studies for dioxins in the absence of the systems with high resolution. On the other hand, the proposed methodology cannot be used for the direct analysis of dioxins without improvement of 2,3,7,8-TCDD detection and quantification.

*Key words:* gas chromatography, mass spectrometry, negative chemical ionization, dioxins

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