# Principles and Techniques towards Successful Development of Enzyme-Linked Immunosorbent Assay (ELISA) for Dioxin Analysis

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## Abstract

Dioxins are highly toxic, persistent and bio-accumulative compounds. Laboratory detection of dioxins in various environmental matrices is one of the most technically demanding and expensive tasks in analytical chemistry. The cost to analyze a soil sample by conventional gas chromatography-high resolution mass spectrometry (GC-HRMS) is approximately $1900 USD according to the United States Environmental Protection Agency (US EPA) (Billets, 2005). As an alternative, enzyme-linked immunosorbent assay (ELISA) for dioxin analysis has been commercially available for over a decade and recognized as US EPA Method 4025. However, assay attributes need to be examined, especially at trace level detection. In this study, sources of error in ELISA, such as background contamination and dioxin-like polychlorinated biphenyl (dl-PCB) cross-reactions have been investigated. Quality assurance data on spikes have been reviewed and the recovery was estimated to be 70%. Technical details that are crucial for the performance of dioxin ELISA were also identified and addressed.