

## The Long Term Monitoring of Ordnance Related Compounds

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### ABSTRACT:

Long term monitoring of waste disposal sites for Ordnance Related Compounds, ORCs, using the Environmental Protection Agency Method 8330A, high performance liquid chromatography, is a costly analytical technique for which there is not a current comparable alternative. This has inspired research and development of fast, low cost techniques to similarly detect parts per billion concentrations of ORCs such as such as 2,4,6-TNT and 2,4-DNT in ground water. In collaboration with the U.S. Army Engineer Research and Development Center, Columbia University Department of Chemical Engineering has on-going research efforts combining electrochemical engineering, microfluidics, and protein engineering with a goal of developing engineering fundamentals to enable *in-situ* detection of ORCs. Recent efforts included examination of adsorptive effects of ORCs to a gold rotating disc electrode surface endowed with an alkanethiol self-assembled monolayer at pH 2, 4, and 7. Over this pH range, the peak current response decreased while the peak potential became more positive. In some cases, at pH 2, hydrogen evolution masked detection of the analyte. Similar behavior was observed in a microfluidic device. This work increased understanding of the system parameters for future optimization. The current focus is on development of a microfluidic device that will selectively detect concentrations of an ORC from roughly nanomolar quantities to reliably detectable levels via electrochemical methodologies.

KEYWORDS: rotating disk electrode, self-assembled monolayer, micro-fluidics

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