Detailed Analysis of Contaminants in Samples Obtained From Talbert Marsh via GC×GC-FID Methods

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Objective: To discover, analyze, and measure the concentrations of potential contaminants in the Talbert Marsh using solvent extraction methods and comprehensive two-dimensional gas chromatography equipped with flame ionization detection

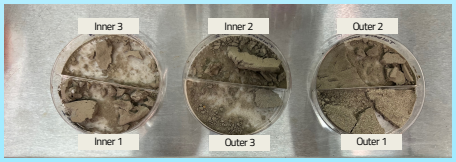
Introduction

- October 2021 - Pipeline linking the Port of Long Beach to an offshore oil station failed
- 140,000 gallons of post-production crude oil spilled into ocean
- Collecting sample from Talbert Marsh (Huntington Beach, CA)
- Record the progression of the hazardous chemical concentrations found in Talbert Marsh over a one-year period

Methodology

- Six samples collected from six different locations in Talbert Marsh
  - Outer (3 total)
  - Inner (3 total)

- Hydrocarbon compounds extracted from marsh samples using solvent extraction method: acetone-ethyl acetate-water solvent (50:40:10) [1].
- Solid-Liquid mass ratio for extraction (1:2)
- Shaker>centrifuge>GC×GC-FID

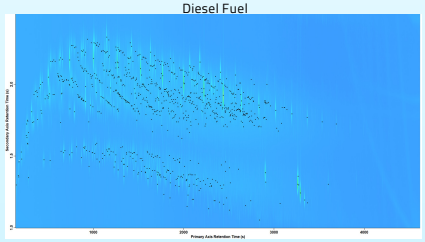


Results

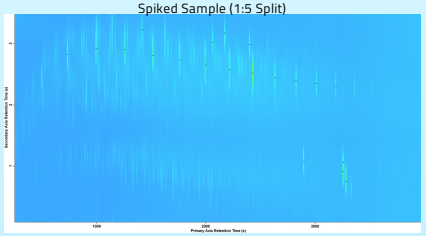
Validation of extraction and GC×GC-FID method:

- Soil samples were spiked with diesel fuel > solvent extraction > GC×GC-FID
- Two split ratios were tested – 1:5 and 1:1
- GC×GC chromatograms were compared

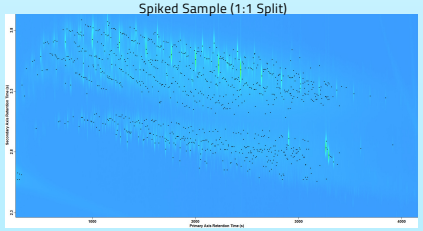
Diesel Fuel



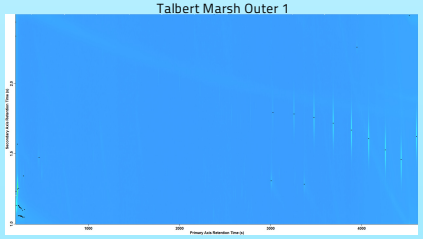
Spiked Sample (1:5 Split)



Spiked Sample (1:1 Split)



Talbert Marsh Outer 1

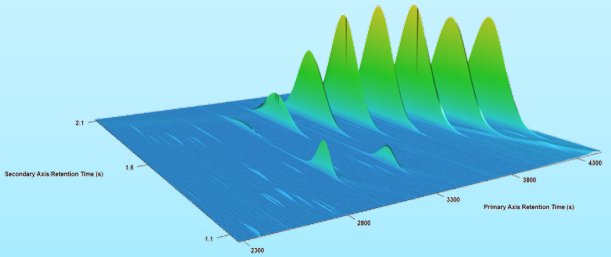


Analyzing Talbert Marsh samples:

- All six samples were analyzed
- Outer 1 shows highest hydrocarbon concentration

Conclusion and Future Work

- Acetone-ethyl acetate-water solvent
- Split 1:1 yields higher concentration hydrocarbons
- Use GC-MS to identify the compounds on Outer 1
- Continuing to collect and analyze more samples from Talbert Marsh
- Concentrate the samples to pass the limit of detection



References

- [1] A. Silva, C. Delerue-Matos, A. Fiúza, *Use of solvent extraction to remediate soils contaminated with hydrocarbons*, (2005).
- [2] X. Li, Y. Du, Z. Li, *Solvent extraction for heavy crude oil removal from contaminated soils.*

Acknowledgements

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