



## Application of PIONA GC-FID in Oil Spill Studies: Detail Hydrocarbon Profiling

Mahyar Sakari<sup>1,2\*</sup>, Ryan Staub<sup>1</sup>, Lisa Neville<sup>3</sup> and James MacDonald<sup>3</sup>

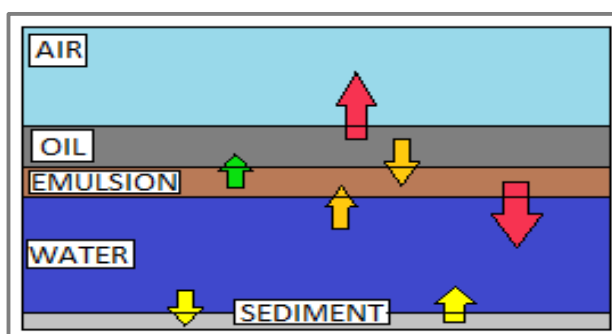
1. Petroleum Testing Services, AGAT Laboratories; Calgary, AB, T2E6V6, CANADA
  2. Environment and Sustainability, Royal Roads University, Victoria, BC, V9B 5Y2, CANADA
  3. Technical Sciences, AGAT Laboratories; Calgary, AB, T2E7P7, CANADA
- Email: [sakari@agatlabs.com](mailto:sakari@agatlabs.com), [mahyar.sakari@royalroads.ca](mailto:mahyar.sakari@royalroads.ca)

Accepted on 17<sup>th</sup> October, 2019

### ABSTRACT

The fate of oil in the marine environment after an oil spill depends on the physical and chemical characteristics of the spilled oil, the marine environment itself and weather conditions. In this lab based experiment, sea water was generated and exposed to two types of light and heavy Alberta based oil types then were left in the lab for time intervals of 6 h, 30 h and 1 week. The water column beneath the spilled oil was collected and extracted for the presence of BTEX using Hexane: Dichloromethane mixture (3:1). The floating oil was collected and treated with isooctane. Samples were analyzed using a PIONA GC-FID for the presence of BTEX. The results showed that floating oil demonstrates significant loss of BTEX, which was being released to the water column and evaporated to the air. The release of BTEX from the lighter oil to the air and the water column showed a linear decreasing trend while the heavier oil showed an irregularity. BTEX concentrations in the water column increased 2-3 times in the first 24 h in the lighter oil while the heavier oil did not show a meaningful change. This study revealed that 80-97 % of benzene species that existed in the crude oil reached the water column during the experiment in various concentrations. The results of the work in this study demonstrate that BTEX compounds were predominantly released to the air or remained in the emulsion layer. This study verifies the principle that a quick response to clean the contaminated site reduces BTEX release to the atmospheric environment.

### Graphical Abstract



Formation of various layers in a spill condition. Red arrows are considered harmful to the human health and the environment, green shows a positive re-association of emulsified compounds to the oil and yellow show potential of staying in the target layers

**Keywords:** PIONA, Oil Spill, BTEX, Benzene Species, Emulsion Layer.

---