

Direct quantification of hydrocarbons using Mass Spectrometry incorporated with soft ionization technique

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Introduction

Analysis of hydrocarbons with mass spectrometry remains a great challenge due to the lack of suitable ionization techniques for such non-polar chemical species. Conventional hard ionization techniques induce molecule fragmentation that disables compound identification and quantification in complex samples. We utilize plasma ionization technique to ionize short-chain hydrocarbons, aiming to establish a quick quantification method for applications such as mud logging.

A 'coaxial' plasma-based ionization source was built by modifying the configuration reported by Harper *et al* [1], which generated metastable helium that possess enough internal energy to ionize hydrocarbons yet with reduced fragments. The ionization source was placed in front of a commercial mass spectrometer and tested with alkanes mixed in air.

Results and Discussion

The plasma-based ionization source is capable of ionizing short alkanes such as ethane at a high efficiency. Due to the existence of oxygen in air, alkane molecules are oxidized by ozone produced at the discharge region during the ionization process, resulting in a dominant ion peak $[M+O-3H]^+$ in most mass spectra. Ion signal intensity is found to be proportional to alkane concentration.

[1] Harper *et al.* (2008) *Analytical Chemistry* **80**, 9097-9014.