

## Tracing Isotope fingerprints in crude oil for petroleum exploration assessment by using GC-IRMS

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### Isotope ratio analysis of hydrocarbons using GC combustion IRMS

Materials from nature and industrial processes have a fingerprint, a unique chemical signature embedded in their structure. Isotope Ratio Mass Spectrometry (IRMS) can visualize isotope fingerprints of hydrocarbons and their precursors involved in the process of fossil fuel production. This poster presents how isotope fingerprints are used in analysis of crude oil by GC coupled with IRMS. By getting the unique information contained in isotope fingerprints, the source and formation of crude oil can be assessed. Here presented pristane and phytane isotope analysis in crude oil require highly efficient GC separation and are well known biomarkers providing biogeochemical information.

### GC-C-IRMS Method

GC combustion IRMS has been available for a number of years and has proven itself as a useful technique for the stable isotope analysis of GC injectable compounds where the components of the GC chromatogram are individually combusted to form a chromatogram of CO<sub>2</sub>. Each peak is analyzed in turn in the IRMS as it elutes from the combustion oven. Prior to the GC-C-IRMS hyphenation each component in the sample would be chemically separated, combust, and then analyzed as discrete samples; a time consuming, labour intensive routine requiring significant amounts of sample. With the current setup highly complex chromatograms, such as oils, can be analyzed in a similar time to a normal GC run.

### Conclusions

Complex gasolines can be analyzed in the GC-C-IRMS system with the precision required to make meaningful observations on the source reservoir of the oil. All with the speed of analysis and degree of automation necessary in a modern analytical laboratory.

### Acknowledgements

Mario Tuthorn, Thermo Fisher Scientific, Hanna-Kunath-Str. 11, 28199 Bremen, Germany