

Structural analysis and trace product analysis of synthetic fuels (GTL) for carbon neutral — GC x GC Q-TOF/MS —

The technology to produce fuels and other products from natural gas through FT synthesis reactions (GTL) for carbon neutral is attracting a great deal of attention. As a method to evaluate synthesized fuels in detail, we present here a case study in which GC x GC Q-TOF/MS with high separation capability was used to compare compositions and detect trace compounds.

GC x GC Q-TOF/MS : Comprehensive two-dimensional gas chromatograph-mass spectrometer

Samples

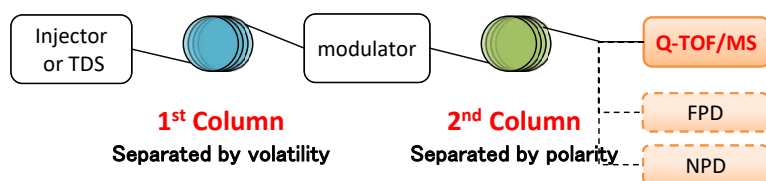
- Synthetic fuel (GTL)
- Diesel fuel (Reference)

GTL (Gas to Liquid) : Technology to create various products from gas by FT synthesis.



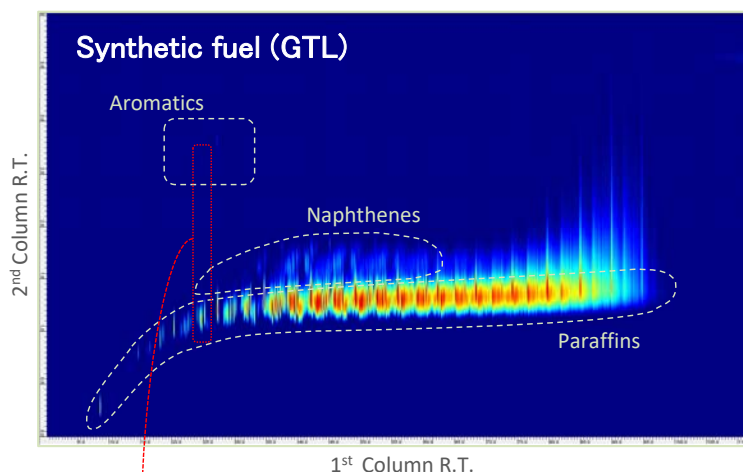
GC x GC Q-TOF/MS

- Separation by two columns with different characteristics
- Detected by high-sensitivity, high-resolution Q-TOF/MS

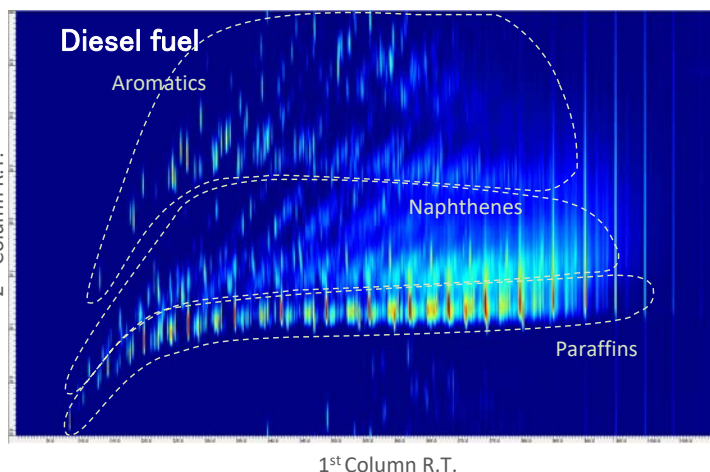


Extraction of specific elements (S, P, N) is also possible by using FPD and NPD. In addition to liquid samples, TDS can be used for analysis of gas samples.

Sample comparison by 2D chromatogram



Almost all paraffins, but trace amounts of naphthenes also detected

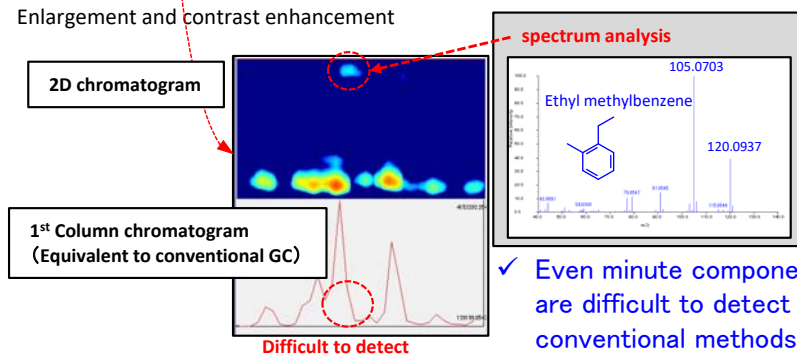


Naphthenes and aromatics detected in addition to paraffins

✓ Comparison is possible by grouping detected components based on differences in detection position.

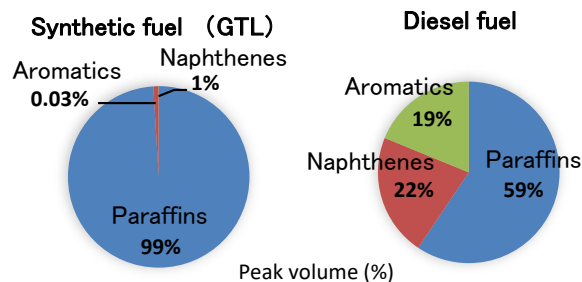
Detection of trace compounds

Enlargement and contrast enhancement



✓ Even minute components that are difficult to detect by conventional methods can be detected by 2D separation.

Type analysis of detected compounds



✓ Percentage of component groups can be calculated from detection intensity

GC x GC Q-TOF/MS can compare complex compositions such as fuels and detect trace compounds