The Waxphaltene Determinator Method for Automated Precipitation and Re-Dissolution of Wax and Asphaltene Components

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Results and Discussion

A new Waxphaltene Determinator method is based on the on-column precipitation and re-dissolution separation technique developed at Western Research Institute. Although high-performance liquid chromatography (HPLC) instrumentation and detectors are used, the separation does not involve chromatographic interaction between the material being separated and the stationary phase. It is based on freezing, melting, and solubility. The Waxphaltene Determinator uses methyl ethyl ketone at -24 ºC to precipitate waxes and asphaltenes. The precipitated material is re-dissolved in four steps by use of a series of three solvents of increasing polarity, at different temperature: heptane at -24 ºC, heptane at 60 ºC, toluene at 30 ºC, and methylene chloride:methanol (98:2 v:v) at 30 ºC. This approach allows the detection of waxy, polar, and pericondensed aromatic components in minutes.[1] Note the need for ultrahigh mass resolution to identify the various components (see **Figure 1**).

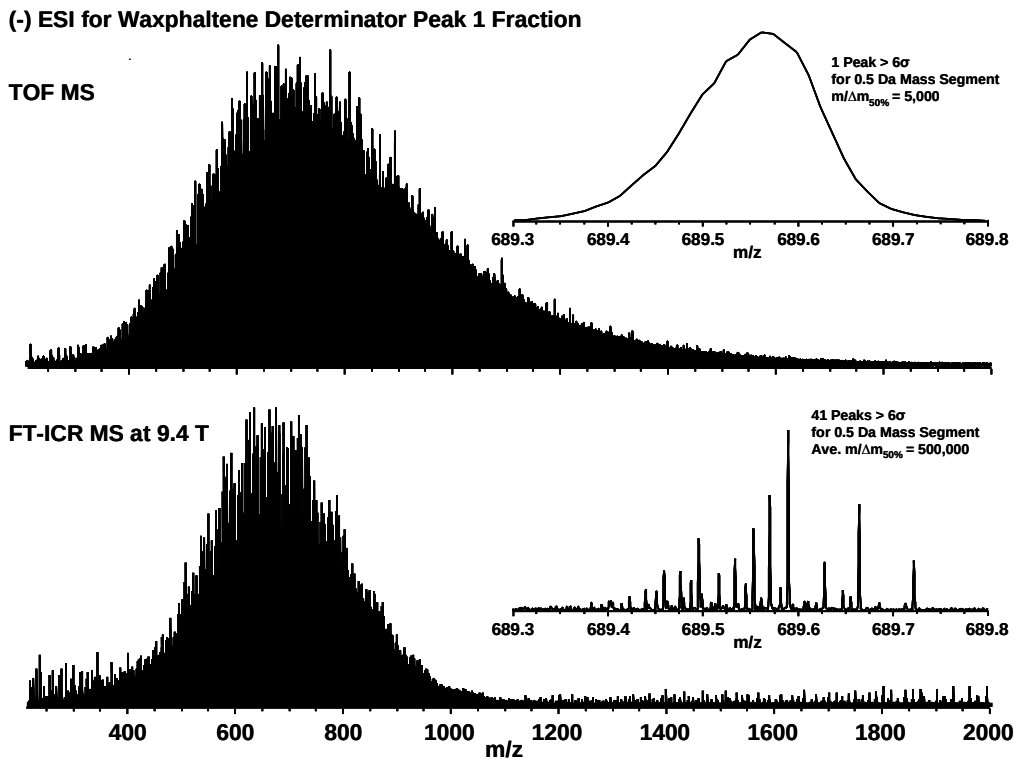

Figure 1. Negative Ion ESI TOF mass spectrum (top) vs. FT-ICR mass spectrum (bottom) of Waxphaltene Determinator Peak Fractions 1. The corresponding zoom insets show the necessity for ultrahigh resolution provided by FT-ICR MS to resolve and identify the thousands of peaks in the spectrum.

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References

[1] Schabron, J. J., *et al.*, Energy & Fuels, **26**, 2256-2268 (2012).