# Joint Industrial Case Study for Asphaltene Deposition

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## Results and Discussion

Here, we present a case study for a Wyoming well with known asphaltene deposition issues as a result of natural depletion. Field deposits and crude oil from the same well were collected for analysis. Compositional differences between field deposits, lab-generated capillary deposits, and $C_7$-precipitated asphaltenes were determined by Fourier transform ion cyclotron resonance mass spectrometry (FT-ICR MS), and all three samples show similar trends in composition, displayed as plots of aromaticity versus carbon number (**Figure 1**). An enrichment of highly condensed aromatic molecules for the field deposit is detected with both ultrahigh-resolution mass spectrometry and thermal cracking experiments, and could predict asphaltene deposition. FT-ICR mass spectral analysis of solvent-extracted fractions suggest different deposition mechanisms for field deposits (slow deposition) compared to rapid precipitation in standard asphaltene preparation protocols that contain trapped maltenes.

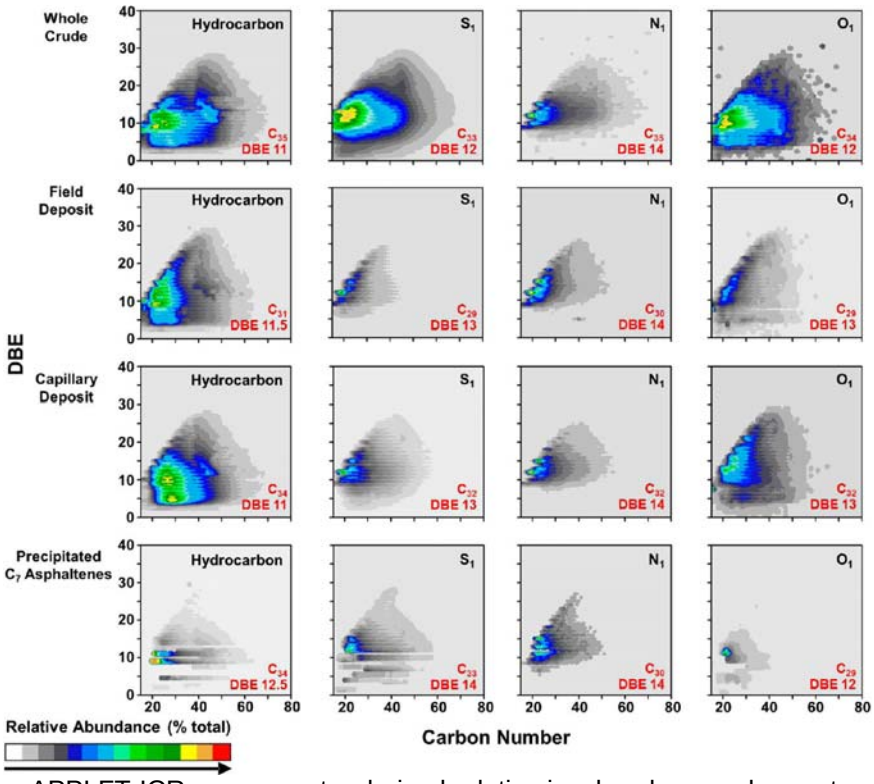


**Figure 1**. Positive-ion APPI FT-ICR mass spectra derived relative isoabundance color-contoured plots of double bond equivalents (DBE) versus carbon number for hydrocarbon, $S_1$, $N_1$, and $O_1$ class species from the Wyoming crude oil, and deposits from the field, capillary deposition experiment, and heptane-precipitated asphaltenes.

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## References

[1] Juyal, P., *et al*., Energy & Fuels., **27**, 1899-1908 (2013)