Supporting Information

Isolation of Crude Oil Peaks Differing by ~*m/z* 0.1 via Tandem Mass Spectrometry using a Novel Cyclic Ion Mobility Mass Spectrometer

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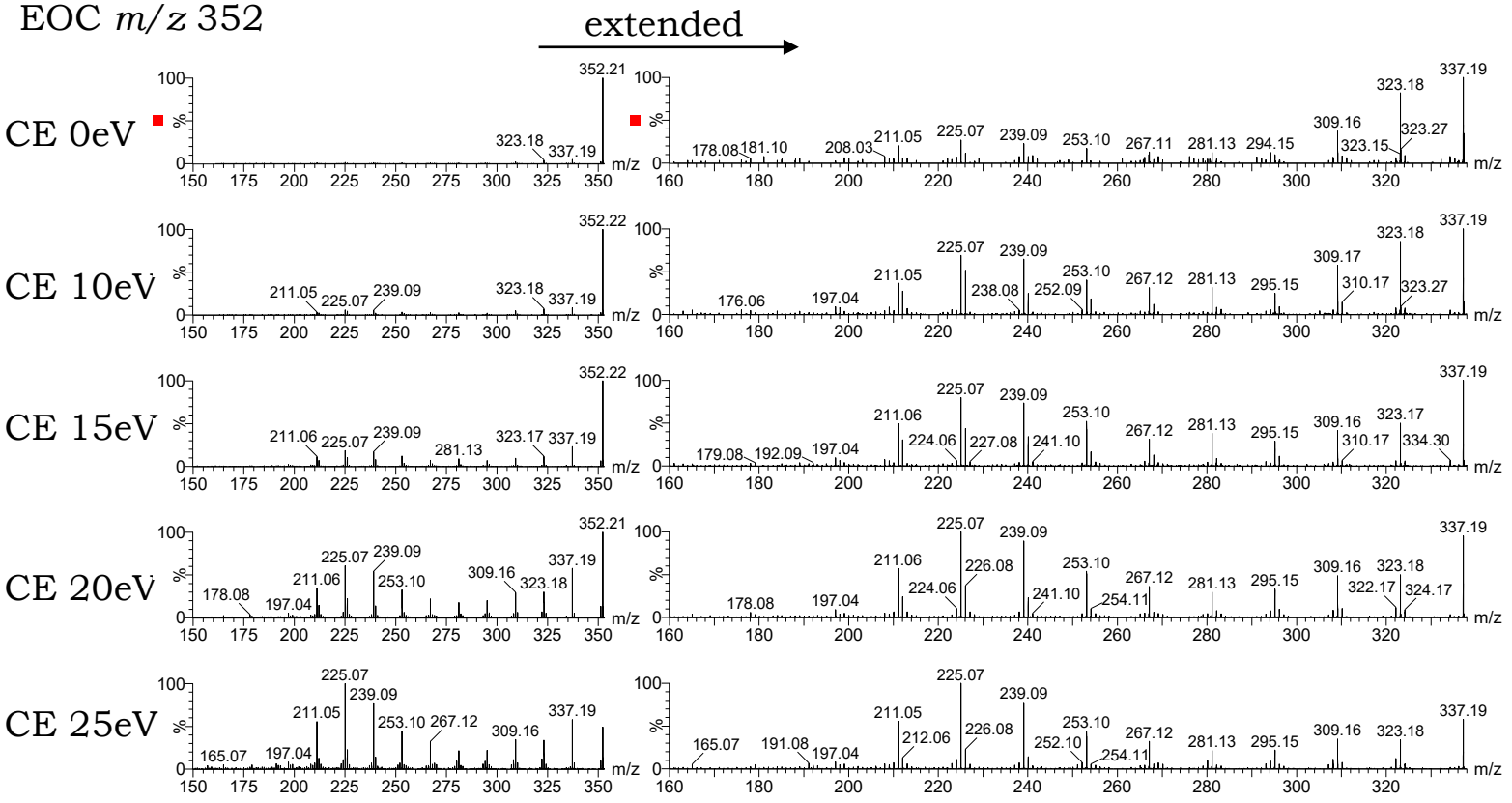
Table S1. The properties of crude oil samples used in this study.

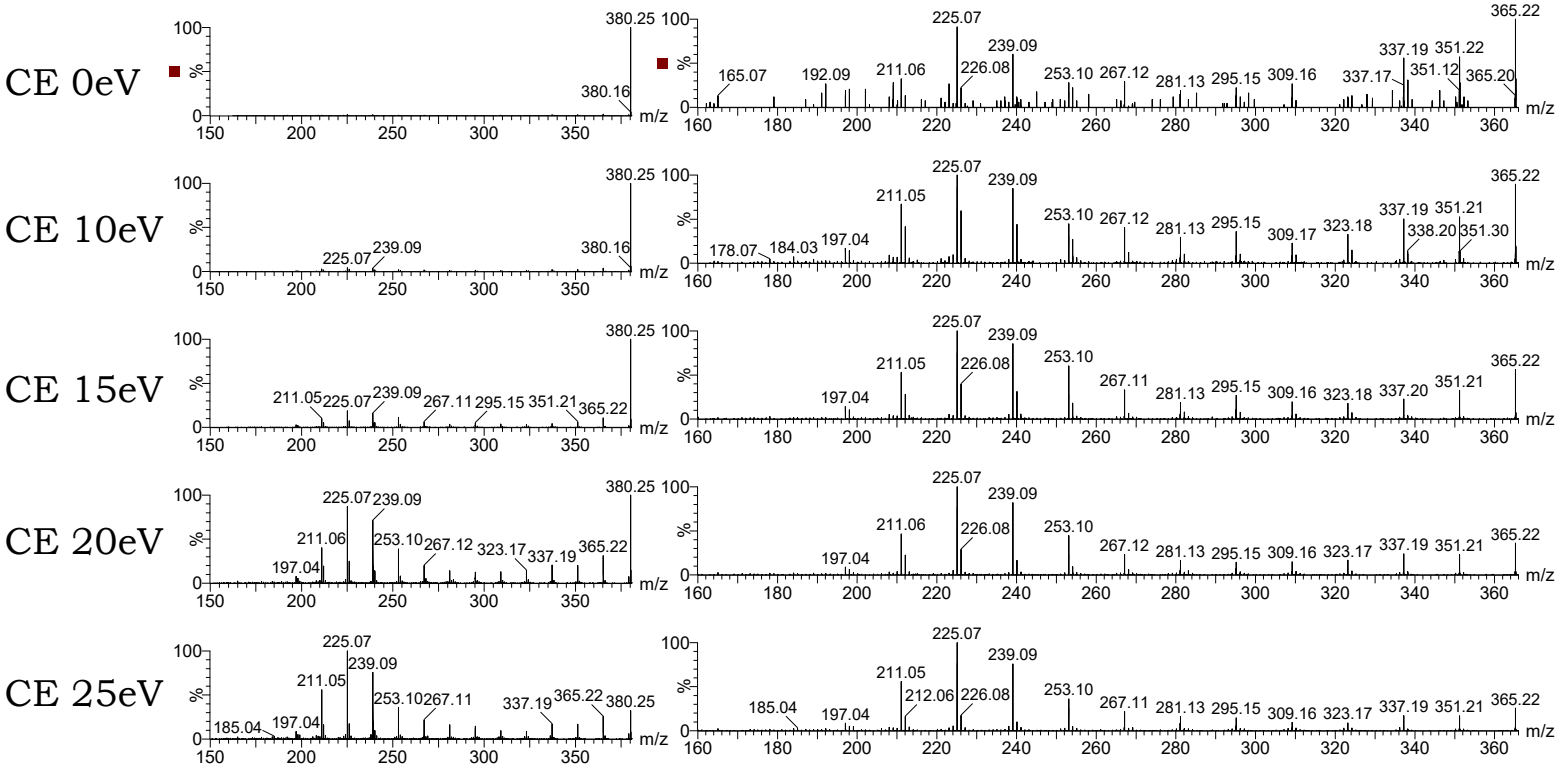
Name	Eocene (EOC)	Escalante (ESA)
Sulfur, wt%	4.79	0.18
N, wt ppm	2136	3532
TAN	0.27	0.79
API	18.3	23.1
Fe, wt ppm	2.3	11.5
V, wt ppm	54.6	3.7
Ni, wt ppm	21.4	3.9

Figure S1. The tandem mass spectra of Eocene crude oil at specified collision energies (CE).

EOC *m/z* 352



EOC *m/z* 380



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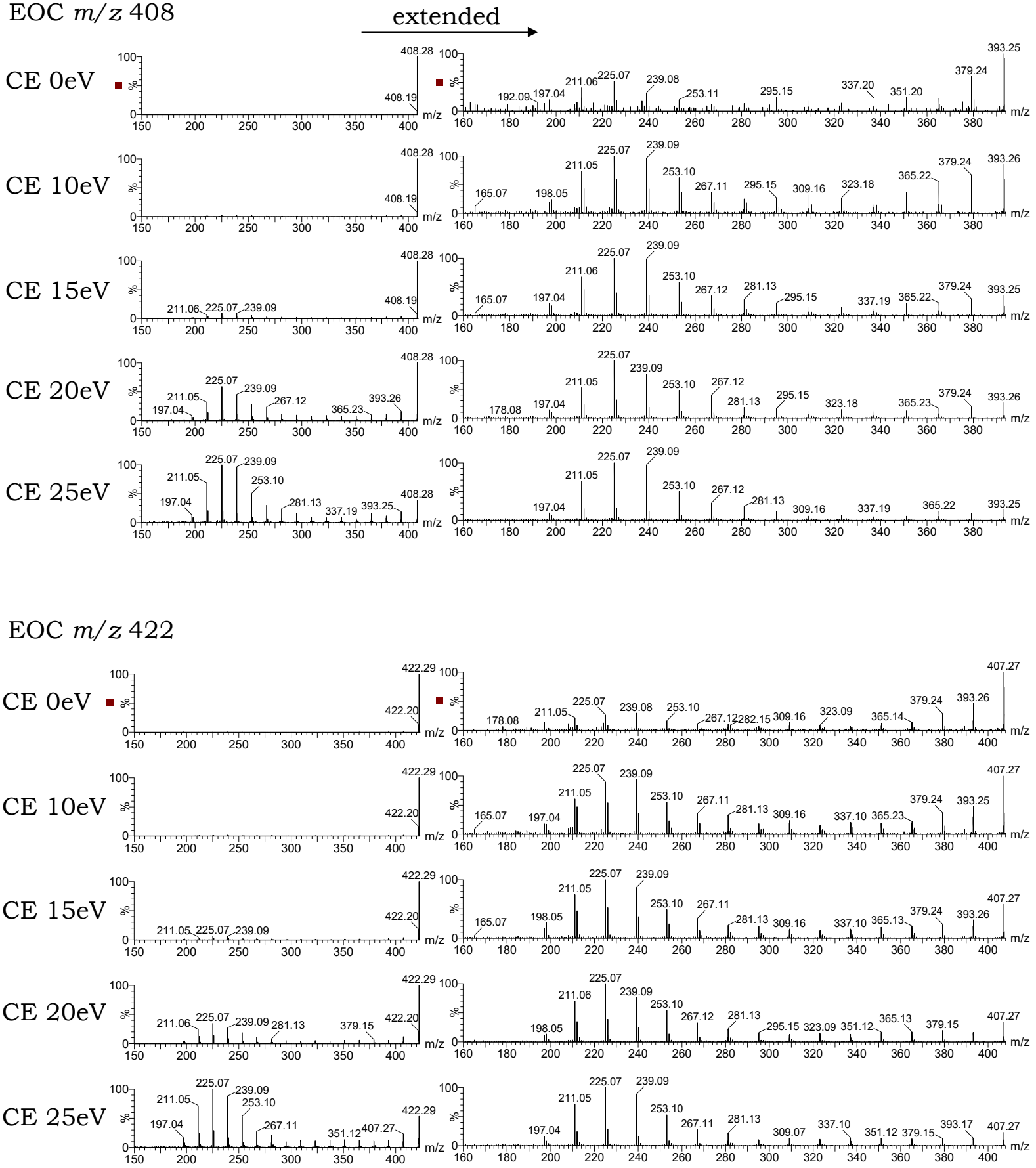


Figure S1. The tandem mass spectra of Eocene crude oil at specified collision energies (CE).

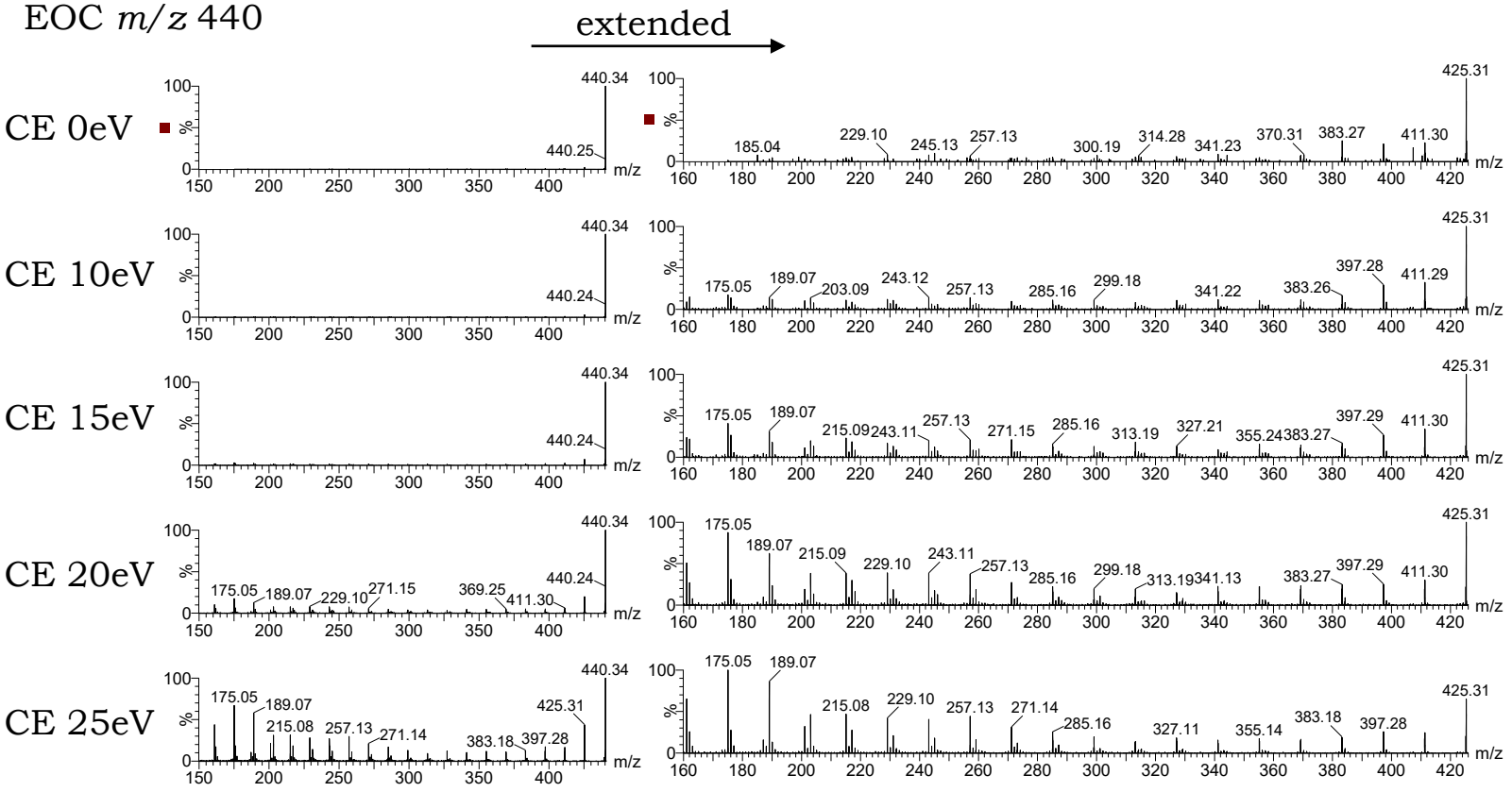


Figure S2. (a) Full spectrum of Eocene crude oil sample obtained with (+) APPI cyclic ion mobility MS. (b) The expanded spectrum of Eocene crude oil at *m/z* 436 with (+) APPI FT-ICR MS (the expanded spectrum with (+) APPI cyclic ion mobility MS is provided in Figure 3).

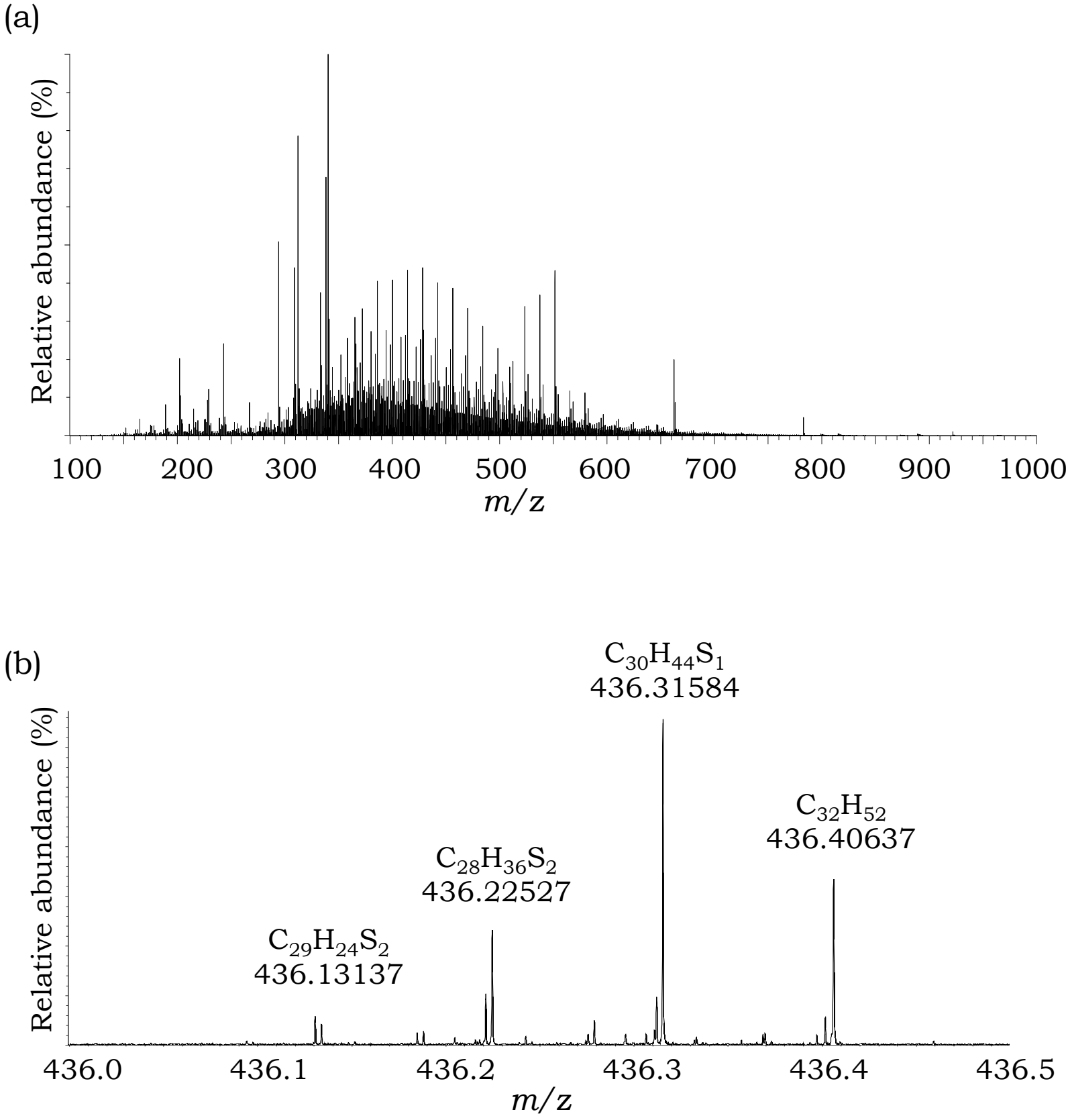


Figure S3. (a) Broadband spectrum and time domain of Escalante crude oil sample obtained with (+) APPI FT-ICR MS. (b) Full spectrum obtained with (+) APPI cyclic ion mobility MS.

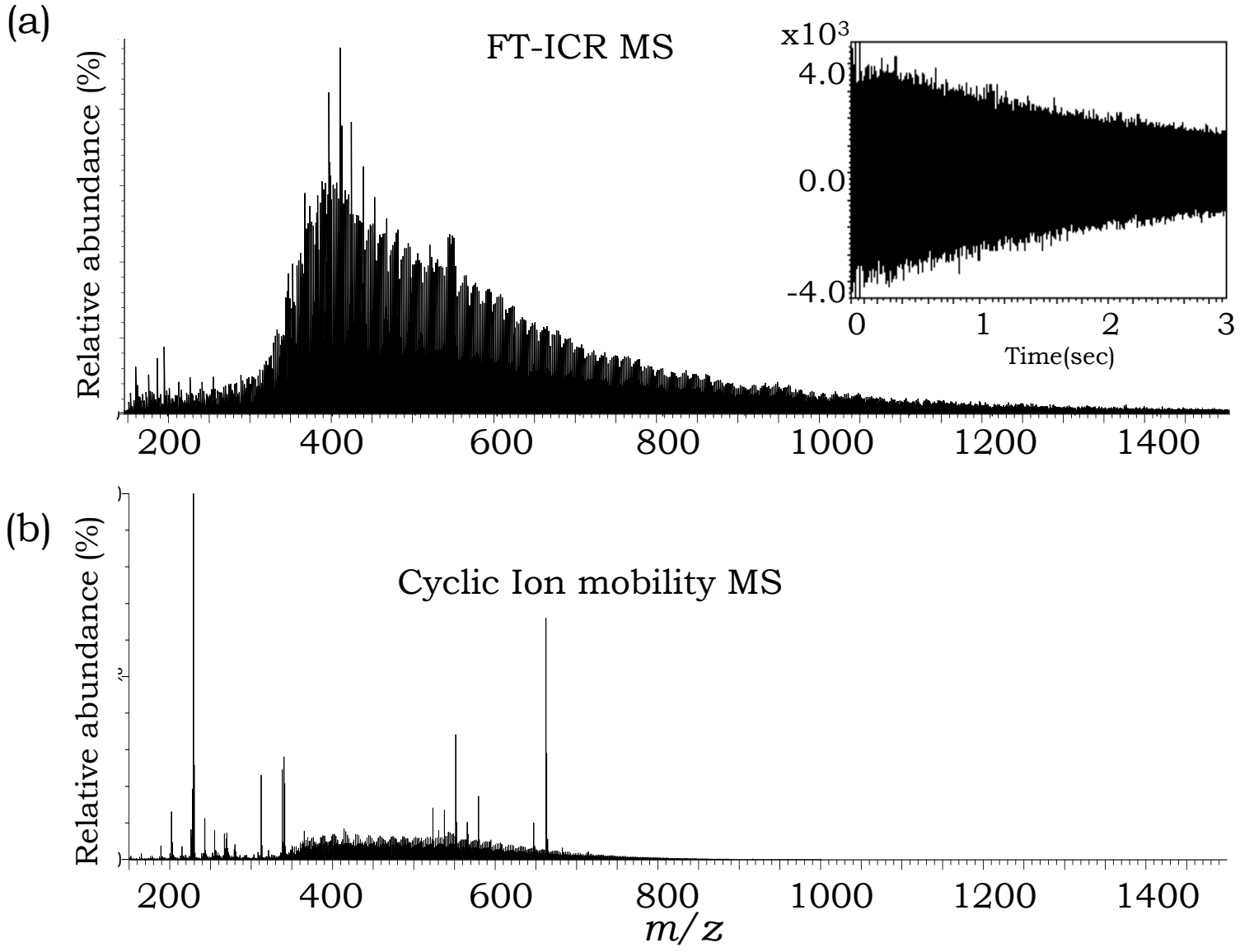


Figure S4. The tandem mass spectra of Escalante crude oil sample obtained in *m/z* 100-400 with (+) APPI cyclic ion mobility MS.

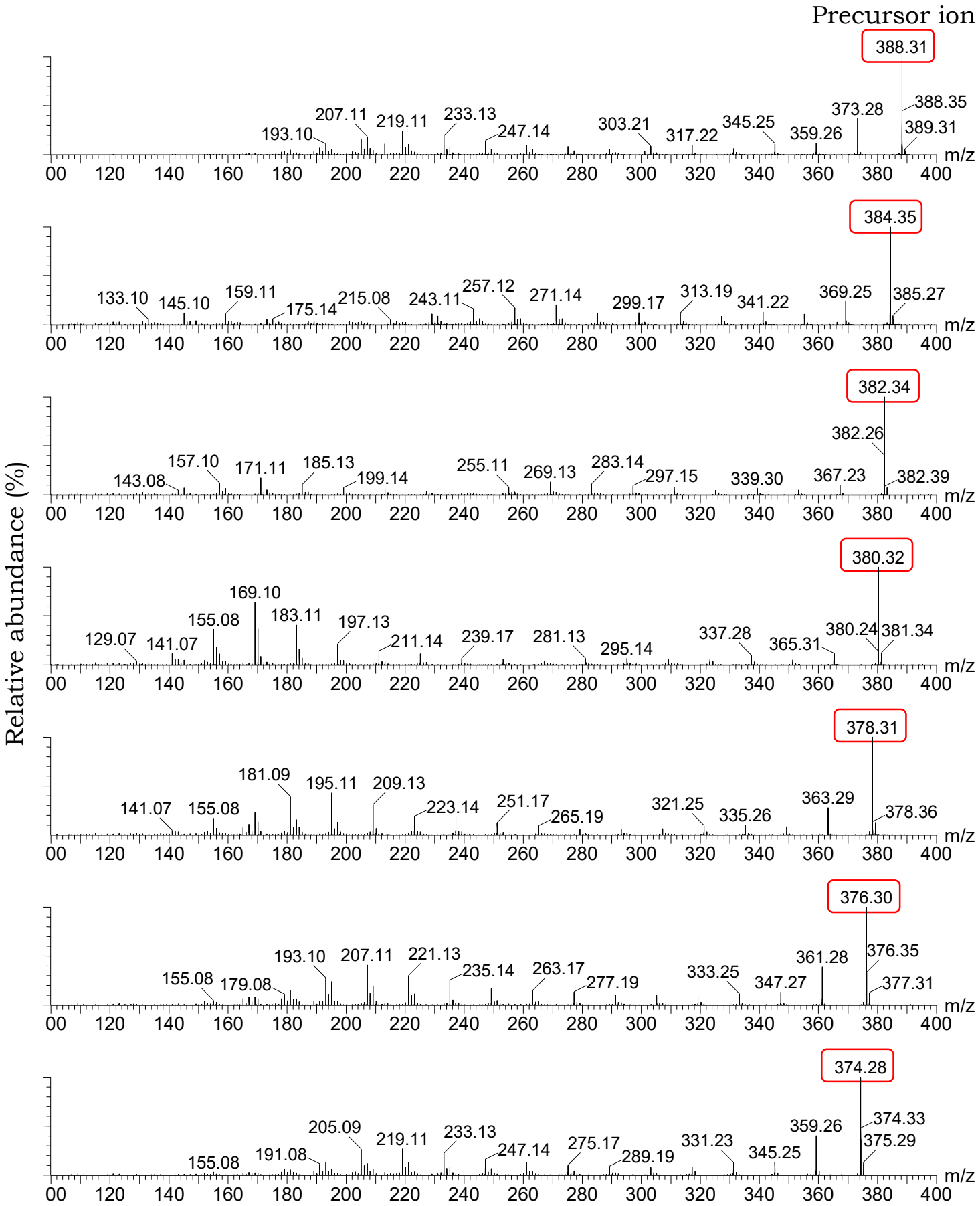
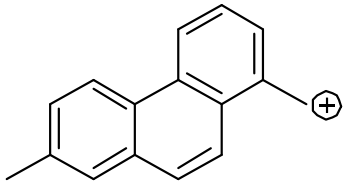
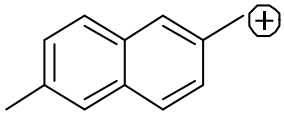
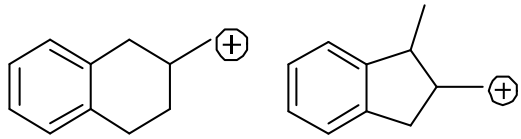


Figure S5. The structure and information for the expected ions.

Name	Dimethyl phenanthrene	Dimethyl naphthalene	Methyl-tetraline or Dimethyl indane
Structure			
Molecular weight (g/mol)	205.10118	155.08553	145.10118
Composition	$C_{16}H_{13}^{+}$	$C_{12}H_{11}^{+}$	$C_{11}H_{13}^{+}$
DBE	10	7	5