

## Supplementary material

Table S1 Data of the sampling carried out in Italy

Sample Name	Site	Sampler	Time h	Date	Wether	Average temperaure °C	Volume m3
<b>U72</b>	Umbria	A	72	24-27/08/2021		18	34.967
<b>U48</b>	Umbria	B	48	24-26/08/2021	Sunny/partly Cloudy	17.3	24.723
<b>U24</b>	Umbria	B	24	27/08/2021	Rainy/Cloudy	19	11.126
<b>UB</b>	Umbria		<i>Blank</i>				
<b>1E72</b>	EMEP CNR	A	72	13-16/09/2021		24	35.044
<b>1E48</b>	EMEP CNR	B	48	13/15/09/2021	Partly cloudy	24	23.579
<b>1E24</b>	EMEP CNR	B	24	16/09/2021	Sunny	23	12.084
<b>1EB</b>	EMEP CNR		<i>Blank</i>				
<b>2E72</b>	EMEP CNR	A	72	18-21/10/2021		18	40.8461
<b>2E48</b>	EMEP CNR	B	48	18-20/10/2021	Clear/Partly cloudy	17	26.47
<b>2E24</b>	EMEP CNR	B	24	21/10/2021	Partly cloudy	20	14.3522
<b>2EB</b>	EMEP CNR		<i>Blank</i>				

*Table S2 Retention times of n-alkanes used in the Deconvolution processing as references. Standard used: . Alkanes Mix C8-C40 0.5 mg/mL in Hexane by AccuStandards.*

Carbon #	RT (min)
8	5.05
9	6.59
10	8.24
11	9.85
12	11.4
13	12.84
14	14.2
15	15.49
16	16.7
17	17.86
18	18.92
19	19.75
20	20.38
21	20.92
22	21.36
23	21.76
24	22.14
25	22.54
26	22.96
27	23.43
28	23.96
29	24.59
30	25.33

31	26.33
32	27.33
33	28.33
34	29.33
35	30.33
36	31.33

Table S3 54 Component Volatile Organic Combination Mix at 2,000 µg/mL in Methanol-P&T, 1 mL. ISO 9001:2015 certified, ISO/IEC 17025:2017 and ISO 17034:2016 accredited.

Components	Components
Benzene (CAS #71-43-2)	1,3-Dichlorobenzene (CAS #541-73-1)
1,4-Dichlorobenzene (CAS #106-46-7)	n-Propylbenzene (CAS #103-65-1)
Styrene (CAS #100-42-5)	Bromodichloromethane (CAS #75-27-4)
Bromoform (CAS #75-25-2)	1,1-Dichloroethene (CAS #75-35-4)
cis-1,2-Dichloroethene (CAS #156-59-2)	Tetrachloroethene (CAS #127-18-4)
Toluene (CAS #108-88-3)	tert-Butylbenzene (CAS #98-06-6)
Carbon tetrachloride (CAS #56-23-5)	1,3-Dichloropropane (CAS #142-28-9)
2,2-Dichloropropane (CAS #594-20-7)	1,1,1-Trichloroethane (CAS #71-55-6)
1,1,2-Trichloroethane (CAS #79-00-5)	2-Chlorotoluene (CAS #95-49-8)
4-Chlorotoluene (CAS #106-43-4)	trans-1,3-Dichloropropene (CAS #10061-02-6)
Ethylbenzene (CAS #100-41-4)	1,2,4-Trimethylbenzene (CAS #95-63-6)
1,3,5-Trimethylbenzene (CAS #108-67-8)	1,2-Dibromoethane (CAS #106-93-4)
Dibromomethane (CAS #74-95-3)	p-Isopropyltoluene (CAS #99-87-6)
Methylene chloride (CAS #75-09-2)	p-Xylene (CAS #106-42-3)
Naphthalene (CAS #91-20-3)	Bromobenzene (CAS #108-86-1)
Bromochloromethane (CAS #74-97-5)	1,1-Dichloroethane (CAS #75-34-3)
1,2-Dichloroethane (CAS #75-34-3)	1,1,1,2-Tetrachloroethane (CAS #630-20-6)
1,1,2,2-Tetrachloroethane (CAS #79-34-5)	n-Butylbenzene (CAS #104-51-8)
sec-Butylbenzene (CAS #135-98-8)	trans-1,2-Dichloroethene (CAS #156-60-5)
1,2-Dichloropropane (CAS #78-87-5)	1,2,3-Trichlorobenzene (CAS #87-61-6)
1,2,4-Trichlorobenzene (CAS #120-82-1)	Chlorobenzene (CAS #108-90-7)
Chloroform (CAS #67-66-3)	1,1-Dichloropropene (CAS #563-58-6)
cis-1,3-Dichloropropene (CAS #10061-01-5)	Trichloroethene (CAS #79-01-6)
1,2,3-Trichloropropane (CAS #96-18-4)	1,2-Dibromo-3-chloropropane (CAS #96-12-8)
Dibromochloromethane (CAS #124-48-1)	Hexachlorobutadiene (CAS #87-68-3)
Isopropylbenzene (CAS #98-82-8)	m-Xylene (CAS #108-38-3)
o-Xylene (CAS #95-47-6)	1,2-Dichlorobenzene (CAS #95-50-1)

Table S4 VOC Standard M-502-REG by Chiron at 0.2 mg/mL in Methanol-P&T, 1 mL.

Components	Components
Benzene (CAS #71-43-2)	1,2-Dichloropropane (CAS #78-87-5)
Bromodichloromethane (CAS #75-27-4)	Ethylbenzene (CAS #100-41-4)
Bromoform (CAS #75-25-2)	Styrene (CAS #100-42-5)
Carbon tetrachloride (CAS #56-23-5)	Tetrachloroethylene (CAS #127-18-4)
Chloroform (CAS #75-25-2)	Toluene (CAS #108-88-3)
Chlorobenzene (CAS #108-90-7)	1,2,4-Trichlorobenzene (CAS #120-82-1)
Dibromochloromethane (CAS #124-48-1)	1,1,1-Trichloroethane (CAS #71-55-6)
1,2-Dichlorobenzene (CAS #95-50-1)	1,1,2-Trichloroethane (CAS #79-00-5)
1,4-Dichlorobenzene (CAS #106-46-7)	Trichloroethylene (CAS #79-01-6)
1,2-Dichloroethane (CAS #107-06-2)	Vinyl chloride (CAS #75-01-4)
1,1-Dichloroethylene (CAS #75-35-4)	m-Xylene (CAS #108-38-3)
cis-1,2-Dichloroethylene (CAS #156-59-2)	o-Xylene (CAS #95-47-6)
trans-1,2-Dichloroethylene (CAS #156-60-5)	p-Xylene (CAS #106-42-3)
Dichloromethane (CAS #75-09-2)	

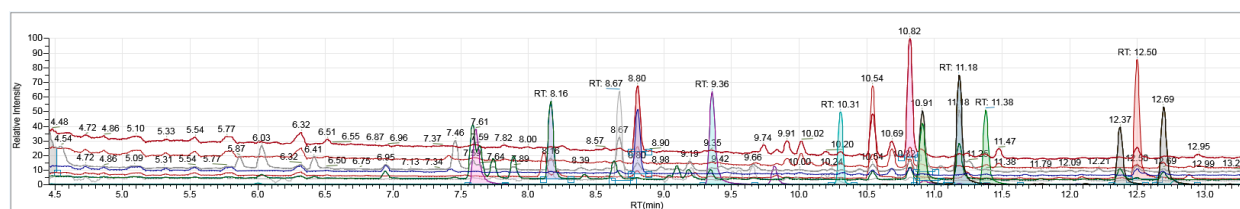


Figure S1 3 Days sampling Umbria 24-27/08/2021. Sampler A. Deconvoluted chromatogram. Zoom 4.4-13.50 min RT.

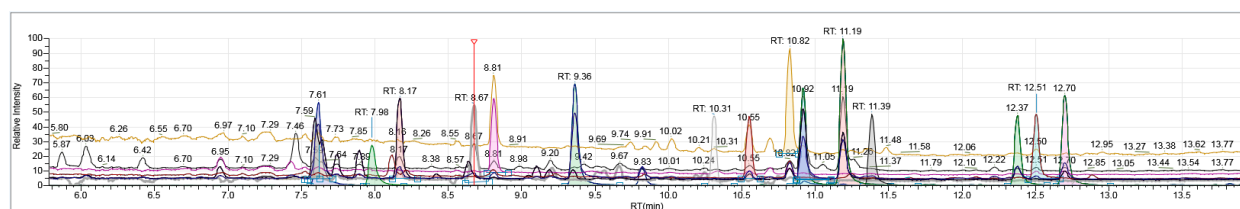


Figure S2 2 Days sampling Umbria 24-26/08/2021. Sampler B. Deconvoluted chromatogram. Zoom 5.5-13.95 min RT.

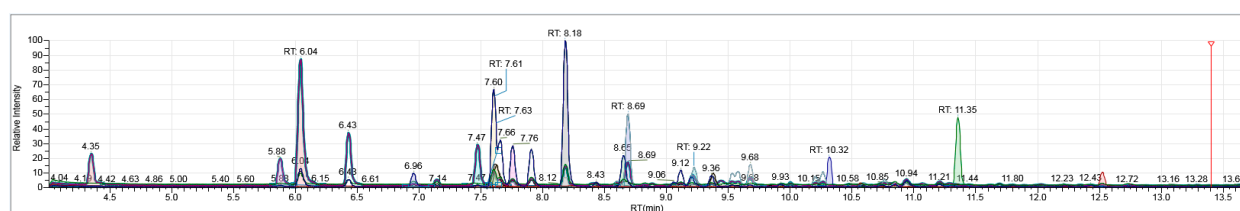


Figure S3 1 Days sampling Umbria 27/08/2021. Sampler B. Deconvoluted chromatogram. Zoom 4.4-13.65 min RT.

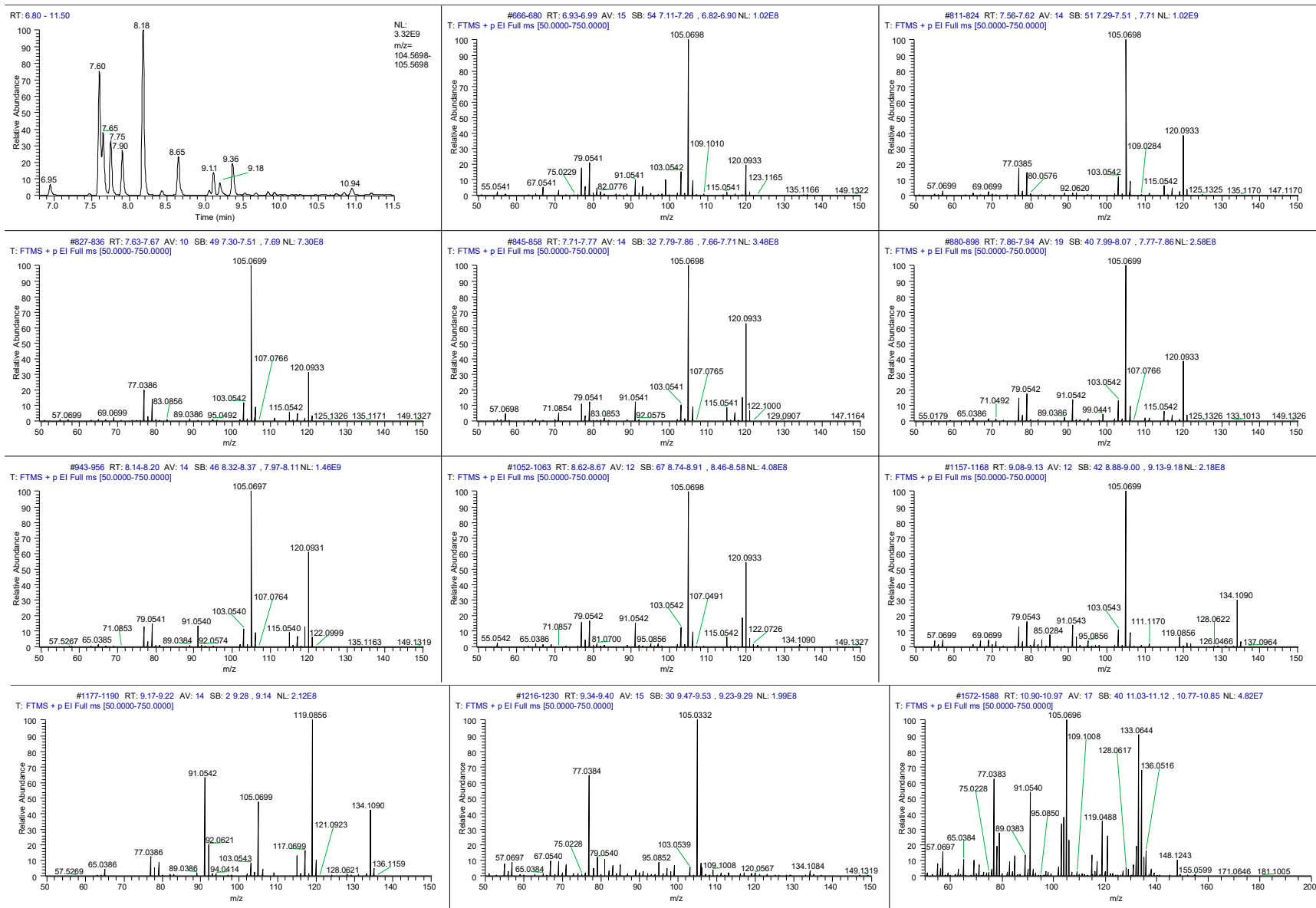


Figure S4 Chromatogram of 2E72 sample, 105.0698 m/z: RT 6.95 Isopropylbenzene (cumene); 7.60 Benzene, 1-ethyl-3-methyl-, 7.65 Benzene, 1-ethyl-4-methyl-, 7.75 Mesitylene, 7.90 Pseudocumene?, 8.18 Hemellitene ?, 8.65 not identified, 9.11 not identified, 9.18 not identified, 9.36 Acetophenone ?, 10.94 Ethylbenzaldehyde?

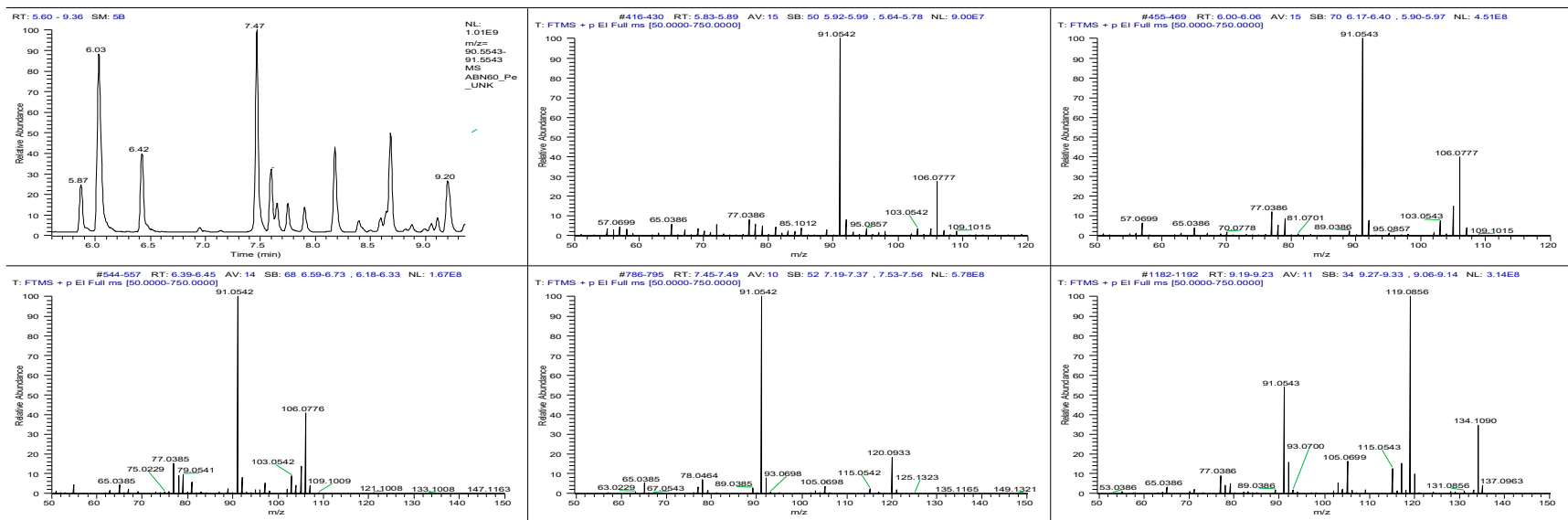


Figure S5 Fragment 91.0543, RT 5.87 Ethylbenzene, 6.03 m/p-Xylene, 6.42 o-Xylene, 7.47 n-Propylbenzene, 9.18 n-Butylbenzene? Peak mix

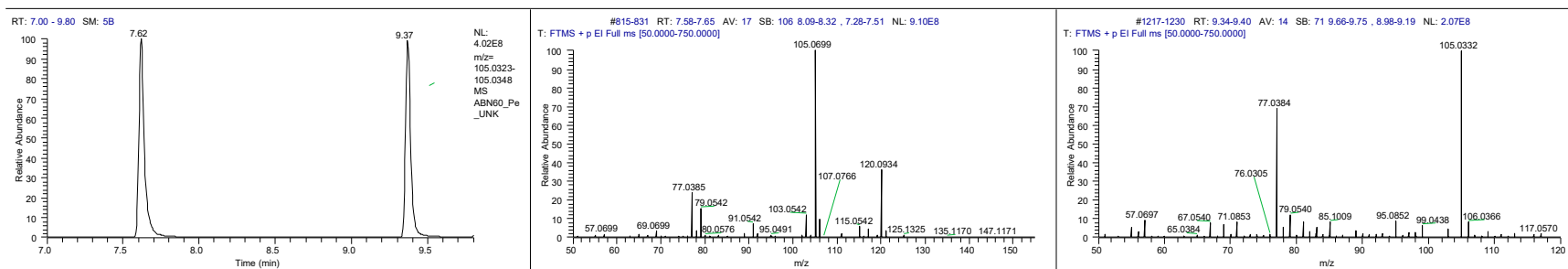


Figure S6 Fragment 105.0323-105.0348, RT 7.62 Benzaldehyde ?, 9.37 Acetophenone ?

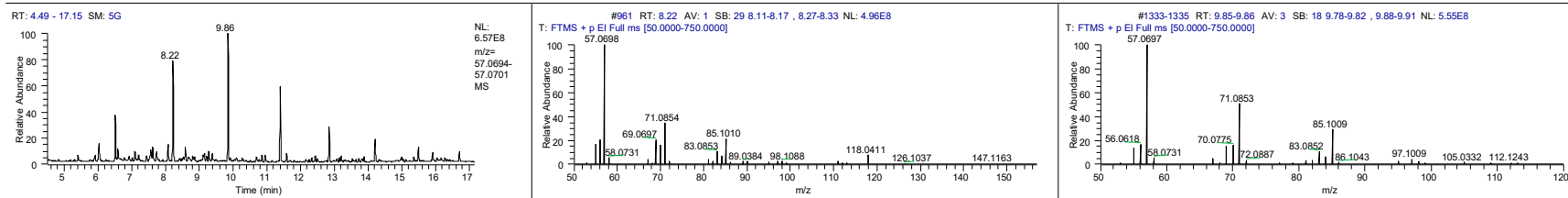


Figure S7 Fragment 57.0698 RT 8.22 n-Decane, 9.86 n-Undecane

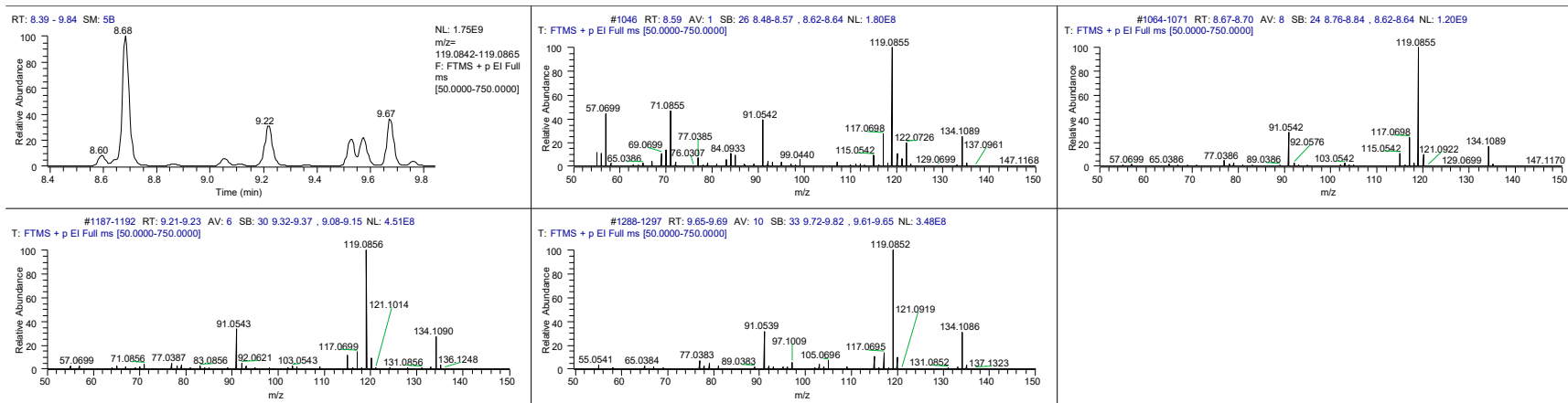


Figure S8 Fragment 119.0855 RT 8.60 o-Cimene, 8.68 p-Cimene, 9.22 1,3,8-p-Menthatriene, 9.67 not indentified

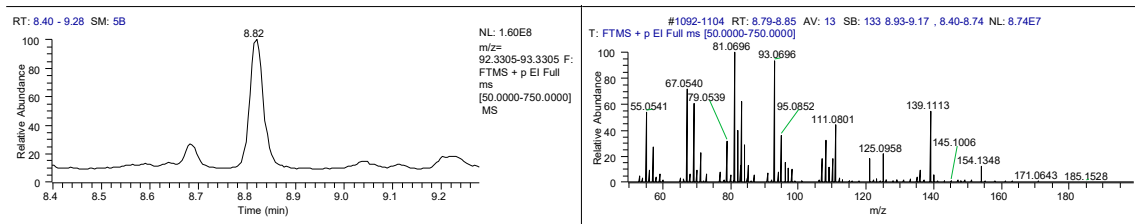


Figure S9 Fragment 93.0696 RT 8.82 Terpenoide

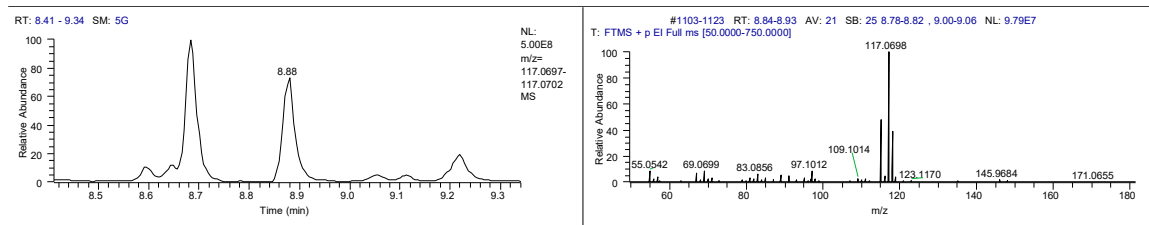


Figure S10 Fragment 117.0698 RT 8.88 Similar Indano

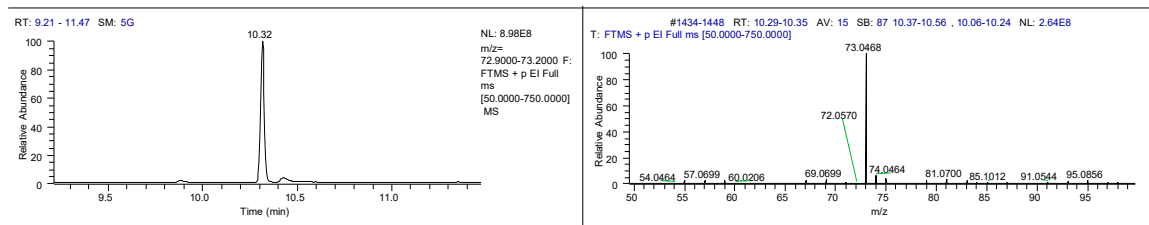


Figure S11 Fragment 73.0468, RT 10.32 D5-Siloxane

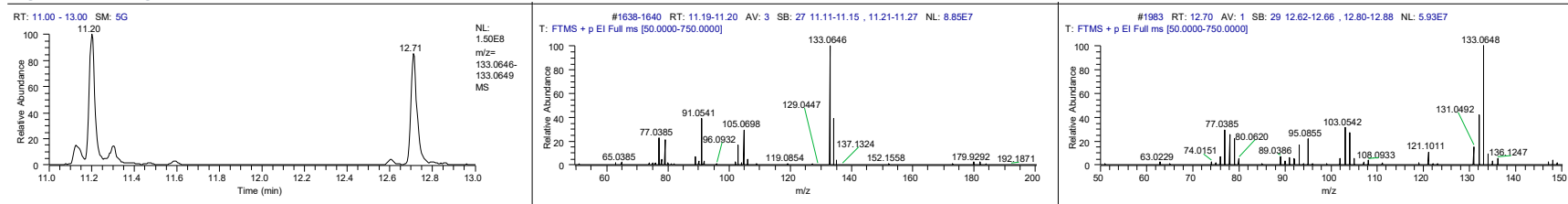


Figure S12 Fragment 133.0646 RT 11.20 Dimethylbenzaldehyde?, 12.71 Ethyl/Dimethylacetophenone ?

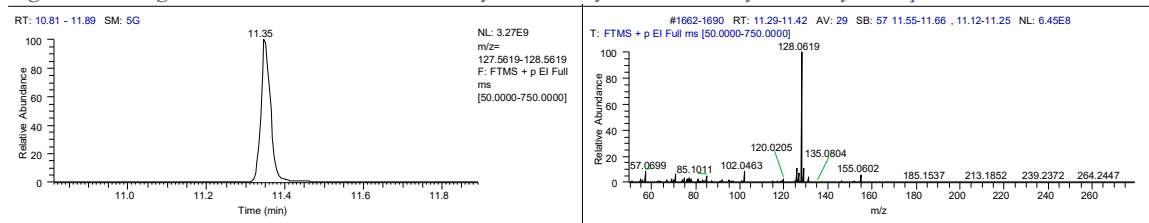


Figure S13 Fragment 128.0619 RT 11.35 Naphthalene



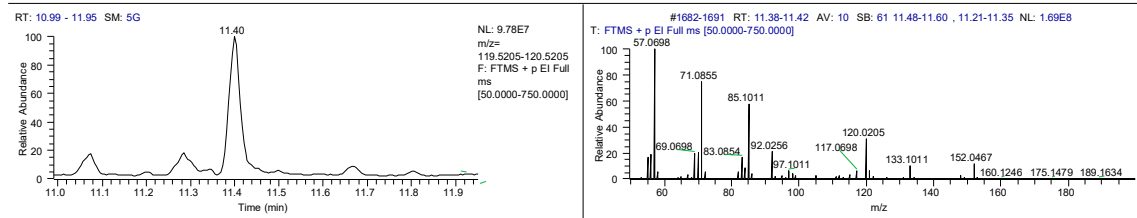


Figure S14 Fragment 120.0205 RT 11.40 Methylsalicylate

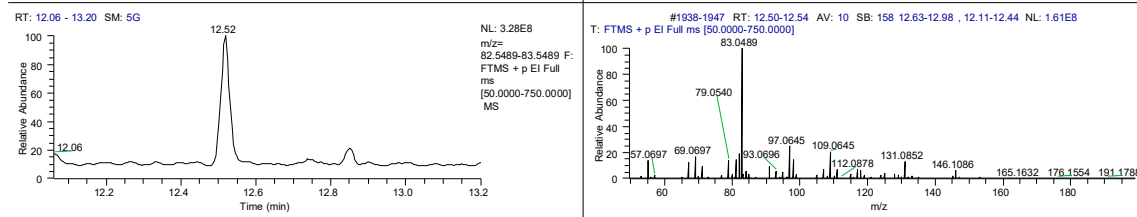
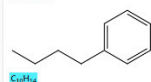


Figure S15 Fragment 83.0489 RT 12.52 The C<sub>7</sub>H<sub>9</sub>O ion is also present LITERATURE

# C<sub>10</sub>H<sub>14</sub> Isomers Mass Spectra

104-51-8



C<sub>10</sub>H<sub>14</sub>

CAS Name  
Butylbenzene

Conditions

Nominal Mass

134

Number of Peaks

47

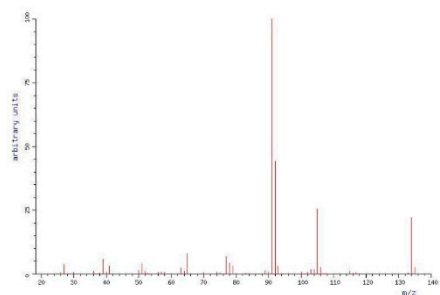
Spectrum Summary

Spectrum ID

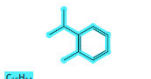
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Source

Spectral data were obtained from John Wiley & Sons, Inc.



527-84-4



C<sub>10</sub>H<sub>14</sub>

CAS Name

o-Cymene

Conditions

Nominal Mass

134

Number of Peaks

83

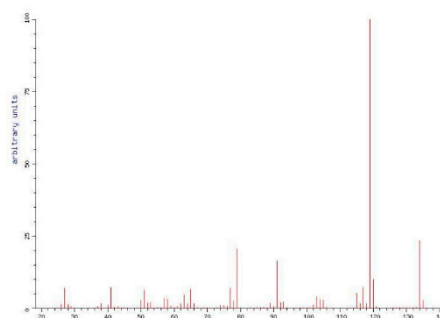
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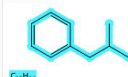
8\_LMCM-60104-076Y

Source

Spectral data were obtained from John Wiley & Sons, Inc.



538-93-2



C<sub>10</sub>H<sub>14</sub>

CAS Name

Isobutylbenzene

Conditions

Nominal Mass

134

Number of Peaks

74

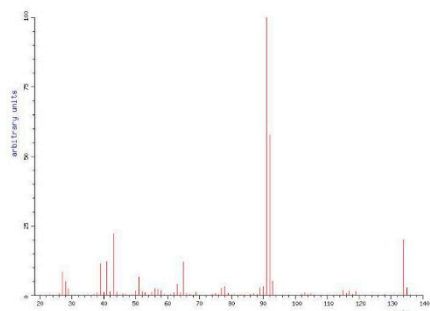
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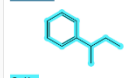
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Source

Spectral data were obtained from John Wiley & Sons, Inc.



135-98-8



C<sub>10</sub>H<sub>14</sub>

CAS Name

sec-Butylbenzene

Conditions

Nominal Mass

134

Number of Peaks

78

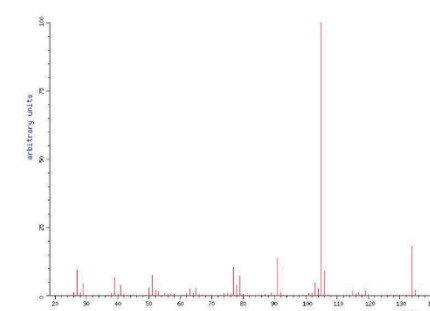
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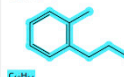
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Source

Spectral data were obtained from John Wiley & Sons, Inc.



1074-17-5



C<sub>10</sub>H<sub>14</sub>

CAS Name

1-Methyl-2-propylbenzene

Conditions

Nominal Mass

134

Number of Peaks

91

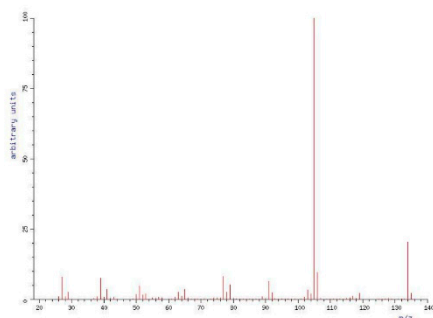
Spectrum Summary

Spectrum ID

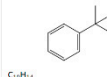
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Source

Spectral data were obtained from John Wiley & Sons, Inc.



98-06-6



C<sub>10</sub>H<sub>14</sub>

CAS Name

tert-Butylbenzene

Conditions

Nominal Mass

134

Number of Peaks

40

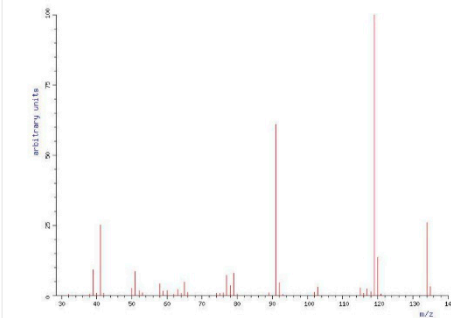
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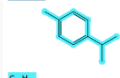
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Source

Spectral data were obtained from John Wiley & Sons, Inc.



99-87-6



C<sub>10</sub>H<sub>14</sub>

CAS Name

p-Cymene

Conditions

Nominal Mass

134

Number of Peaks

77

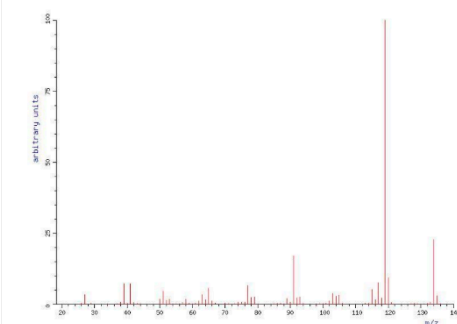
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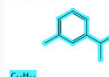
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Source

Spectral data were obtained from John Wiley & Sons, Inc.



535-77-3



C<sub>10</sub>H<sub>14</sub>

CAS Name

m-Cymene

Conditions

Nominal Mass

134

Number of Peaks

101

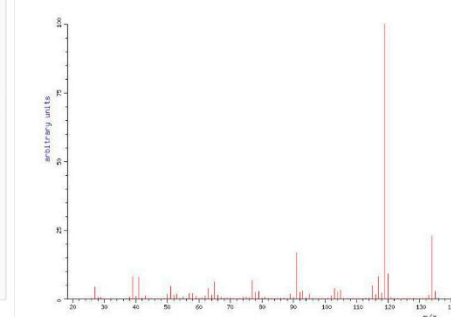
Spectrum Summary

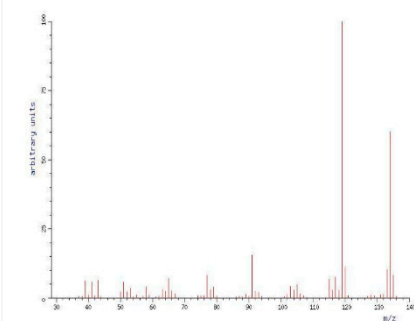
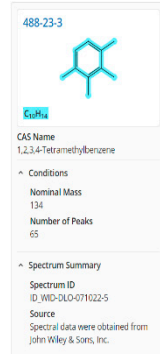
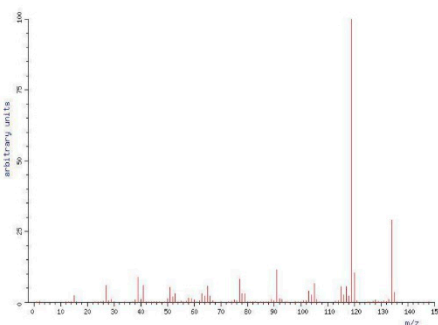
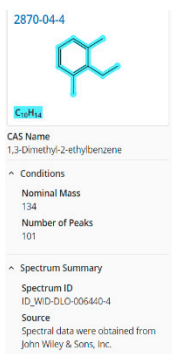
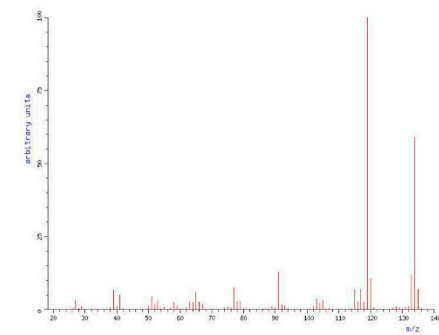
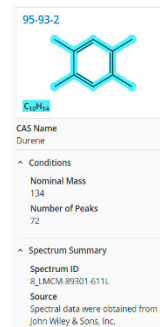
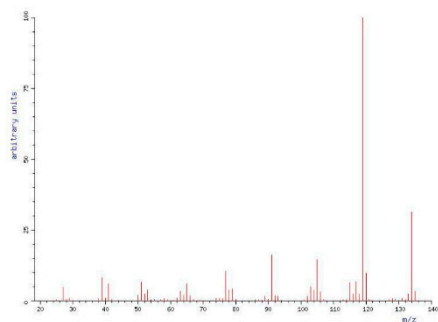
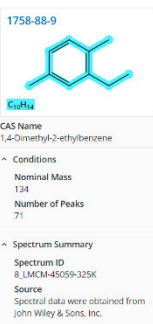
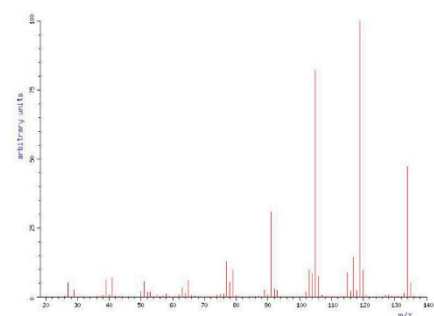
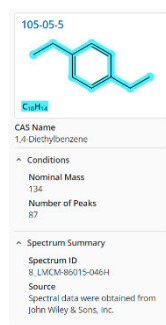
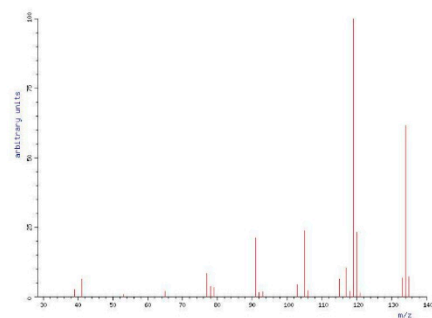
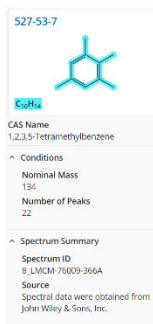
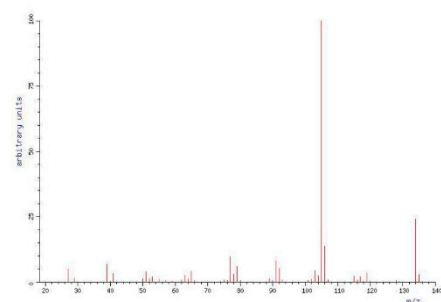
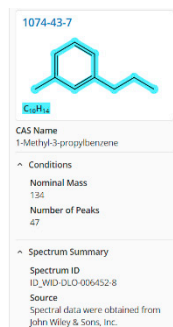
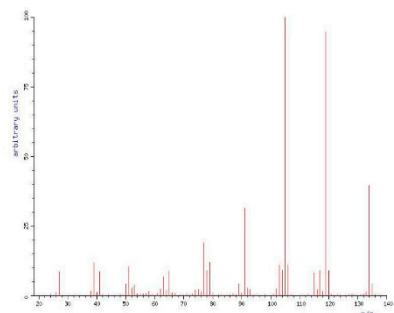
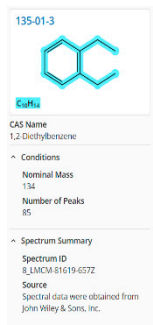
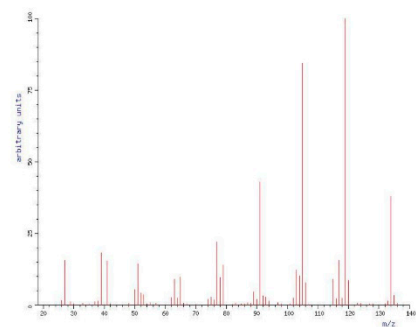
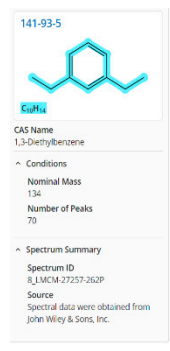
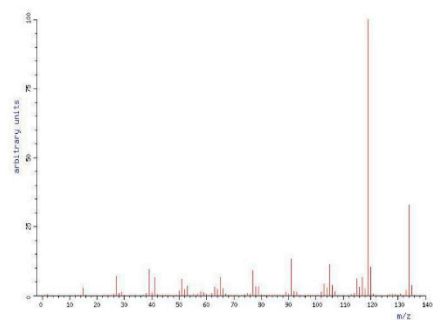
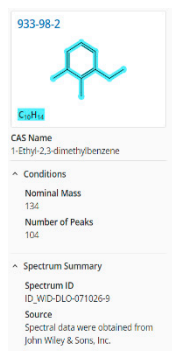
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8\_LMCM-44524-510V

Source

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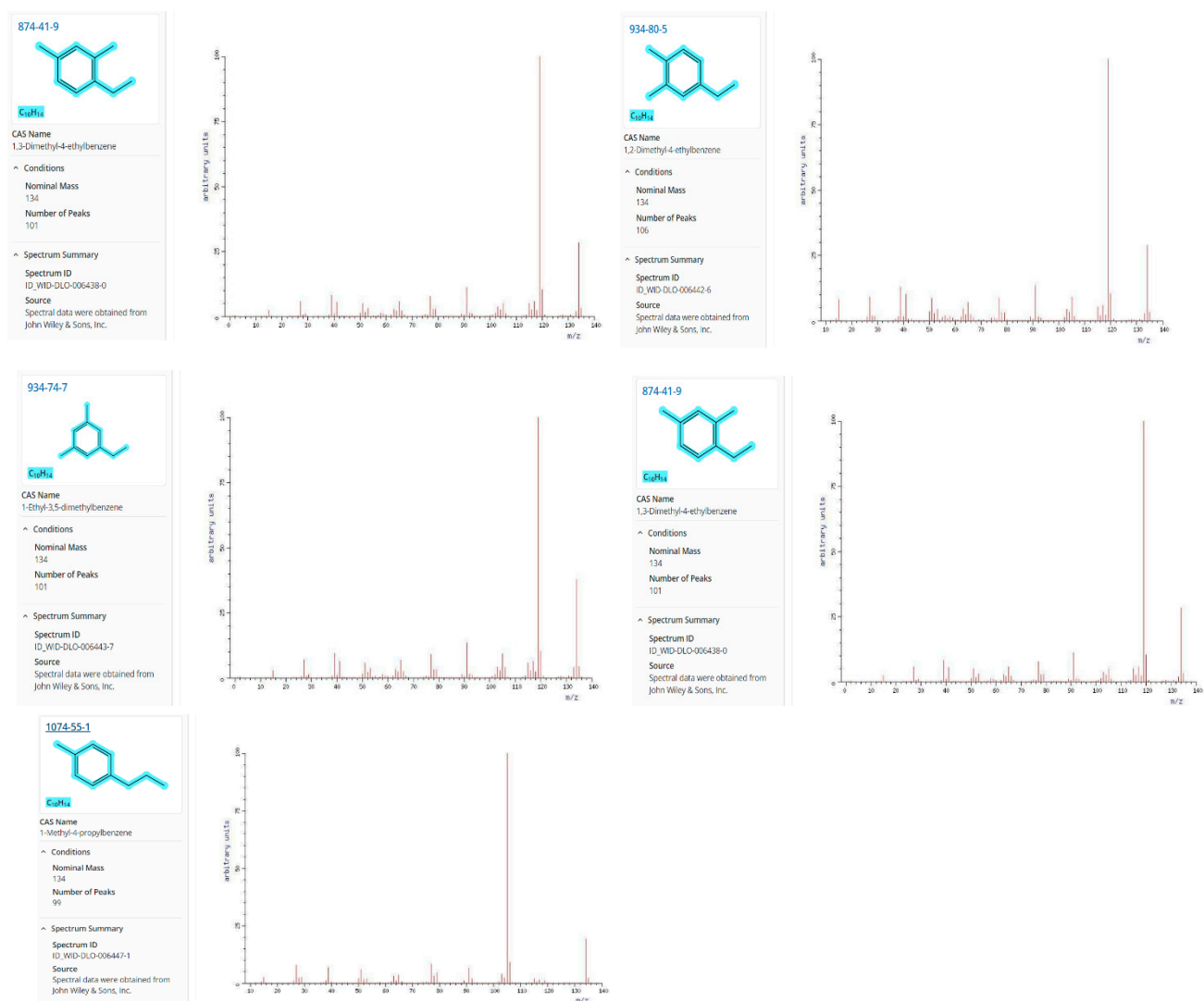


Figure S16 C<sub>10</sub>H<sub>14</sub> Isomers Mass Spectra