

Data Path : Z:\voasrv\HPCHEM1\MSVOA_X\Data\VX070124\
 Data File : VX042110.D
 Acq On : 01 Jul 2024 13:35
 Operator : JC/MD
 Sample : P3073-03RE
 Misc : 5.0mL/MSVOA_X/WATER
 ALS Vial : 11 Sample Multiplier: 1

Instrument :
 MSVOA_X
 ClientSampleId :
 MW14-20240625

Quant Time: Jul 02 02:04:30 2024
 Quant Method : Z:\voasrv\HPCHEM1\MSVOA_X\Method\82X061824W.M
 Quant Title : SW846 8260
 QLast Update : Fri Jun 21 23:51:58 2024
 Response via : Initial Calibration

Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)

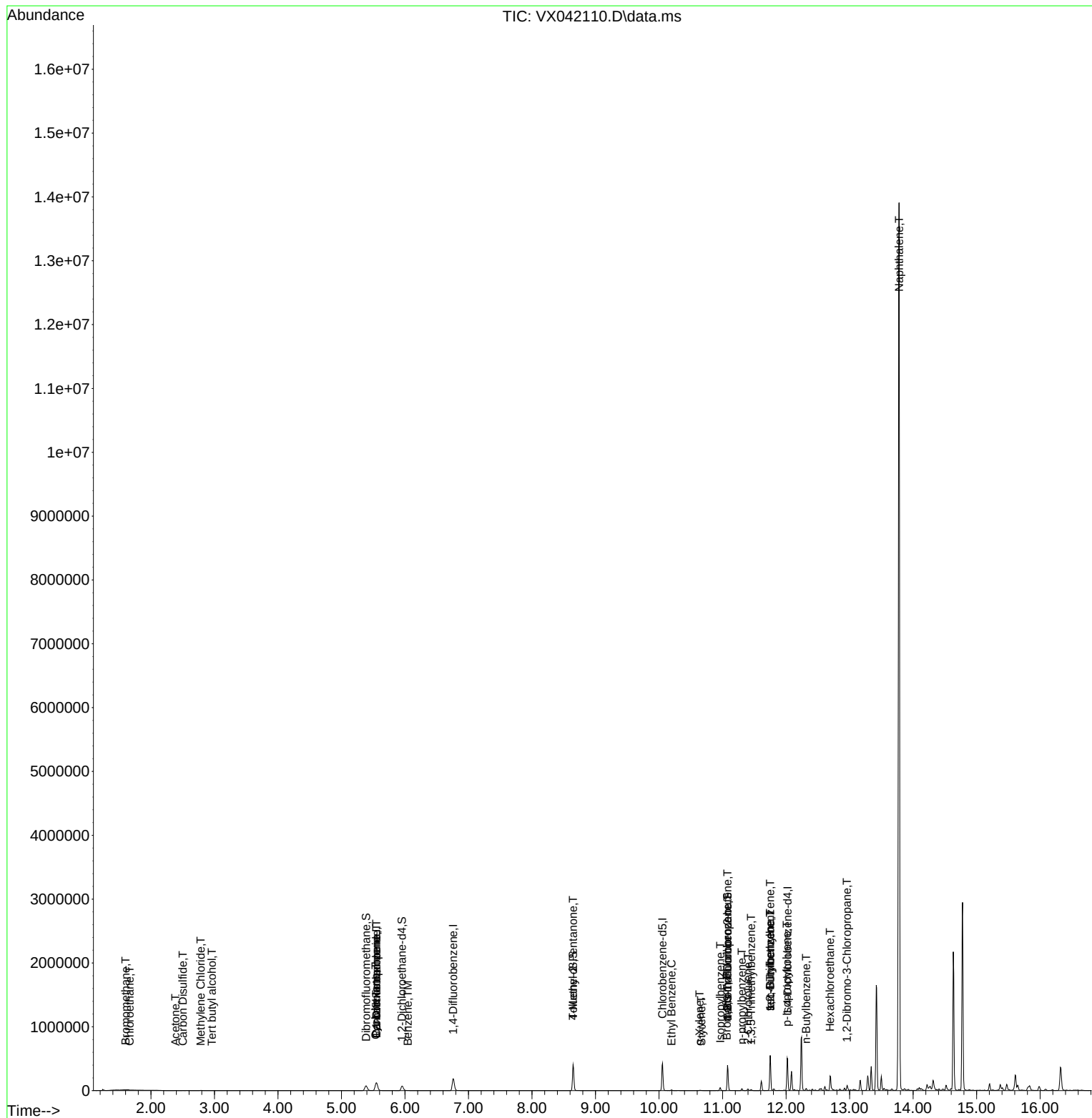
Internal Standards						
1) Pentafluorobenzene	5.550	168	140588	50.000	ug/l	# 0.00
34) 1,4-Difluorobenzene	6.757	114	215496	50.000	ug/l	0.00
63) Chlorobenzene-d5	10.055	117	215533	50.000	ug/l	0.00
72) 1,4-Dichlorobenzene-d4	12.024	152	122242	50.000	ug/l	0.00
System Monitoring Compounds						
33) 1,2-Dichloroethane-d4	5.952	65	68508	42.259	ug/l	0.00
Spiked Amount	50.000	Range	78 - 117	Recovery	=	84.520%
35) Dibromofluoromethane	5.385	113	66814	43.696	ug/l	0.00
Spiked Amount	50.000	Range	75 - 124	Recovery	=	87.400%
50) Toluene-d8	8.647	98	251420	46.805	ug/l	0.00
Spiked Amount	50.000	Range	92 - 112	Recovery	=	93.600%
62) 4-Bromofluorobenzene	11.079	95	100539	50.774	ug/l	0.00
Spiked Amount	50.000	Range	83 - 123	Recovery	=	101.540%
Target Compounds						
						Qvalue
5) Bromomethane	1.599	94	196	0.295	ug/l	99
6) Chloroethane	1.666	64	2013	0.548	ug/l	# 50
11) Tert butyl alcohol	2.959	59	504	1.638	ug/l	# 78
16) Acetone	2.386	43	2258	3.172	ug/l	# 79
17) Carbon Disulfide	2.502	76	1153	0.466	ug/l	# 90
20) Methylene Chloride	2.782	84	2152	1.381	ug/l	90
31) Cyclohexane	5.538	56	948	0.500	ug/l	# 1
36) 1,1-Dichloropropene	5.550	75	8052	4.959	ug/l	# 51
38) Carbon Tetrachloride	5.550	117	11475	6.396	ug/l	# 15
40) Benzene	6.044	78	1471	0.269	ug/l	98
51) 4-Methyl-2-Pentanone	8.647	43	880	0.393	ug/l	# 1
67) Ethyl Benzene	10.195	91	7705	1.097	ug/l	98
69) o-Xylene	10.640	106	1580	0.563	ug/l	90
70) Styrene	10.665	104	1787	0.380	ug/l	94
71) Bromoform	11.067	173	46	0.907	ug/l	# 29
73) Isopropylbenzene	10.963	105	25866	3.480	ug/l	96
76) 1,2,3-Trichloropropane	11.079	75	45723	20.604	ug/l	# 39
78) n-propylbenzene	11.305	91	20059	2.487	ug/l	97
79) 2-Chlorotoluene	11.402	91	1927	0.371	ug/l	# 42
80) 1,3,5-Trimethylbenzene	11.451	105	6722	1.086	ug/l	90
81) trans-1,4-Dichloro-2-b...	11.079	75	45723	58.512	ug/l	# 5
83) tert-Butylbenzene	11.750	119	31052	4.571	ug/l	# 71
84) 1,2,4-Trimethylbenzene	11.750	105	242607	39.060	ug/l	91
85) sec-Butylbenzene	11.750	105	242607	31.575	ug/l	# 57
86) p-Isopropyltoluene	12.012	119	3864	0.576	ug/l	# 72
89) n-Butylbenzene	12.317	91	3249	0.629	ug/l	# 1
90) Hexachloroethane	12.695	117	98902	86.550	ug/l	# 17
92) 1,2-Dibromo-3-Chloropr...	12.957	75	342	0.624	ug/l	# 9
95) Naphthalene	13.780	128	8359543	940.307	ug/l	# 92

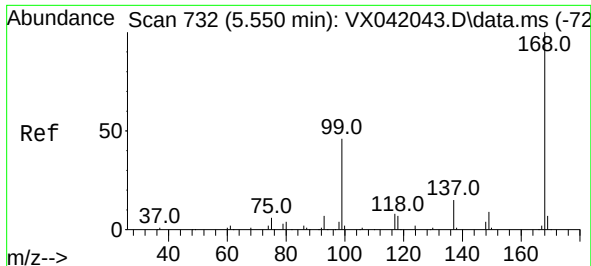
(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data Path : Z:\voasrv\HPCHEM1\MSVOA_X\Data\VX070124\
Data File : VX042110.D
Acq On : 01 Jul 2024 13:35
Operator : JC/MD
Sample : P3073-03RE
Misc : 5.0mL/MSVOA_X/WATER
ALS Vial : 11 Sample Multiplier: 1

Instrument :
MSVOA_X
ClientSampleId :
MW14-20240625

Quant Time: Jul 02 02:04:30 2024
Quant Method : Z:\voasrv\HPCHEM1\MSVOA_X\Method\82X061824W.M
Quant Title : SW846 8260
QLast Update : Fri Jun 21 23:51:58 2024
Response via : Initial Calibration

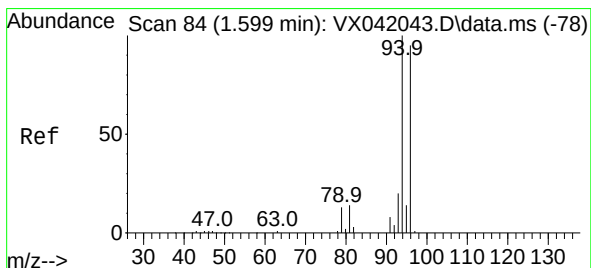
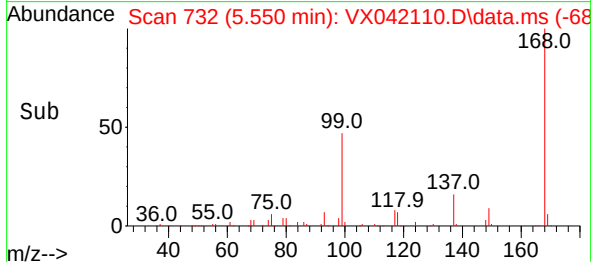
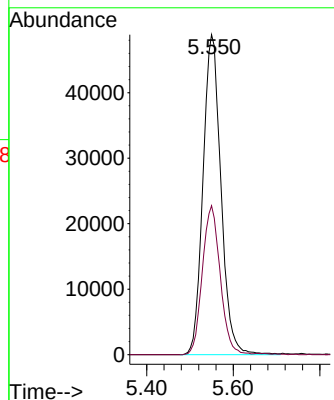
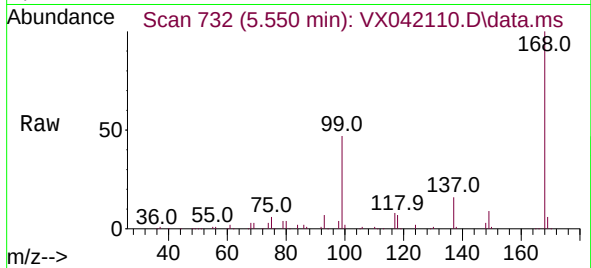




#1
Pentafluorobenzene
Concen: 50.000 ug/l
RT: 5.550 min Scan# 732
Delta R.T. -0.000 min
Lab File: VX042110.D
Acq: 01 Jul 2024 13:35

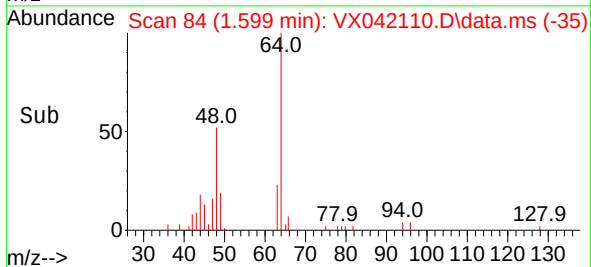
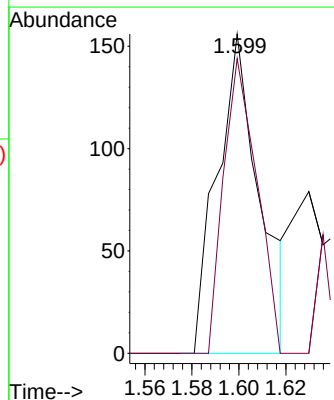
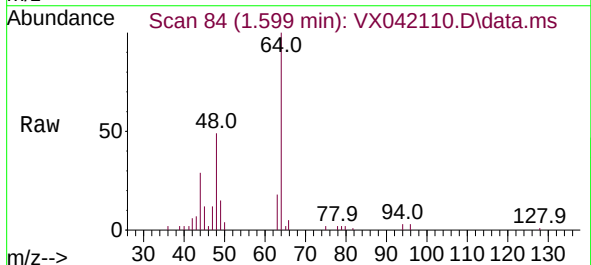
Instrument :
MSVOA_X
ClientSampleId :
MW14-20240625

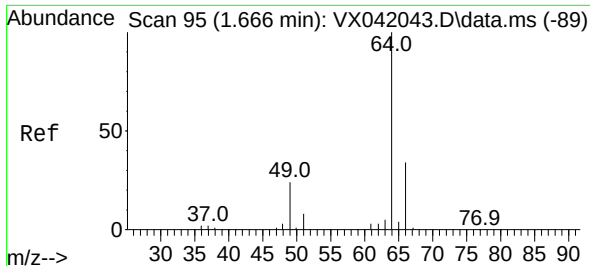
Tgt Ion:168 Resp: 140588
Ion Ratio Lower Upper
168 100
99 46.6 56.6 85.0#



#5
Bromomethane
Concen: 0.295 ug/l
RT: 1.599 min Scan# 84
Delta R.T. 0.000 min
Lab File: VX042110.D
Acq: 01 Jul 2024 13:35

Tgt Ion: 94 Resp: 196
Ion Ratio Lower Upper
94 100
96 92.3 74.6 111.8

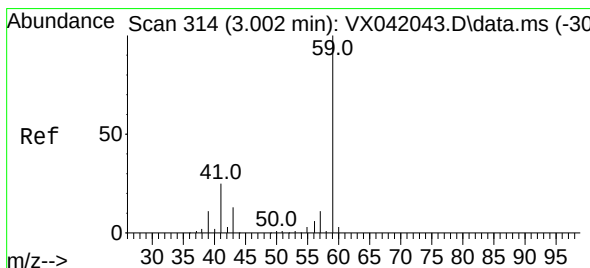
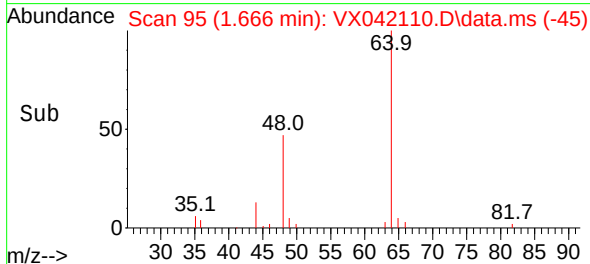
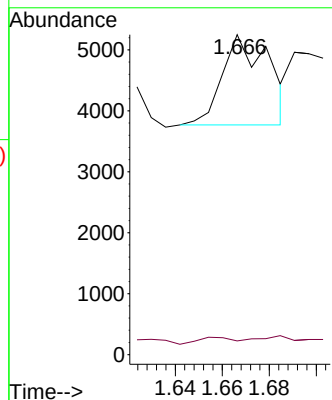
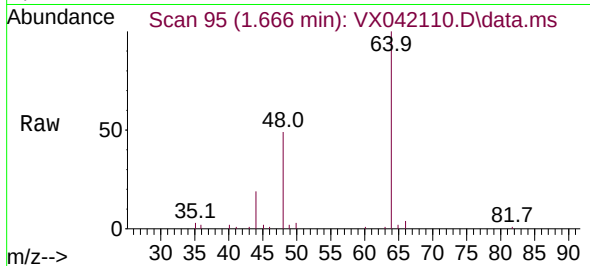




#6
Chloroethane
Concen: 0.548 ug/l
RT: 1.666 min Scan# 95
Delta R.T. 0.006 min
Lab File: VX042110.D
Acq: 01 Jul 2024 13:35

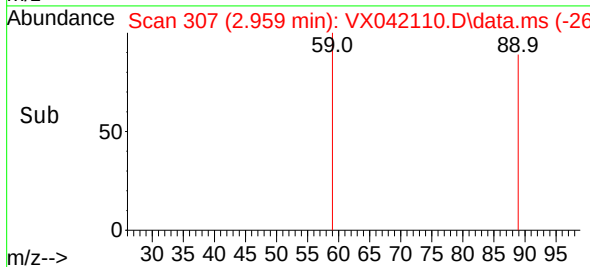
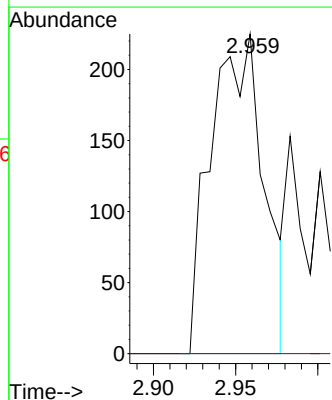
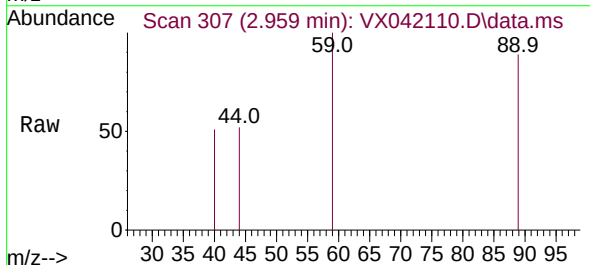
Instrument :
MSVOA_X
ClientSampleId :
MW14-20240625

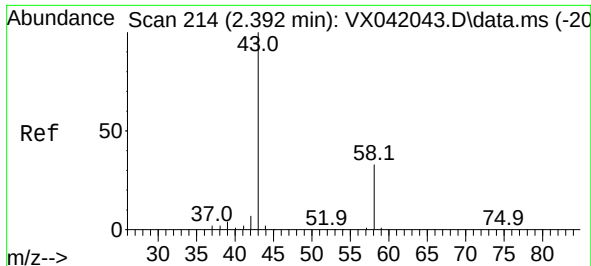
Tgt Ion: 64 Resp: 2013
Ion Ratio Lower Upper
64 100
66 3.7 25.1 37.7#



#11
Tert butyl alcohol
Concen: 1.638 ug/l
RT: 2.959 min Scan# 307
Delta R.T. -0.049 min
Lab File: VX042110.D
Acq: 01 Jul 2024 13:35

Tgt Ion: 59 Resp: 504
Ion Ratio Lower Upper
59 100
57 0.0 6.0 9.0#

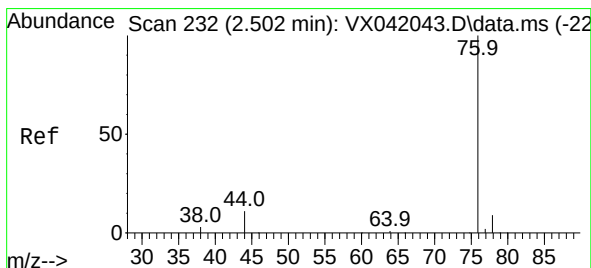
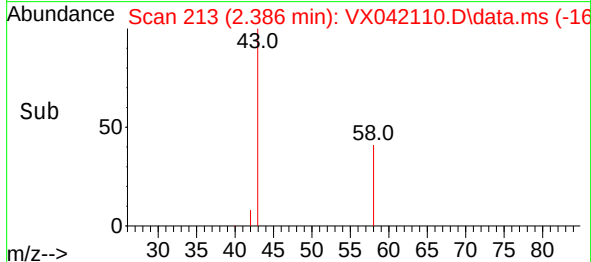
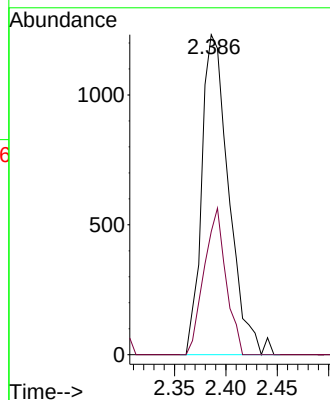
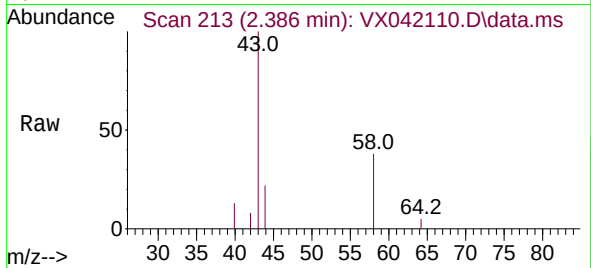




#16
Acetone
Concen: 3.172 ug/l
RT: 2.386 min Scan# 214
Delta R.T. -0.012 min
Lab File: VX042110.D
Acq: 01 Jul 2024 13:35

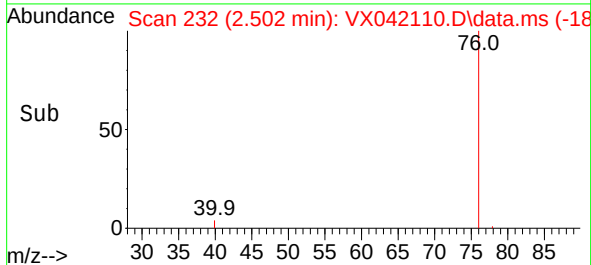
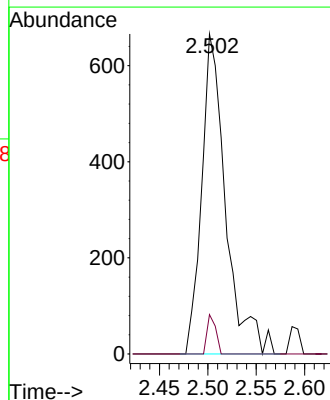
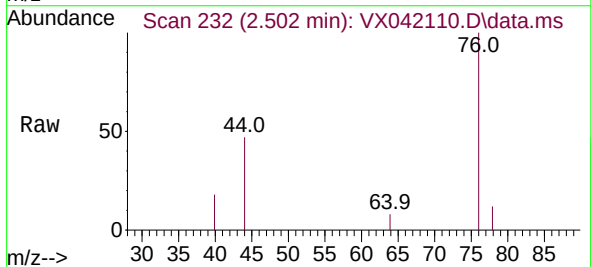
Instrument :
MSVOA_X
ClientSampleId :
MW14-20240625

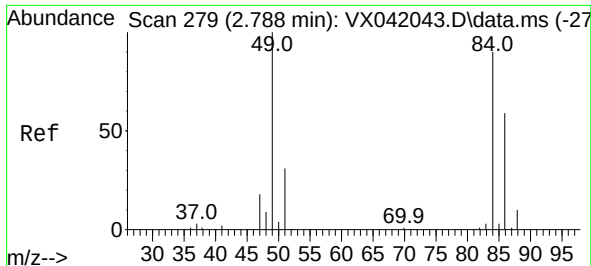
Tgt Ion: 43 Resp: 2258
Ion Ratio Lower Upper
43 100
58 38.5 21.9 32.9#



#17
Carbon Disulfide
Concen: 0.466 ug/l
RT: 2.502 min Scan# 232
Delta R.T. 0.000 min
Lab File: VX042110.D
Acq: 01 Jul 2024 13:35

Tgt Ion: 76 Resp: 1153
Ion Ratio Lower Upper
76 100
78 12.3 7.0 10.6#





#20

Methylene Chloride

Concen: 1.381 ug/l

RT: 2.782 min Scan# 21

Delta R.T. 0.000 min

Lab File: VX042110.D

Acq: 01 Jul 2024 13:35

Instrument :

MSVOA_X

ClientSampleId :

MW14-20240625

Tgt Ion: 84 Resp: 2152

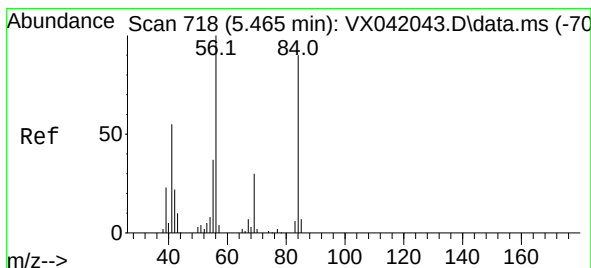
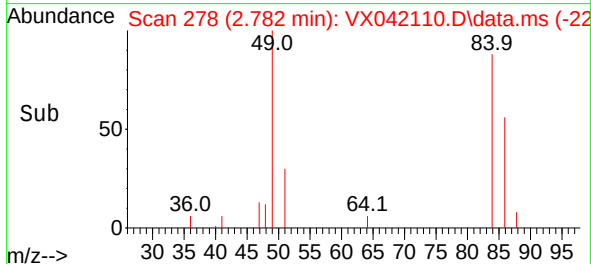
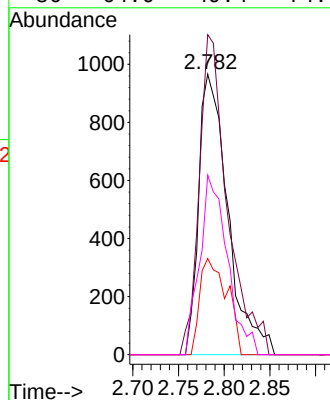
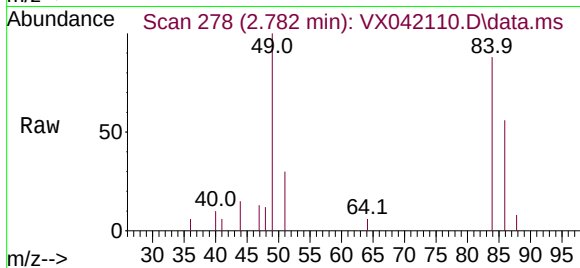
Ion Ratio Lower Upper

84 100

49 114.1 103.6 155.4

51 34.3 33.8 50.6

86 64.0 49.4 74.0



#31

Cyclohexane

Concen: 0.500 ug/l

RT: 5.538 min Scan# 730

Delta R.T. 0.073 min

Lab File: VX042110.D

Acq: 01 Jul 2024 13:35

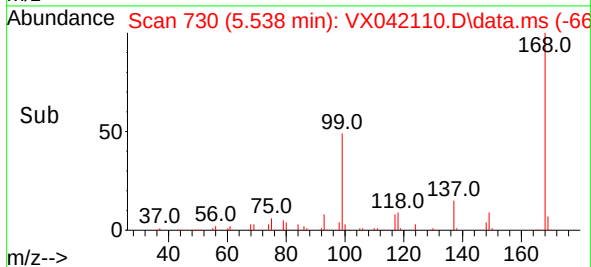
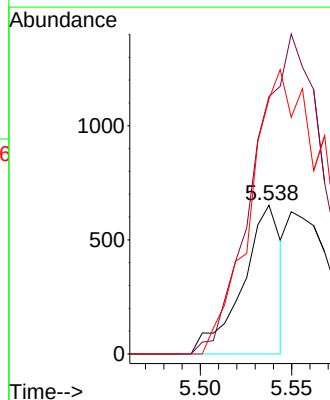
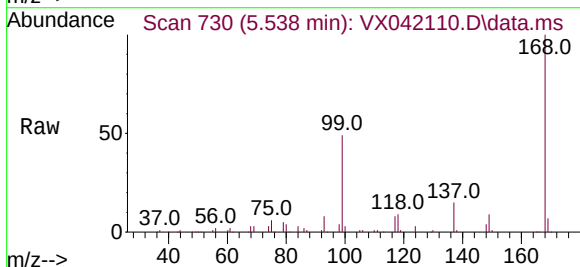
Tgt Ion: 56 Resp: 948

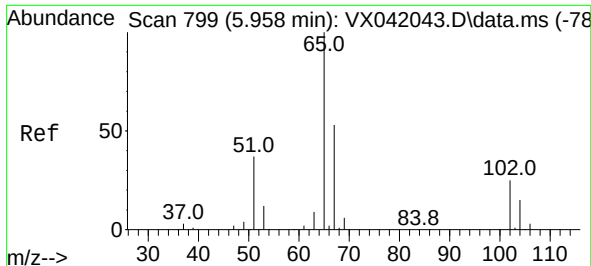
Ion Ratio Lower Upper

56 100

69 173.0 23.4 35.2#

84 171.3 65.9 98.9#





#33

1,2-Dichloroethane-d4

Concen: 42.259 ug/l

RT: 5.952 min Scan# 799

Delta R.T. -0.006 min

Lab File: VX042110.D

Acq: 01 Jul 2024 13:35

Instrument :

MSVOA_X

ClientSampleId :

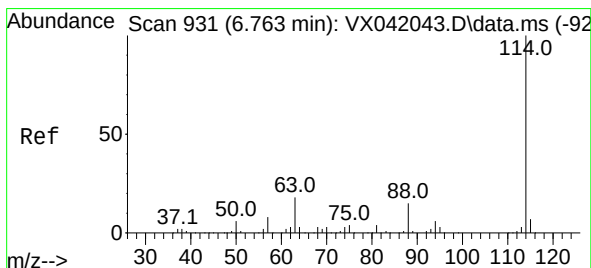
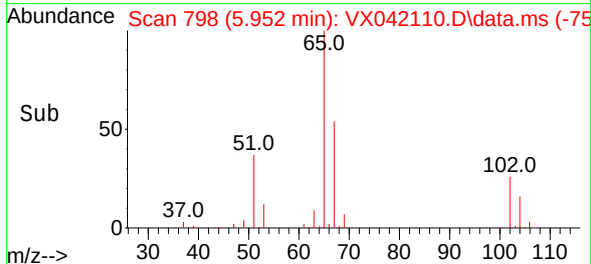
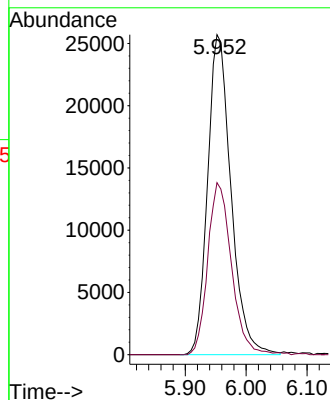
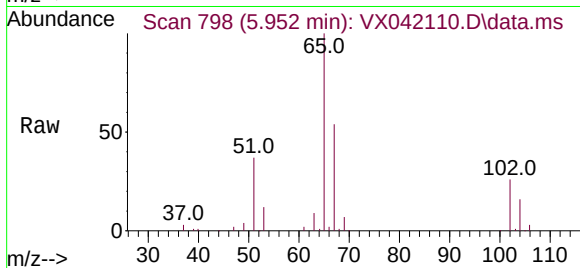
MW14-20240625

Tgt Ion: 65 Resp: 68508

Ion Ratio Lower Upper

65 100

67 54.7 0.0 100.2



#34

1,4-Difluorobenzene

Concen: 50.000 ug/l

RT: 6.757 min Scan# 930

Delta R.T. -0.006 min

Lab File: VX042110.D

Acq: 01 Jul 2024 13:35

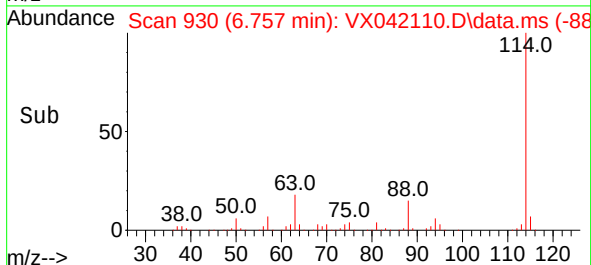
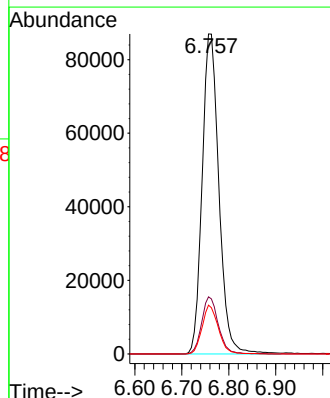
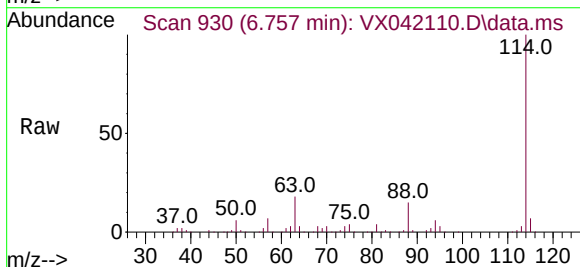
Tgt Ion: 114 Resp: 215496

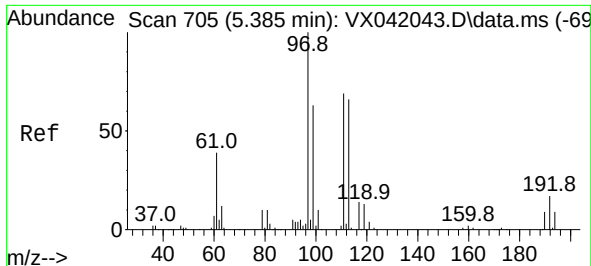
Ion Ratio Lower Upper

114 100

63 17.8 0.0 45.0

88 15.2 0.0 36.6





#35

Dibromofluoromethane

Concen: 43.696 ug/l

RT: 5.385 min Scan# 705

Delta R.T. -0.006 min

Lab File: VX042110.D

Acq: 01 Jul 2024 13:35

Instrument :

MSVOA_X

ClientSampleId :

MW14-20240625

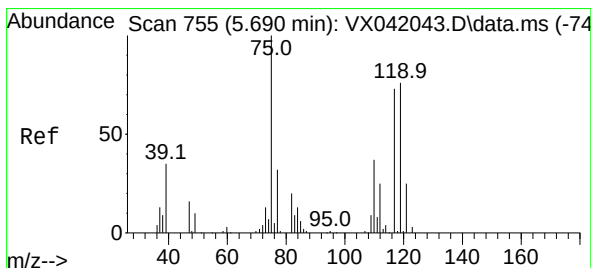
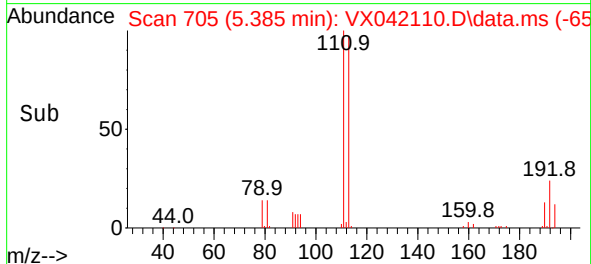
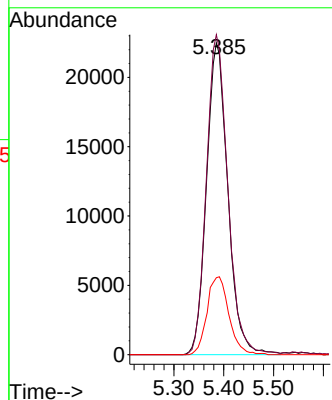
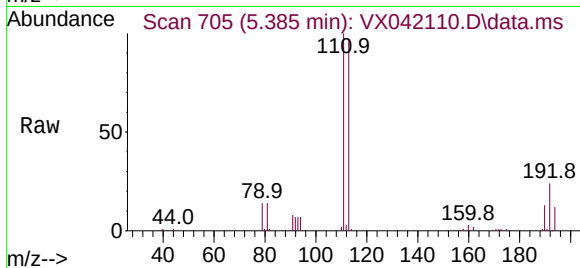
Tgt Ion:113 Resp: 66814

Ion Ratio Lower Upper

113 100

111 102.9 82.9 124.3

192 25.7 13.3 19.9#



#36

1,1-Dichloropropene

Concen: 4.959 ug/l

RT: 5.550 min Scan# 732

Delta R.T. -0.140 min

Lab File: VX042110.D

Acq: 01 Jul 2024 13:35

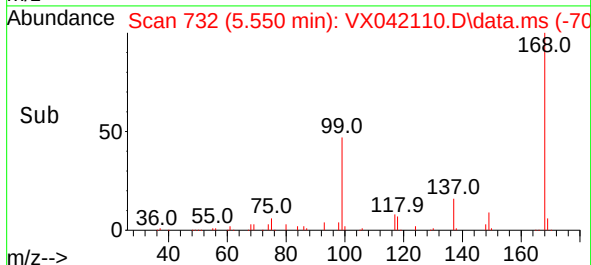
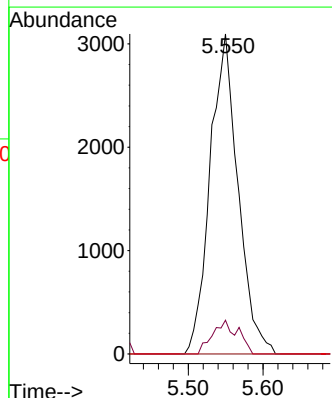
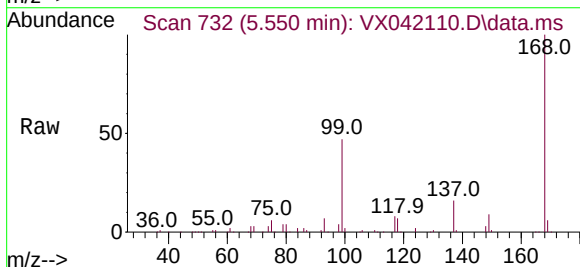
Tgt Ion: 75 Resp: 8052

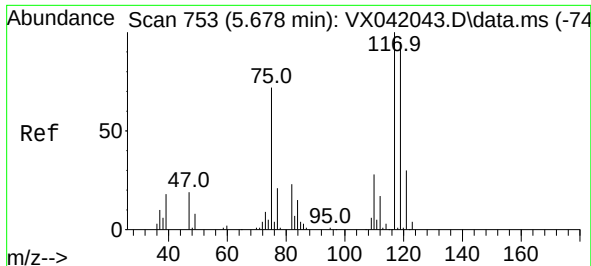
Ion Ratio Lower Upper

75 100

110 9.6 17.0 50.9#

77 0.0 24.7 37.1#





#38

Carbon Tetrachloride

Concen: 6.396 ug/l

RT: 5.550 min Scan# 74

Delta R.T. -0.128 min

Lab File: VX042110.D

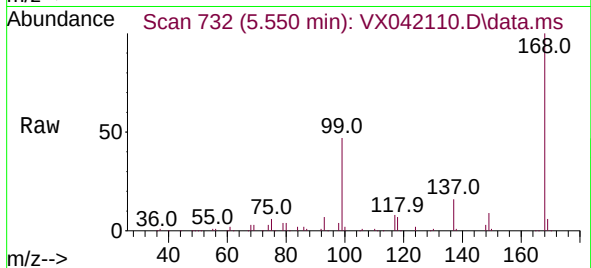
Acq: 01 Jul 2024 13:35

Instrument :

MSVOA_X

ClientSampleId :

MW14-20240625



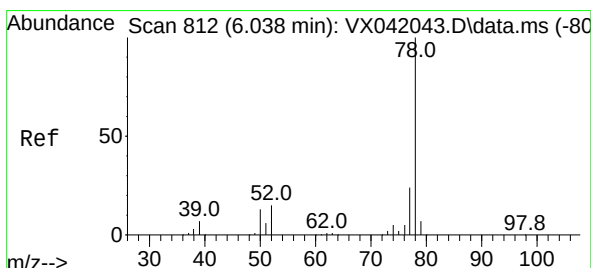
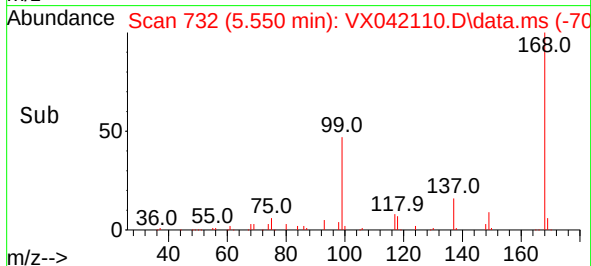
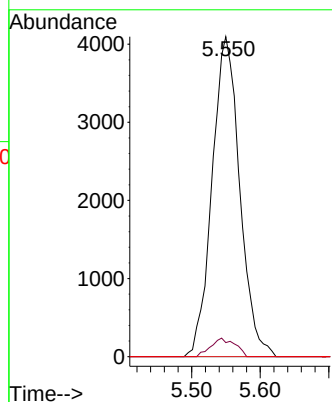
Tgt Ion:117 Resp: 11475

Ion Ratio Lower Upper

117 100

119 4.4 78.2 117.2#

121 0.0 24.4 36.6#



#40

Benzene

Concen: 0.269 ug/l

RT: 6.044 min Scan# 813

Delta R.T. 0.006 min

Lab File: VX042110.D

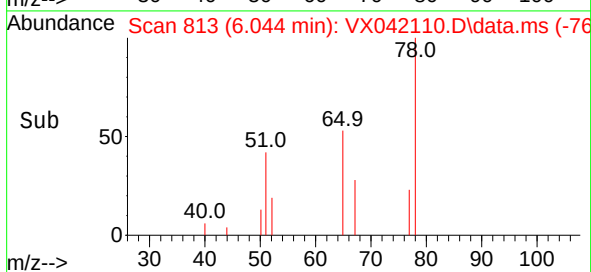
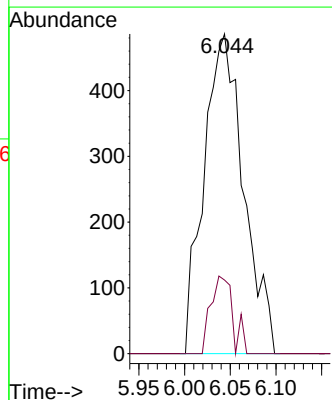
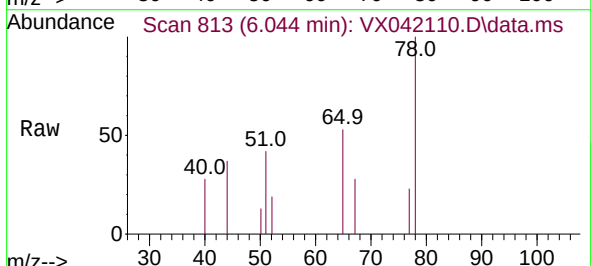
Acq: 01 Jul 2024 13:35

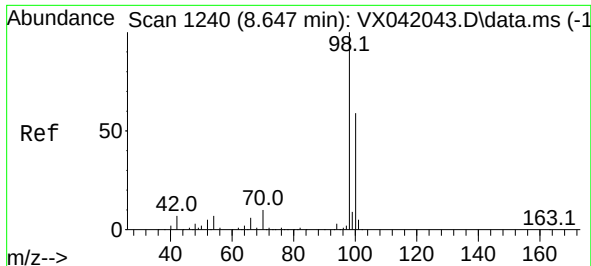
Tgt Ion: 78 Resp: 1471

Ion Ratio Lower Upper

78 100

77 23.0 19.3 28.9





#50

Toluene-d8

Concen: 46.805 ug/l

RT: 8.647 min Scan# 1240

Delta R.T. 0.000 min

Lab File: VX042110.D

Acq: 01 Jul 2024 13:35

Instrument :

MSVOA_X

ClientSampleId :

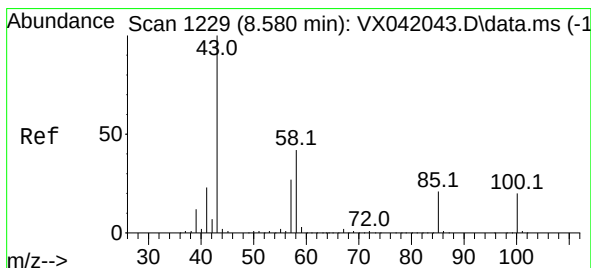
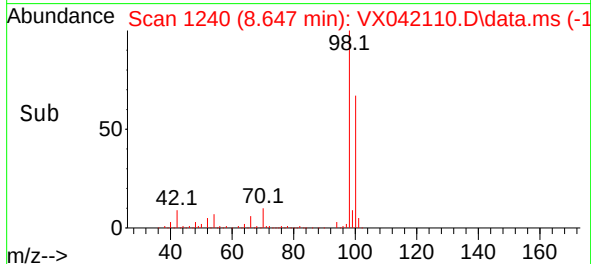
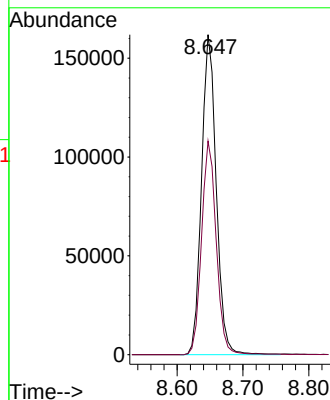
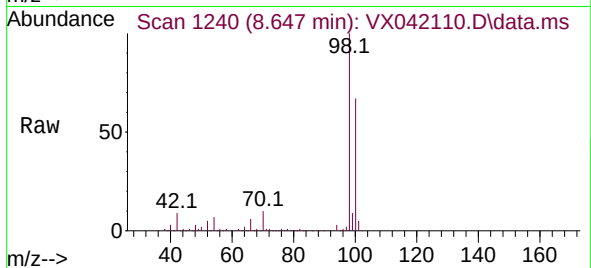
MW14-20240625

Tgt Ion: 98 Resp: 251420

Ion Ratio Lower Upper

98 100

100 66.9 53.1 79.7



#51

4-Methyl-2-Pentanone

Concen: 0.393 ug/l

RT: 8.647 min Scan# 1240

Delta R.T. 0.067 min

Lab File: VX042110.D

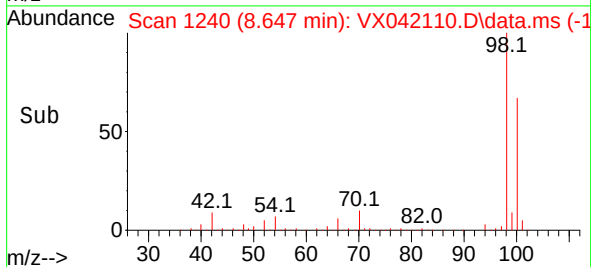
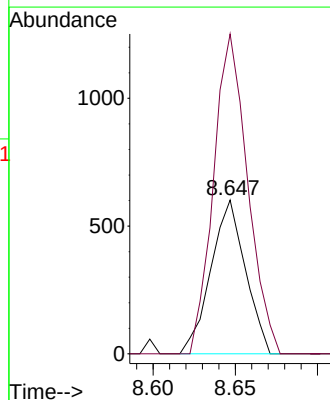
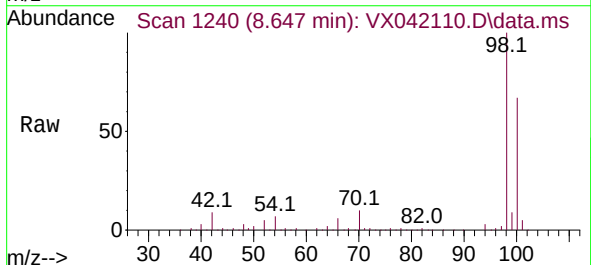
Acq: 01 Jul 2024 13:35

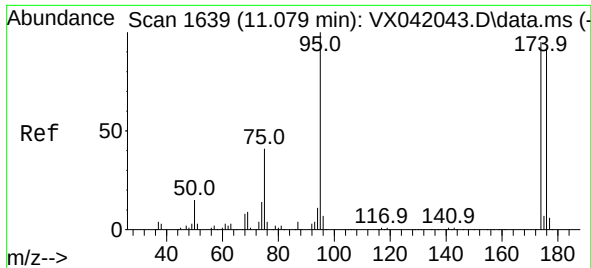
Tgt Ion: 43 Resp: 880

Ion Ratio Lower Upper

43 100

58 205.5 30.4 45.6#





#62

4-Bromofluorobenzene

Concen: 50.774 ug/l

RT: 11.079 min Scan# 1

Delta R.T. 0.000 min

Lab File: VX042110.D

Acq: 01 Jul 2024 13:35

Instrument :

MSVOA_X

ClientSampleId :

MW14-20240625

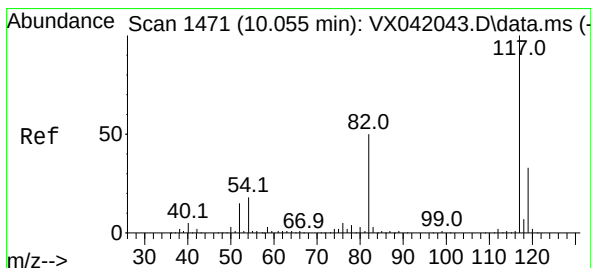
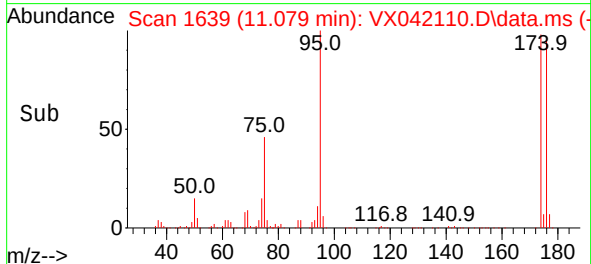
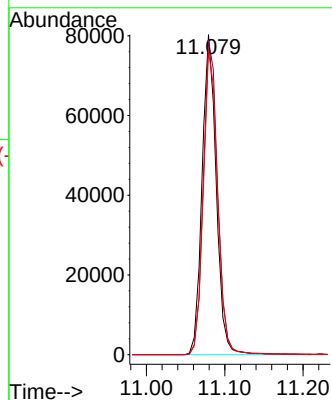
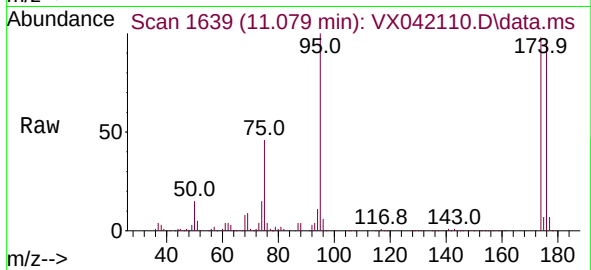
Tgt Ion: 95 Resp: 100539

Ion Ratio Lower Upper

95 100

174 100.5 0.0 135.6

176 95.9 0.0 131.0



#63

Chlorobenzene-d5

Concen: 50.000 ug/l

RT: 10.055 min Scan# 1471

Delta R.T. 0.000 min

Lab File: VX042110.D

Acq: 01 Jul 2024 13:35

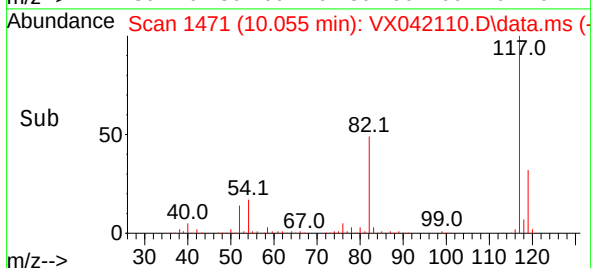
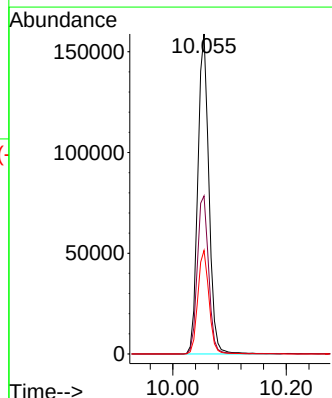
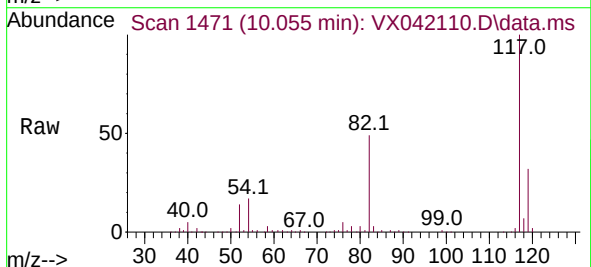
Tgt Ion: 117 Resp: 215533

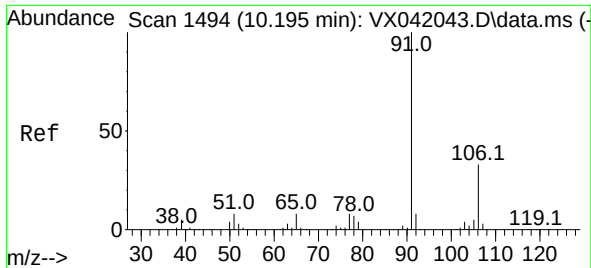
Ion Ratio Lower Upper

117 100

82 49.4 46.2 69.4

119 32.3 25.5 38.3





#67

Ethyl Benzene

Concen: 1.097 ug/l

RT: 10.195 min Scan# 1494

Delta R.T. 0.000 min

Lab File: VX042110.D

Acq: 01 Jul 2024 13:35

Instrument :

MSVOA_X

ClientSampleId :

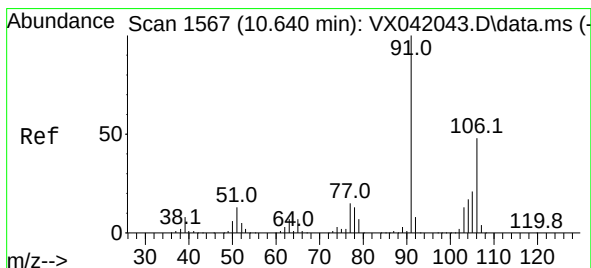
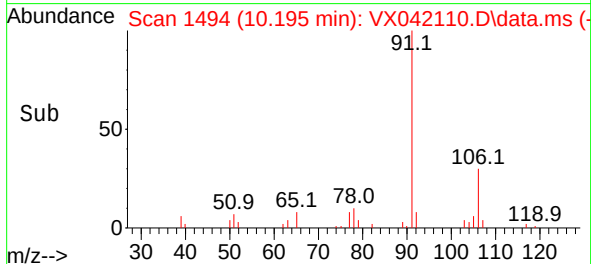
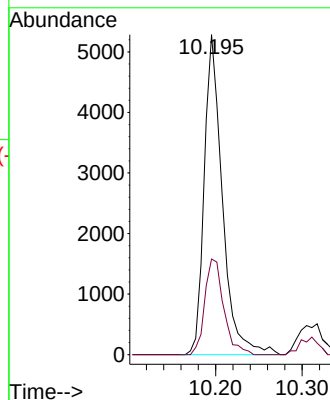
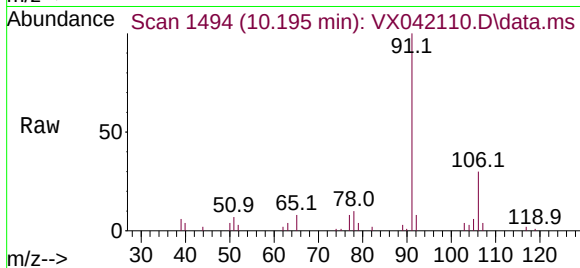
MW14-20240625

Tgt Ion: 91 Resp: 7705

Ion Ratio Lower Upper

91 100

106 29.9 24.9 37.3



#69

o-Xylene

Concen: 0.563 ug/l

RT: 10.640 min Scan# 1567

Delta R.T. 0.000 min

Lab File: VX042110.D

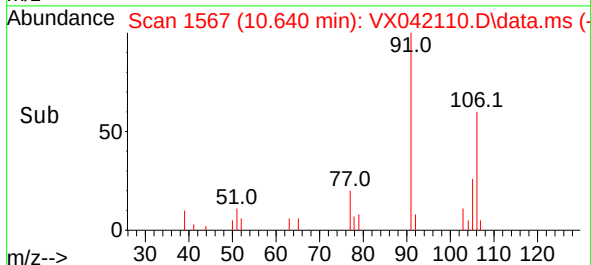
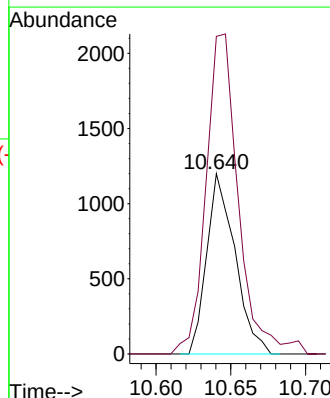
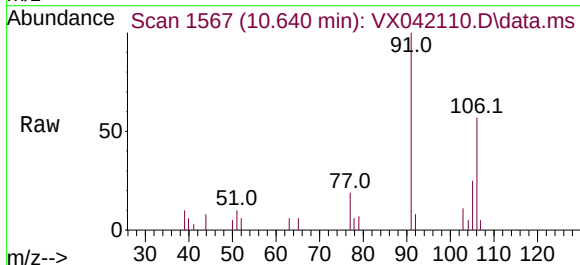
Acq: 01 Jul 2024 13:35

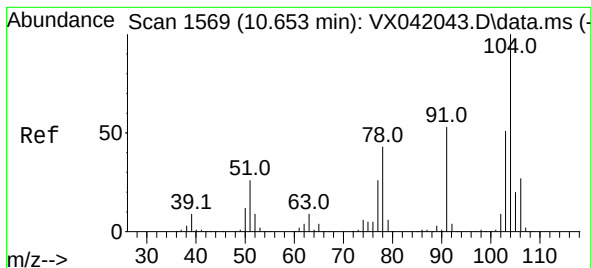
Tgt Ion: 106 Resp: 1580

Ion Ratio Lower Upper

106 100

91 202.7 108.9 326.8





#70

Styrene

Concen: 0.380 ug/l

RT: 10.665 min Scan# 1637

Delta R.T. 0.006 min

Lab File: VX042110.D

Acq: 01 Jul 2024 13:35

Instrument :

MSVOA_X

ClientSampleId :

MW14-20240625

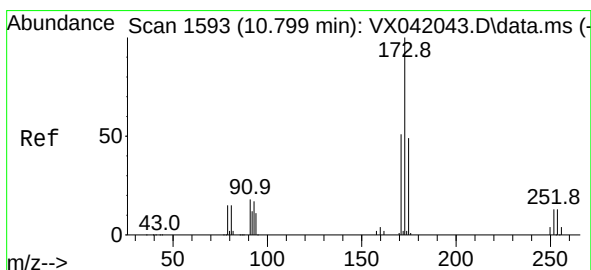
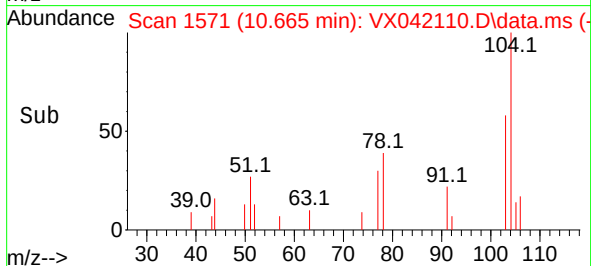
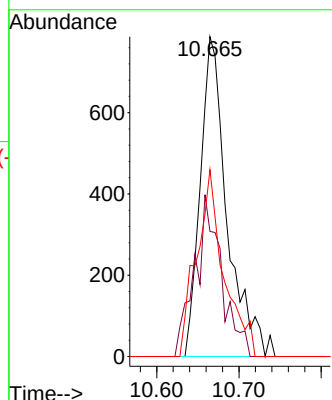
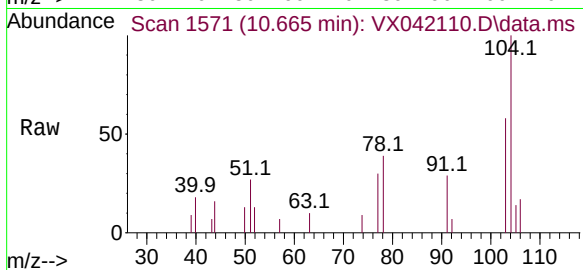
Tgt Ion:104 Resp: 1787

Ion Ratio Lower Upper

104 100

78 50.3 43.6 65.4

103 59.4 43.6 65.4



#71

Bromoform

Concen: 0.907 ug/l

RT: 11.067 min Scan# 1637

Delta R.T. 0.268 min

Lab File: VX042110.D

Acq: 01 Jul 2024 13:35

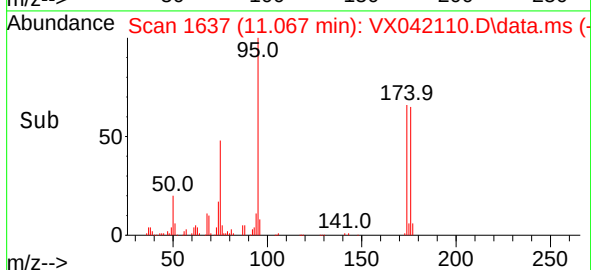
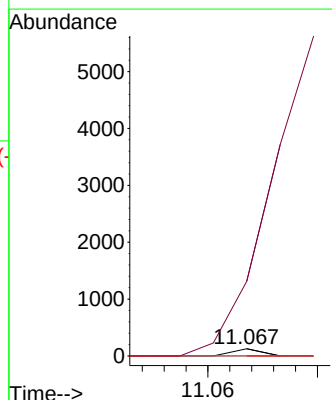
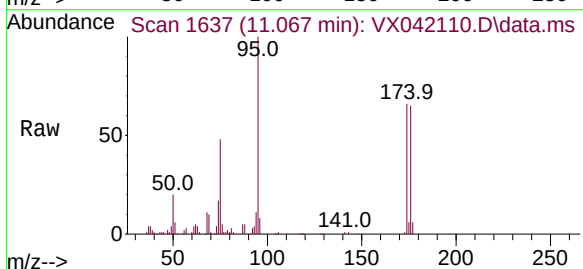
Tgt Ion:173 Resp: 46

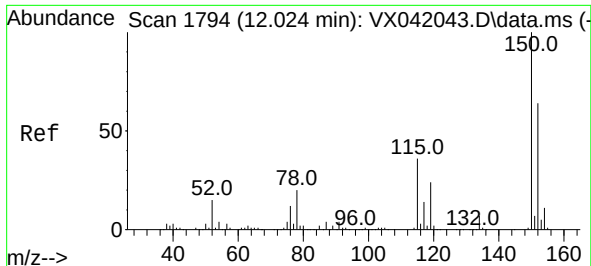
Ion Ratio Lower Upper

173 100

175 0.0 24.1 72.4#

254 0.0 0.0 0.0

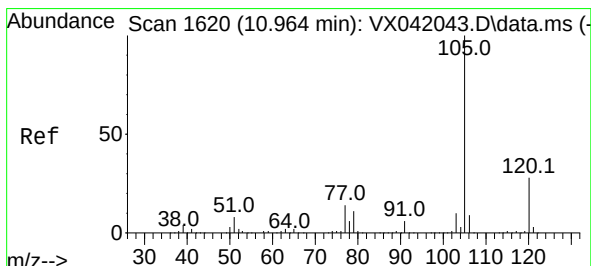
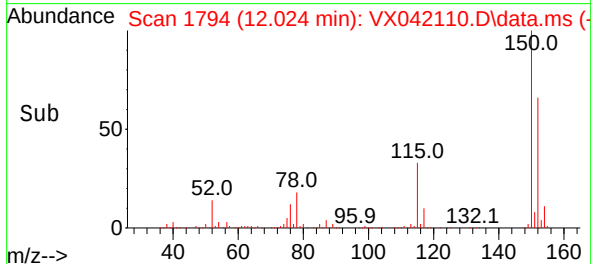
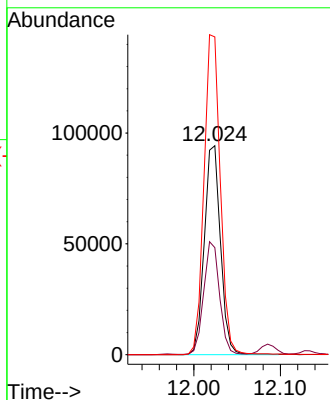
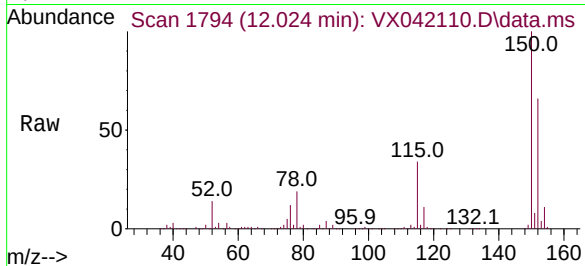




#72
1,4-Dichlorobenzene-d4
Concen: 50.000 ug/l
RT: 12.024 min Scan# 1794
Delta R.T. 0.000 min
Lab File: VX042110.D
Acq: 01 Jul 2024 13:35

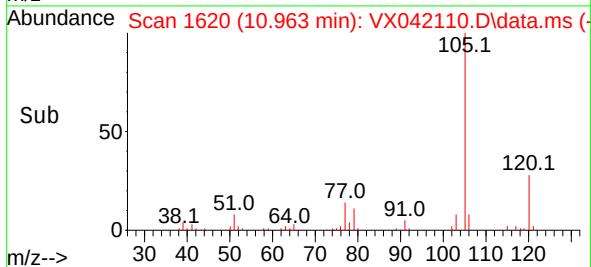
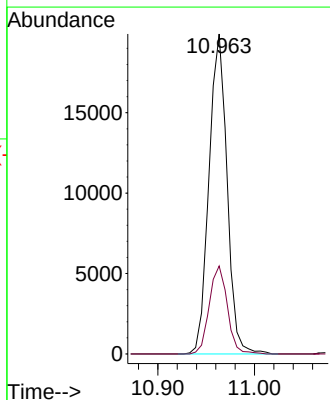
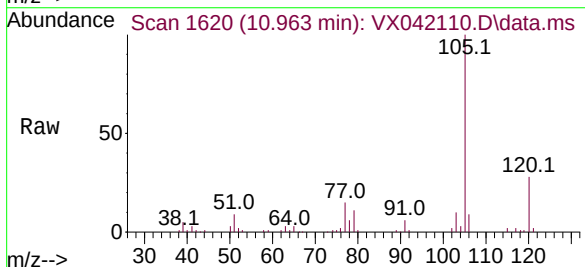
Instrument :
MSVOA_X
ClientSampleId :
MW14-20240625

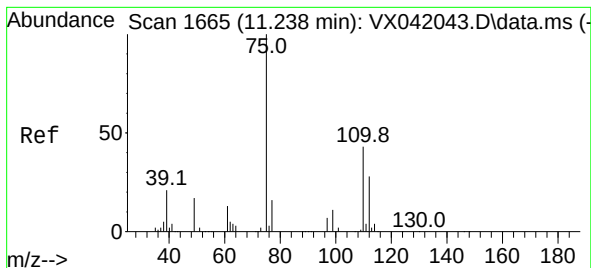
Tgt Ion:152 Resp: 122242
Ion Ratio Lower Upper
152 100
115 52.7 43.3 129.9
150 154.7 0.0 345.0



#73
Isopropylbenzene
Concen: 3.480 ug/l
RT: 10.963 min Scan# 1620
Delta R.T. 0.000 min
Lab File: VX042110.D
Acq: 01 Jul 2024 13:35

Tgt Ion:105 Resp: 25866
Ion Ratio Lower Upper
105 100
120 27.5 12.9 38.6





#76

1,2,3-Trichloropropane

Concen: 20.604 ug/l

RT: 11.079 min Scan# 1639

Delta R.T. -0.158 min

Lab File: VX042110.D

Acq: 01 Jul 2024 13:35

Instrument :

MSVOA_X

ClientSampleId :

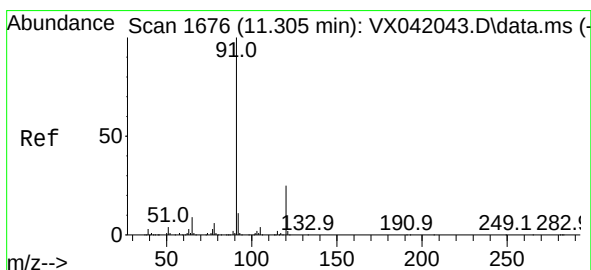
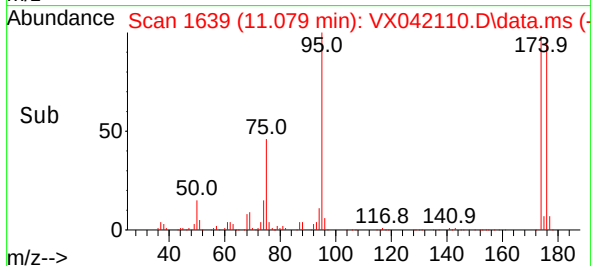
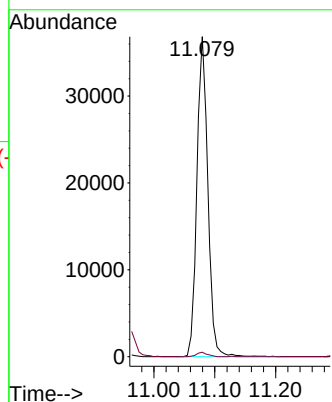
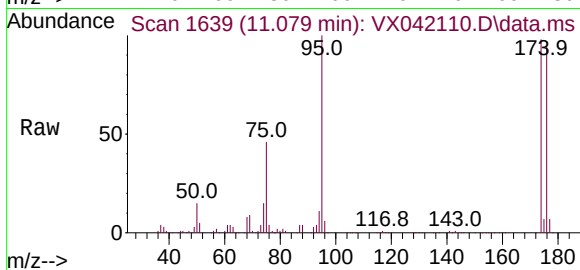
MW14-20240625

Tgt Ion: 75 Resp: 45723

Ion Ratio Lower Upper

75 100

77 1.4 19.1 57.5#



#78

n-propylbenzene

Concen: 2.487 ug/l

RT: 11.305 min Scan# 1676

Delta R.T. 0.000 min

Lab File: VX042110.D

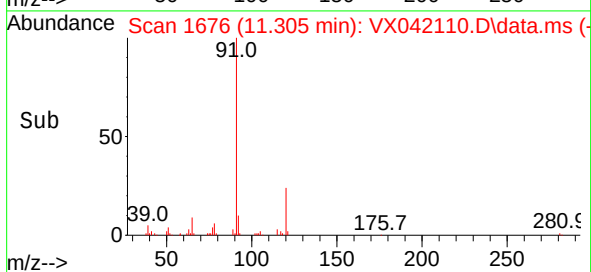
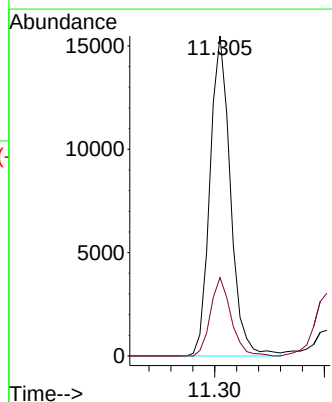
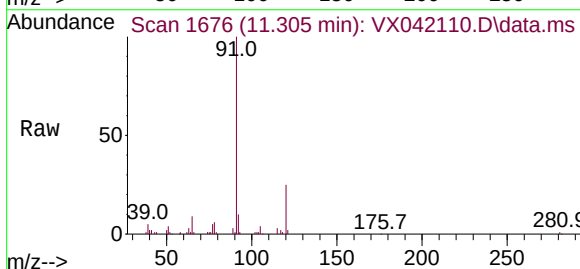
Acq: 01 Jul 2024 13:35

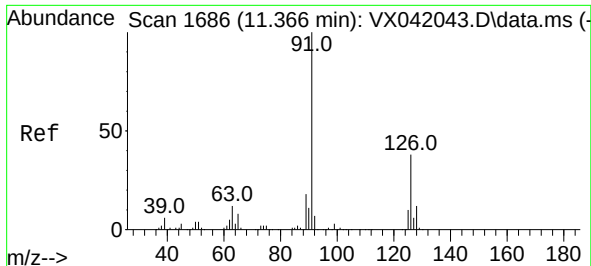
Tgt Ion: 91 Resp: 20059

Ion Ratio Lower Upper

91 100

120 24.4 11.5 34.4





#79

2-Chlorotoluene

Concen: 0.371 ug/l

RT: 11.402 min Scan# 1

Delta R.T. 0.037 min

Lab File: VX042110.D

Acq: 01 Jul 2024 13:35

Instrument :

MSVOA_X

ClientSampleId :

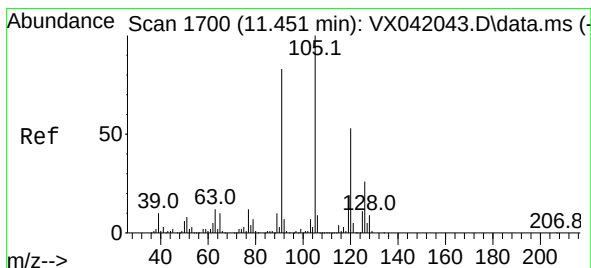
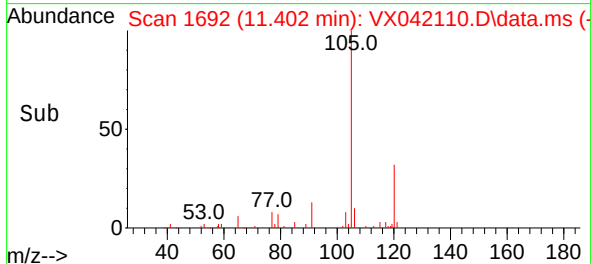
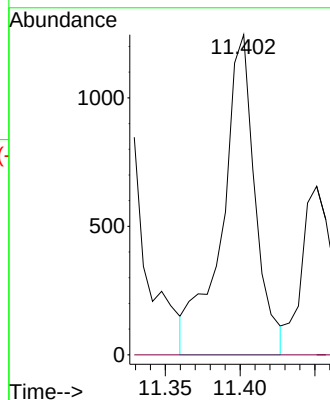
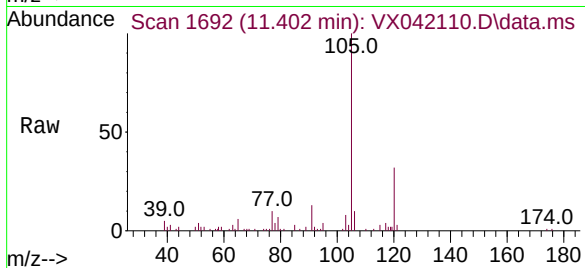
MW14-20240625

Tgt Ion: 91 Resp: 1927

Ion Ratio Lower Upper

91 100

126 0.0 16.3 48.8#



#80

1,3,5-Trimethylbenzene

Concen: 1.086 ug/l

RT: 11.451 min Scan# 1700

Delta R.T. 0.000 min

Lab File: VX042110.D

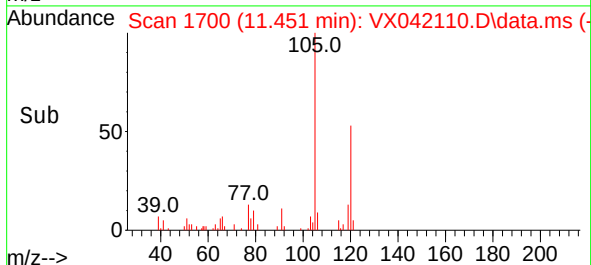
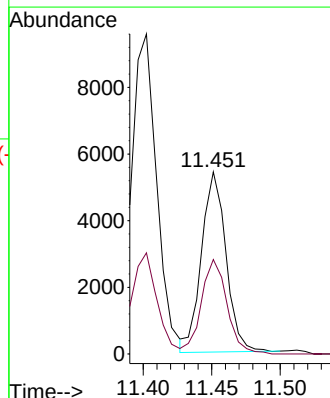
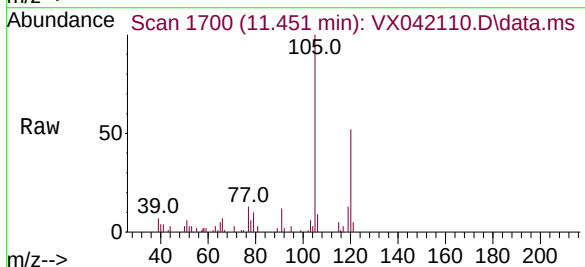
Acq: 01 Jul 2024 13:35

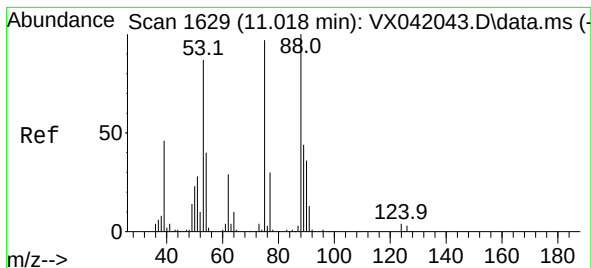
Tgt Ion: 105 Resp: 6722

Ion Ratio Lower Upper

105 100

120 55.0 24.1 72.3

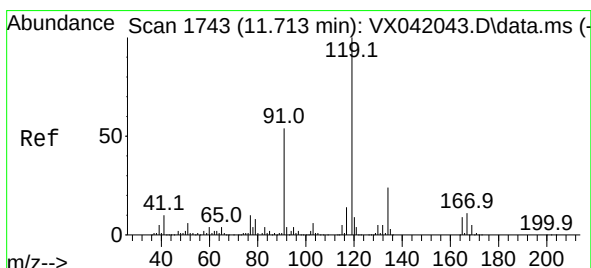
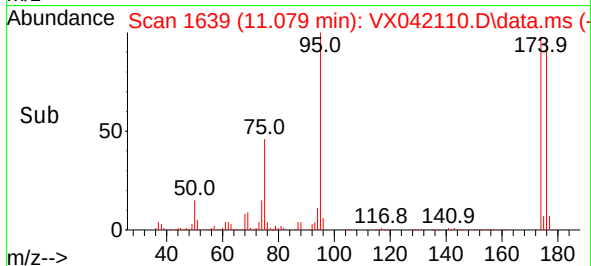
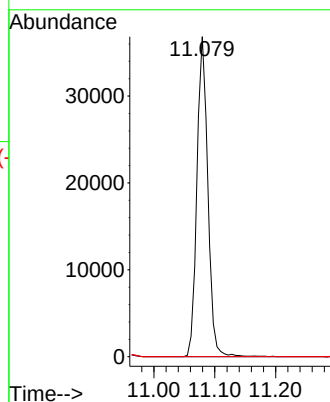
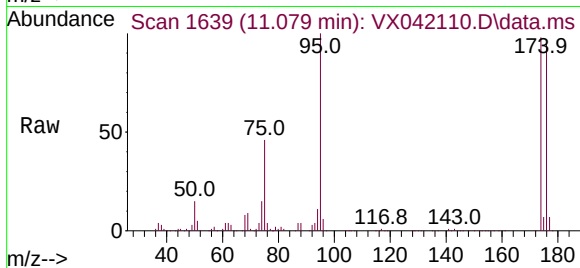




#81
trans-1,4-Dichloro-2-butene
Concen: 58.512 ug/l
RT: 11.079 min Scan# 1639
Delta R.T. 0.061 min
Lab File: VX042110.D
Acq: 01 Jul 2024 13:35

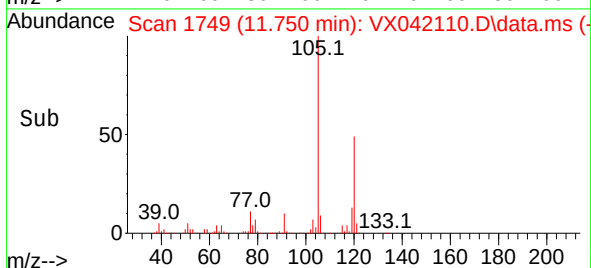
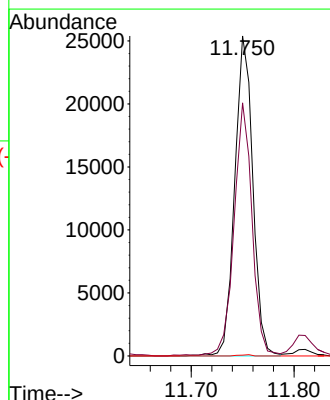
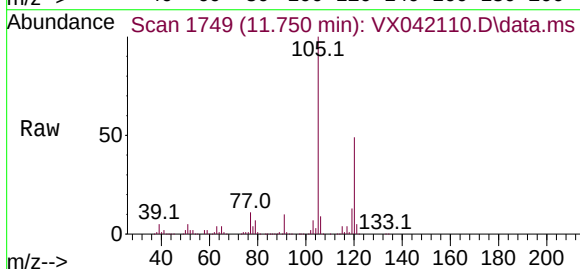
Instrument :
MSVOA_X
ClientSampleId :
MW14-20240625

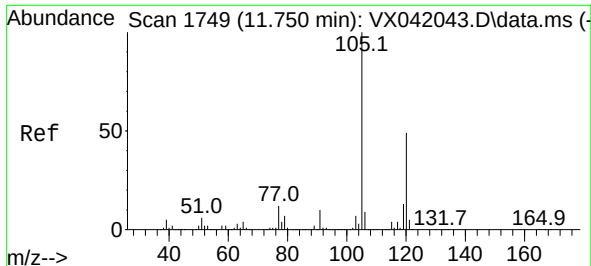
Tgt Ion: 75 Resp: 45723
Ion Ratio Lower Upper
75 100
53 0.0 90.5 135.7#
89 0.0 36.9 55.3#



#83
tert-Butylbenzene
Concen: 4.571 ug/l
RT: 11.750 min Scan# 1749
Delta R.T. 0.037 min
Lab File: VX042110.D
Acq: 01 Jul 2024 13:35

Tgt Ion: 119 Resp: 31052
Ion Ratio Lower Upper
119 100
91 79.1 31.2 93.6
134 0.2 11.7 35.0#

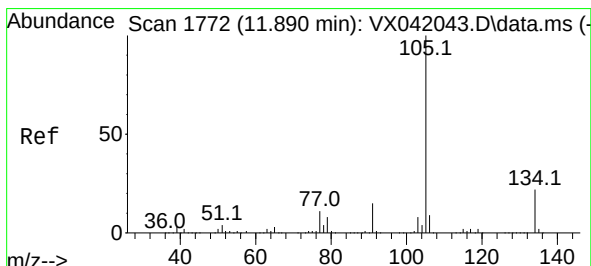
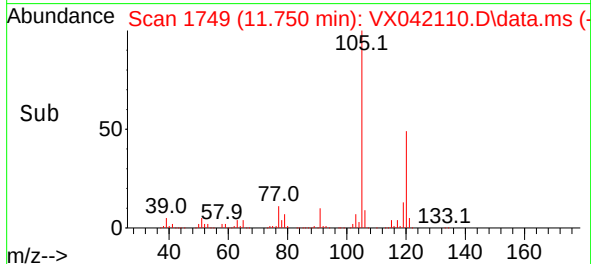
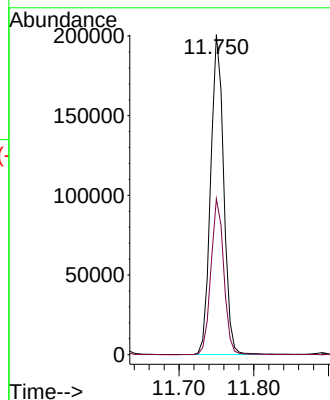
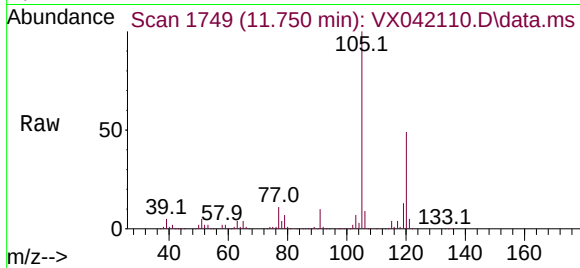




#84
1,2,4-Trimethylbenzene
Concen: 39.060 ug/l
RT: 11.750 min Scan# 1749
Delta R.T. 0.000 min
Lab File: VX042110.D
Acq: 01 Jul 2024 13:35

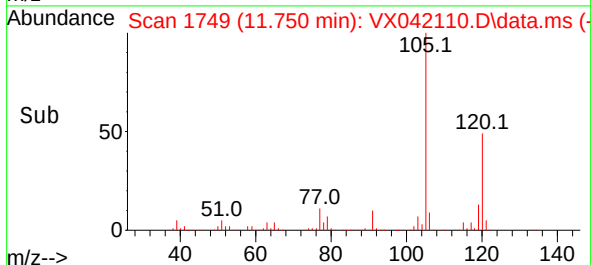
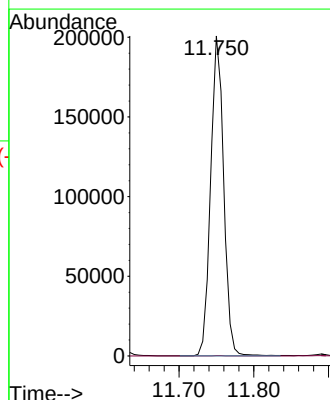
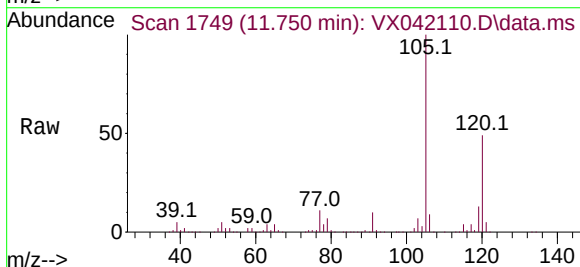
Instrument :
MSVOA_X
ClientSampleId :
MW14-20240625

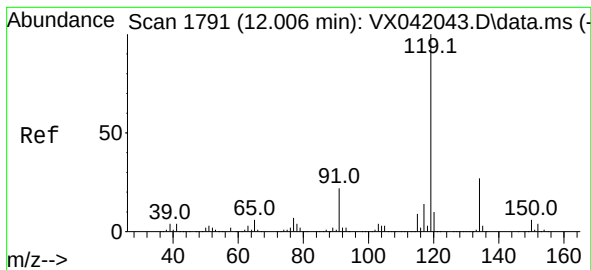
Tgt Ion:105 Resp: 242607
Ion Ratio Lower Upper
105 100
120 48.3 21.2 63.6



#85
sec-Butylbenzene
Concen: 31.575 ug/l
RT: 11.750 min Scan# 1749
Delta R.T. -0.140 min
Lab File: VX042110.D
Acq: 01 Jul 2024 13:35

Tgt Ion:105 Resp: 242607
Ion Ratio Lower Upper
105 100
134 0.0 9.8 29.4#





#86

p-Isopropyltoluene

Concen: 0.576 ug/l

RT: 12.012 min Scan# 1791

Delta R.T. 0.006 min

Lab File: VX042110.D

Acq: 01 Jul 2024 13:35

Instrument :

MSVOA_X

ClientSampleId :

MW14-20240625

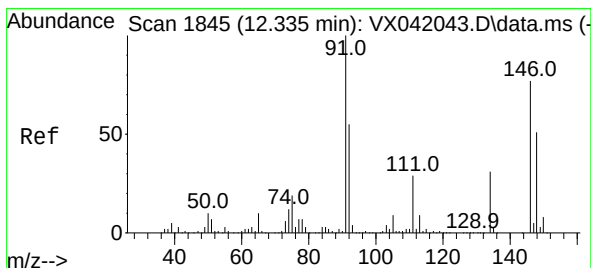
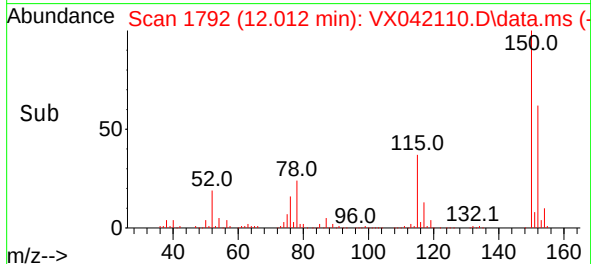
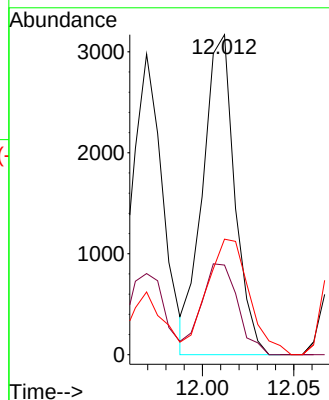
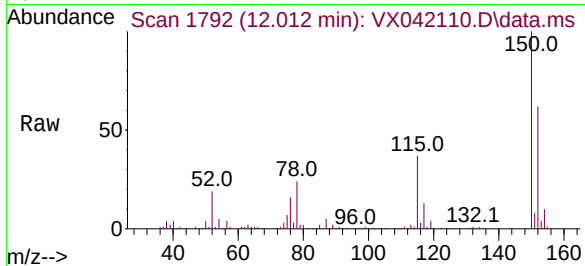
Tgt Ion:119 Resp: 3864

Ion Ratio Lower Upper

119 100

134 32.3 12.8 38.3

91 48.1 13.1 39.3#



#89

n-Butylbenzene

Concen: 0.629 ug/l

RT: 12.317 min Scan# 1842

Delta R.T. -0.018 min

Lab File: VX042110.D

Acq: 01 Jul 2024 13:35

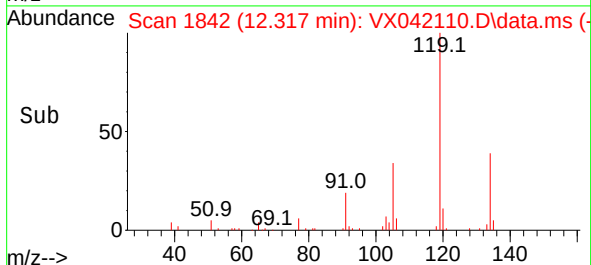
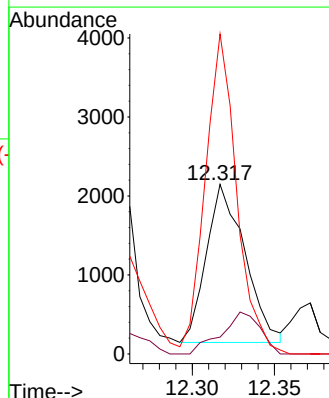
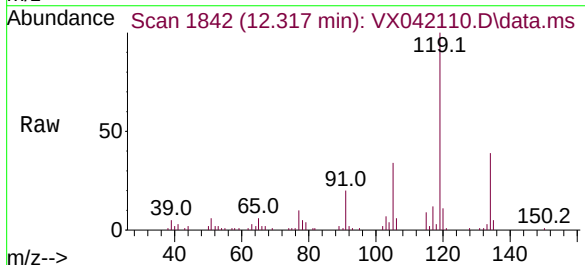
Tgt Ion: 91 Resp: 3249

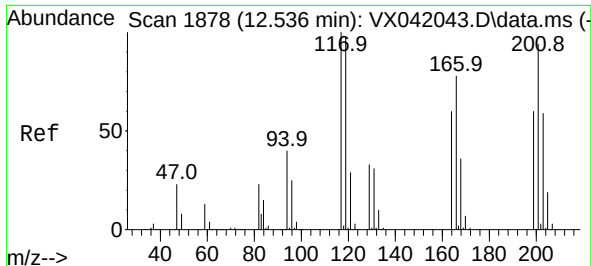
Ion Ratio Lower Upper

91 100

92 26.7 27.4 82.0#

134 165.3 12.6 37.8#

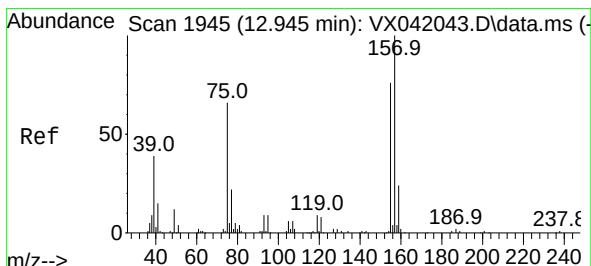
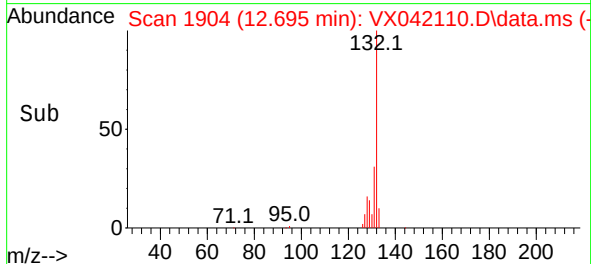
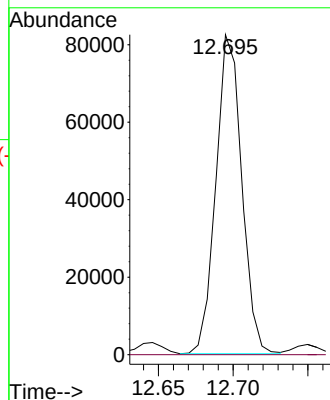
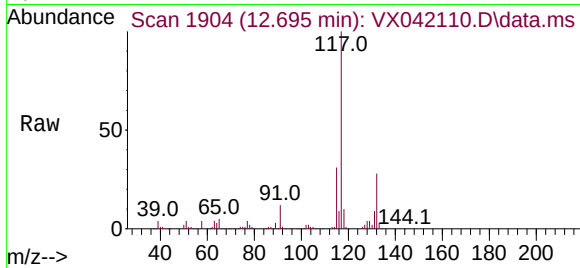




#90
Hexachloroethane
Concen: 86.550 ug/l
RT: 12.695 min Scan# 1904
Delta R.T. 0.159 min
Lab File: VX042110.D
Acq: 01 Jul 2024 13:35

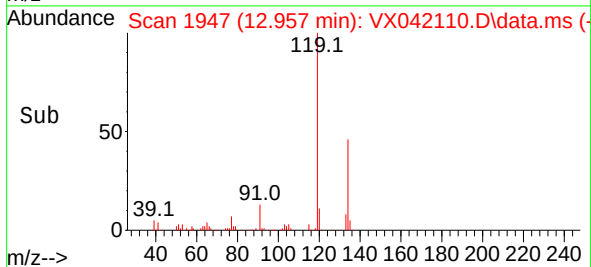
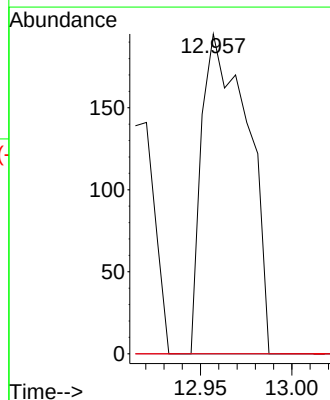
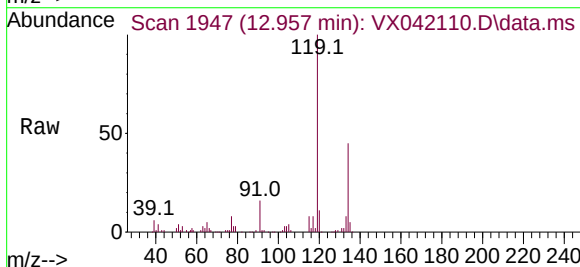
Instrument :
MSVOA_X
ClientSampleId :
MW14-20240625

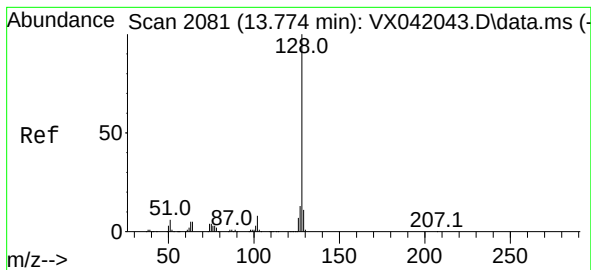
Tgt Ion:117 Resp: 98902
Ion Ratio Lower Upper
117 100
201 0.0 32.9 98.6#



#92
1,2-Dibromo-3-Chloropropane
Concen: 0.624 ug/l
RT: 12.957 min Scan# 1947
Delta R.T. 0.012 min
Lab File: VX042110.D
Acq: 01 Jul 2024 13:35

Tgt Ion: 75 Resp: 342
Ion Ratio Lower Upper
75 100
155 0.0 36.1 108.5#
157 0.0 44.9 134.7#





#95
Naphthalene
Concen: 940.307 ug/l
RT: 13.780 min Scan# 2082
Delta R.T. 0.006 min
Lab File: VX042110.D
Acq: 01 Jul 2024 13:35

Instrument :
MSVOA_X
ClientSampleId :
MW14-20240625

Tgt Ion:128 Resp: 8359543
Ion Ratio Lower Upper
128 100
127 16.2 10.3 15.5#
129 14.1 8.8 13.2#

