

深色果蔬及茶叶中农药多残留的测定 (Copure® QuEChERS)

GB 23200.121-2021 《食品安全国家标准 植物源性食品中 331 种农药及其代谢物残留量的测定 液相色谱 - 质谱联用法》

一、样品前处理

1.1.1 深色果蔬样品提取与净化

称取 10 g(精确至 0.01 g) 试样于 50 mL 塑料离心管中, 加入 10 mL 乙腈及 1 颗陶瓷均质子, 剧烈振荡 1 min, 加入 4 g 无水硫酸镁、1 g 氯化钠、1 g 柠檬酸钠二水合物、0.5 g 柠檬酸二钠盐倍半水合物 (货号: COQ050010CH), 剧烈振荡 1 min 后 5000 r/min 离心 5 min。吸取 6 mL 上清液加到内含 900 mg 硫酸镁、150 mg PSA 及 15 mg GCB (货号: COQ015020H) 的 15 mL 塑料离心管中涡旋混匀 1 min。7500 r/min 离心 2 min, 吸取上清液过微孔滤膜, 待测定。

1.1.2 茶叶样品提取与净化

称取 2 g(精确至 0.01g) 于 50 mL 塑料离心管中, 加 10 mL 水涡旋混匀, 静置 30 min。加入 15 mL 乙腈 - 乙酸溶液及 1 颗陶瓷均质子, 剧烈振荡 1 min, 加入 6 g 无水硫酸镁、1.5 g 乙酸钠 (货号: COQ050020CH), 剧烈振荡 1 min 后 7500 r/min 离心 5 min。吸取 8 mL 上清液加到内含 1200 mg 硫酸镁、400 mg PSA、400mg C18 及 200 mg GCB (货号: COQ015047H) 的 15 mL 塑料离心管中, 涡旋混匀 1 min。7500 r/min 离心 2min, 吸取上清液过微孔滤膜, 待测定。

1.2 标准曲线的制备

选择与被测样品性质相同或相似的空白样品按照 1.1 部分进行前处理, 得到空白基质溶液。精确吸取一定量的混合标准溶液, 逐级用空白基质溶液稀释成质量浓度为 0.002 mg/L, 0.005 mg/L, 0.01 mg/L, 0.02 mg/L, 0.05 mg/L 和 0.1 mg/L 的基质匹配标准工作溶液, 根据仪器性能和检测需要选择不少于 5 个浓度点, 供液相色谱 - 质谱联用仪测定。以农药定量用子离子的质量色谱图峰面积为纵坐标, 相对应的基质匹配标准工作溶液质量浓度为横坐标, 绘制基质匹配标准工作曲线。

二、仪器条件

仪器设备: 串联四级杆线性离子阱质谱仪 AB SCIEX QTRAP4500
色谱柱: ACQUITY UPLC BEH C18 1.7 μ m 2.1 \times 50mm Column

色谱条件:

柱温: 40 $^{\circ}$ C

进样量: 1 μ L

梯度洗脱:

时间 (min)	流速 (mL/min)	5mmol/L 乙酸铵溶液 (0.01% 甲酸)	甲醇 (0.01% 甲酸)
初始	0.300	90.0	10.0
1.50	0.300	50.0	50.0
3.00	0.300	10.0	90.0
5.00	0.300	10.0	90.0
5.10	0.300	90.0	10.0
6.00	0.300	90.0	10.0

质谱条件:

检测方式: 多反应离子监测 (MRM);

表 1 离子源控制条件

电离方式	ESI+
Curtain Gas(CUR)	40.0 Psi
Collision Gas(CAD)	9 Psi
IonSpray Voltage(IS)	5500.0 V
Temperature(TEM)	400.0 $^{\circ}$ C
Ion Source Gas 1(GS1)	50 Psi
Ion Source Gas 1(GS2)	40 Psi

表 2 离子选择参数

化合物名称	母离子 (m/z)	子离子 (m/z)	保留时间 (min)	DP (V)	CE (V)
啶虫脒	223	126*	1.75	65	28
	223	99	1.75	65	60
涕灭威	208	116*	2.02	20	11
	208	89	2.02	20	25
涕灭威砒	240.1	148*	1.29	30	17
	240.1	166	1.29	30	16
涕灭威亚砒	207	132*	1.19	55	9
	207	89	1.19	55	20
莠灭净	228.1	186.2*	2.68	90	25
	228.1	96	2.68	90	35
莎稗磷	368	199*	3.03	80	19
	368	125	3.03	80	45
阿维菌素	890.5	305*	3.82	60	33
	890.5	567.3	3.82	60	20
保棉磷	318	132*	2.59	58	22
	318	125	2.58	58	33
噁菌酯	404.1	372*	2.59	80	20
	404.1	344.1	2.59	80	34
草除灵	272	198*	2.65	65	20
	272	170	2.65	65	33
恶虫威	224.1	167*	2.21	64	12
	224.1	109	2.21	64	23
苯螨特	364.1	199*	3.1	20	12
	364.1	105	3.1	20	36
啶酰菌胺	343	307*	2.71	100	28
	343	140	2.71	100	27
乙啶酚磷酸酯	317	166*	2.95	90	31
	317	210	2.95	90	33
噻嗪酮	306.2	201.1*	3.34	60	17
	306.2	116.2	3.34	60	22
甲萘威	202.1	145*	2.3	56	15
	202.1	127	2.3	56	40
多菌灵	192	160*	1.88	80	25
	192	132	1.87	80	41
克百威	222.1	165*	2.2	70	16
	222.1	123.1	2.2	70	29

3- 羟基克百威	238	181*	1.73	70	16
	238	163	1.73	70	18
氯虫苯甲酰胺	483.9	452.9*	2.54	45	25
	483.9	285.9	2.54	45	19
氟啶脲	540	383*	3.59	70	30
	542	385	3.59	70	30
杀草敏	222	104*	1.8	90	28
	222	92	1.8	90	35
绿麦隆	213.1	72.1*	2.44	60	36
	213.1	46.1	2.44	60	33
环虫酰胺	395.2	175*	2.82	80	18
	395.2	339	2.82	80	9
四螨嗪	303	138*	3.14	51	21
	303	102	3.14	51	47
异噁草酮	240.1	125*	2.6	73	28
	240.1	89.1	2.61	73	65
噻虫胺	250	169.1*	1.68	35	17
	250	132	1.68	35	21
氰草津	241.1	214.1*	2.1	60	24
	241.1	104.1	2.09	60	40
溴氟虫酰胺	475	286*	2.29	30	18
	475	444	2.29	30	27
丁氟螨酯	465.2	173*	3.19	40	30
	465.2	249.1	3.19	40	19
霜脲氰	199.1	128*	1.85	53	12
	199.1	111	1.85	53	24
啉菌环胺	226.1	93*	3.07	96	50
	226.1	108.1	3.07	96	35
除虫脲	311	158*	2.98	45	20
	311	141.2	2.99	45	49
吡氟酰草胺	395.1	266*	3.18	30	34
	395.1	246	3.18	30	46
精二甲吩草胺	276.1	244.1*	2.7	60	20
	276.1	168.1	2.7	60	33
醚菌胺	327.2	205*	3	64	14
	327.2	238.1	2.98	64	15
呋虫胺	203.1	129*	1.23	35	16
	203.1	157	1.22	35	11
氟环唑	330	121*	2.89	85	55
	330	101	2.88	85	70
噁唑菌酮	392	331*	3.04	45	12
	392	238	3.04	45	24
烯炔菌胺	434.1	171*	3.21	60	36
	434.1	212	3.2	60	21
苯线磷	304.2	217.1*	2.93	90	31
	304.2	202	2.93	90	47
苯线磷砒	336	308*	2.22	90	21
	336	266	2.22	90	29
苯线磷亚砒	320.1	233*	2.17	100	32
	320.1	171	2.17	100	30
啉啉醚	307.2	161*	3.79	30	22
	307.2	131.1	3.79	30	60
氯吡脲	248.1	129*	2.54	50	23
	248.1	93	2.54	50	47
安硫磷	258	199*	2.08	20	12
	258	125	2.08	20	32

噻唑磷	284	228*	2.35	65	14
	284	104	2.35	65	30
呋线威	383.2	195*	3.28	85	25
	383.2	252	3.28	85	17
庚烯磷	251	127*	2.52	65	20
	251	125	2.52	65	18
噻螨酮	353	228*	3.43	56	21
	353	168	3.43	56	33
吡虫啉	256.1	175*	1.64	45	27
	256.1	209	1.64	45	22
氯噻啉	262.1	181.1*	1.71	57	19
	262.1	122	1.71	57	36
茚虫威	528	293*	3.13	50	18
	528	249	3.14	50	23
氯唑磷	316	164*	2.8	70	23
	316	122	2.8	70	35
异丙威	194	95*	2.46	57	19
	194	137	2.45	57	12
甲硫威	226.1	169.2*	2.72	61	13
	226.1	121.1	2.72	61	23
甲硫威亚砒	242	185*	1.65	37	18
	242	122	1.65	37	38
灭多威	163	88*	1.41	38	12
	163	106	1.41	38	14
烯虫酯	279	191*	3.89	80	11
	279	237	3.89	80	9
甲氧虫酰胺	369.2	149.1*	2.74	70	21
	369.2	133	2.74	70	15
异丙甲草胺	284.1	251.9*	2.92	60	19
	284.1	176	2.92	60	33
速灭威	166.1	109*	2.11	50	18
	166.1	94.2	2.11	50	40
苯菌酮	409	209.1*	3.14	71	21
	409	227.1	3.14	71	27
噻草酮	215.1	187.1*	2.23	60	24
	215.1	84.1	2.23	60	28
速灭磷	225	127*	1.89	55	21
	225	193	1.89	55	9
啉氧菌酯	368.1	205.1*	2.92	54	13
	368.1	145.1	2.92	54	27
咪鲜胺	376.2	308*	3.11	20	15
	376.2	266	3.11	20	22
咪鲜胺 - 脱氨基咪唑	325	282*	3.12	90	21
	327	284	3.12	90	23
咪鲜胺 - 脱咪唑甲酰胺基	353	308*	3.1	80	19
	355	310	3.1	80	20
吡啉醚菌酯	388.1	194*	3.06	50	18
	388.1	163	3.06	50	36
吡草醚	413	339*	3	40	28
	413	253	3	40	45
啉啉菌酯	382.1	194.1*	2.93	30	16
	382.1	163	2.93	30	34
吡啉磺隆	415.1	182*	2.79	30	25
	415.1	139	2.79	30	59
除虫菊素 I	329.2	161.1*	3.52	75	13
	329.2	133.1	3.53	75	22

啶啉肟草醚	610.2	413.1*	3.24	30	17
	610.2	180.1	3.24	30	48
啉霉胺	200	183*	2.71	30	33
	200	168	2.72	30	40
多杀霉素 D	746.4	142*	3.14	110	34
	746.4	98	3.14	110	101
螺螨酯	411.2	313.1*	3.56	83	15
	411.2	71.1	3.56	83	30
螺甲螨酯	388	273*	3.43	65	23
	388	255	3.44	65	38
螺虫乙酯	374	302*	2.81	87	24
	374	330	2.8	87	20
虫酰肼	353.1	133.1*	2.93	35	24
	353.1	297.1	2.93	35	11
丁噻隆	229.1	172*	2.25	30	23
	229.1	116.1	2.25	30	35
氟苯脲	381.1	158.2*	3.41	71	23
	381.1	141.2	3.41	71	53
特丁硫磷	289.1	103.1*	3.32	53	13
	289.1	233.2	3.33	53	9
特丁硫磷砒	321	97*	2.62	75	57
	321	115	2.63	75	39
特丁硫磷亚砒	305	187*	2.62	57	20
	305	131	2.62	57	38
噻虫嗪	292	211*	1.47	30	16
	292	181	1.47	30	30
苯酰菌胺	336	186.9*	3.1	90	31
	336	204	3.1	90	23
啉啉酯	422	366.1*	3.54	90	23
	422	135.1	3.54	90	43
咯菌腈	266.1	229*	2.73	30	17
	266.1	158	2.74	30	46
氟噻草胺	364	194*	2.84	70	16
	364	152	2.84	70	27
氟虫脲	489	158.1*	3.45	71	27
	489	141.2	3.45	71	65
氟吡菌胺	382.9	172.9*	2.72	50	35
	382.9	364.9	2.73	50	23
氟吡菌酰胺	397	207.9*	2.8	60	30
	397	172.9	2.8	60	40
乙羧氟草醚	465.1	344*	3.16	40	19
	465.1	223	3.17	40	43
呋草酮	334.1	247.1*	2.64	50	30
	334.1	303	2.64	50	20
氟硅唑	316	247.1*	2.93	50	26
	316	165	2.92	50	37
醚菊酯	394.2	177.1*	4.13	30	19
	394.2	107.1	4.13	30	59
粉唑醇	302.1	123*	2.42	69	39
	302.1	109	2.42	69	43
氟唑菌酰胺	382.1	362*	2.73	90	20
	382.1	342.1	2.73	90	28

注：* 为定量离子。

三、实验结果

表 3 0.0200 mg/kg 上海青中农药多残留加标回收实验结果

检测项目	回收率 (%)			平均回收率 (%)	RSD (%)
	1	2	3		
啉虫脒	89.5	88.0	86.0	87.8	2.00
涕灭威	85.5	87.0	80.0	84.2	4.38
涕灭威砒	92.5	90.5	89.0	90.7	1.94
涕灭威亚砒	91.0	88.0	83.5	87.5	4.31
莠灭净	90.0	83.0	86.5	86.5	4.05
莎稗磷	94.0	84.5	79.5	86.0	8.56
阿维菌素	93.5	80.5	75.5	83.2	11.2
保棉磷	95.0	88.5	88.0	90.5	4.32
啉菌酯	92.0	88.5	86.5	89.0	3.13
草除灵	86.0	83.0	86.5	85.2	2.22
恶虫威	90.0	89.0	84.5	87.8	3.34
苯螨特	93.5	92.5	82.0	89.3	7.13
啉酰菌胺	92.5	90.0	85.0	89.2	4.28
乙啉酚磷酸酯	97.0	95.5	81.5	91.3	9.36
噻啉酮	88.0	87.5	83.0	86.2	3.19
甲萘威	90.0	88.5	87.5	88.7	1.42
多菌灵	92.0	90.0	93.5	91.8	1.91
克百威	116	118	110	115	3.62
3-羟基克百威	87.5	88.0	87.5	87.7	0.329
啉虫苯甲酰胺	98.0	95.5	98.5	97.3	1.65
氟啉脲	97.5	85.5	87.5	90.2	7.13
杀草敏	88.0	85.0	86.5	86.5	1.73
绿麦隆	89.0	90.0	92.0	90.3	1.69
环虫酰肼	91.0	90.0	81.0	87.3	6.31
四螨嗪	93.5	80.0	91.5	88.3	8.25
异噻草酮	91.0	91.0	88.5	90.2	1.60
噻虫胺	75.0	81.5	78.0	78.2	4.16
氟草津	98.0	92.0	96.5	95.5	3.27
溴啉虫酰胺	86.5	79.5	87.5	84.5	5.16
丁氟螨酯	79.5	83.0	81.0	81.2	2.16
霜脲氰	88.5	87.0	88.5	88.0	0.984
啉菌环胺	88.0	75.0	81.5	81.5	7.98
除虫脲	82.0	93.5	83.5	86.3	7.24
吡啉酰草胺	90.5	91.0	91.0	90.8	0.318
精二甲吩草胺	99.5	91.5	95.5	95.5	4.19
啉菌胺	92.0	84.0	87.5	87.8	4.57
呋虫胺	88.0	89.5	85.5	87.7	2.30
氟环唑	88.0	87.0	84.0	86.3	2.41
啉啉菌酮	96.0	88.5	98.5	94.3	5.52
烯啉菌胺	86.5	86.5	76.5	83.2	6.94
苯线磷	87.5	83.5	82.0	84.3	3.37
苯线磷砒	100	96.0	90.5	95.5	4.99
苯线磷亚砒	93.0	89.0	90.0	90.7	2.30
啉啉醚	82.0	79.5	78.5	80.0	2.25
啉啉脲	85.0	85.0	80.5	83.5	3.11
安硫磷	73.0	71.5	80.5	75.0	6.43
啉啉磷	89.5	85.5	85.0	86.7	2.84
呋线威	90.0	80.5	92.0	87.5	7.02

庚烯磷	89.5	92.0	86.5	89.3	3.08
噻螨酮	79.0	78.5	82.5	80.0	2.72
吡虫啉	83.0	93.5	82.0	86.2	7.39
氯噻啉	79.0	83.0	80.0	80.7	2.58
茚虫威	116	98.5	112	109	8.41
氯唑磷	95.0	91.5	82.0	89.5	7.52
异丙威	94.0	88.0	89.5	90.5	3.45
甲硫威	103	98.0	100	100	2.52
甲硫威亚砷	85.0	88.5	80.0	84.5	5.06
灭多威	89.5	87.5	88.0	88.3	1.18
烯虫酯	86.0	81.5	77.5	81.7	5.20
甲氧虫酰肼	89.0	106	93.0	96.0	9.26
异丙甲草胺	87.5	87.0	80.0	84.8	4.94
速灭威	91.5	89.5	89.5	90.2	1.28
苯菌酮	83.0	87.5	90.5	87.0	4.34
噻草酮	93.0	94.5	98.5	95.3	2.98
速灭磷	89.5	88.5	90.0	89.3	0.855
啉氧菌酯	96.5	102	92.0	96.8	5.17
咪鲜胺	82.0	78.0	76.5	78.8	3.61
咪鲜胺-脱氨基咪唑	87.5	76.5	83.5	82.5	6.75
咪鲜胺-脱咪唑甲酰胺基	91.0	100	99.5	96.8	5.23
吡唑醚菌酯	99.5	93.5	96.0	96.3	3.13
吡草醚	97.5	94.5	92.0	94.7	2.91
唑胺菌酯	97.0	102	92.0	97.0	5.15
吡啶磺隆	69.0	63.5	71.0	67.8	5.73
除虫菊素 I	77.5	84.0	76.5	79.3	5.14
啉啉肟草醚	83.5	90.5	78.5	84.2	7.16
啉霉胺	92.5	90.0	100	94.2	5.52
多杀霉素 D	79.0	82.0	77.5	79.5	2.88
螺螨酯	80.5	73.5	74.5	76.2	4.97
螺甲螨酯	89.0	83.0	78.0	83.3	6.61
螺虫乙酯	78.0	81.0	83.0	80.7	3.12
虫酰肼	96.5	86.0	83.0	88.5	8.01
丁噻隆	94.5	97.5	88.0	93.3	5.21
氟苯脲	79.0	90.5	88.5	86.0	7.14
特丁硫磷	94.5	94.5	86.5	91.8	5.03
特丁硫磷砷	90.5	93.5	87.5	90.5	3.31
特丁硫磷亚砷	86.0	87.0	91.0	88.0	3.01
噻虫嗪	95.5	90.0	82.5	89.3	7.31
苯酰菌胺	91.5	98.0	81.5	90.3	9.20
唑螨酯	79.5	83.0	81.5	81.3	2.16
咯菌腈	103	112	99.0	105	6.34
氟噻草胺	79.5	89.5	77.0	82.0	8.07
氟虫脲	90.5	82.5	77.0	83.3	8.15
氟吡菌胺	91.0	100	92.0	94.3	5.23
氟吡菌酰胺	77.5	92.0	93.0	87.5	9.91
乙羧氟草醚	88.0	89.5	91.0	89.5	1.68
呋草酮	85.5	93.5	76.5	85.2	9.98
氟硅唑	104	110	96.5	104	6.50
醚菊酯	81.5	78.0	75.5	78.3	3.85
粉唑醇	95.0	89.0	89.5	91.2	3.65
氟唑菌酰胺	100	93.5	98.5	97.3	3.50

表 4 0.375mg/kg 茶叶中农药多残留加标回收实验结果

检测项目	回收率 (%)			平均回收率 (%)	RSD (%)
	1	2	3		
啉虫脒	91.2	93.3	93.9	92.8	1.53
涕灭威	92.0	94.7	91.2	92.6	1.98
涕灭威砷	92.0	92.0	90.1	91.4	1.20
涕灭威亚砷	84.3	84.5	84.5	84.4	0.137
莠灭净	93.6	78.9	87.7	86.7	8.53
莎稗磷	96.0	81.3	91.7	89.7	8.43
阿维菌素	87.7	76.5	86.9	83.7	7.46
保棉磷	89.3	77.1	83.7	83.4	7.32
啉菌酯	88.8	81.1	96.0	88.6	8.41
草除灵	92.5	87.2	98.1	92.6	5.89
恶虫威	89.3	83.7	85.9	86.3	3.27
苯螨特	90.9	84.3	93.6	89.6	5.34
啉酰菌胺	80.5	84.5	86.9	84.0	3.85
乙啉磺酸酯	93.9	103	101	99.3	4.82
噻嗪酮	81.3	81.3	84.3	82.3	2.10
甲萘威	91.5	86.9	89.1	89.2	2.58
多菌灵	75.7	62.9	76.3	71.6	10.6
克百威	90.9	91.5	88.5	90.3	1.76
3- 羟基克百威	94.4	99.5	93.9	95.9	3.23
氯虫苯甲酰胺	91.7	79.2	86.7	85.9	7.32
氟啉脲	90.9	79.5	89.3	86.6	7.13
杀草敏	83.7	89.3	85.3	86.1	3.35
绿麦隆	86.1	81.3	91.2	86.2	5.74
环虫酰肼	95.2	88.0	93.3	92.2	4.05
四螨嗪	82.9	76.8	77.3	79.0	4.29
异噁草酮	87.7	80.5	90.1	86.1	5.80
噻虫胺	86.9	90.9	87.7	88.5	2.39
氟草津	93.3	88.3	93.1	91.6	3.09
溴氟虫酰胺	88.8	77.1	84.0	83.3	7.06
丁氟螨酯	101	104	89.1	98.0	8.04
霜脲氟	93.1	100	92.5	95.2	4.38
啉菌环胺	86.7	69.6	90.9	82.4	13.7
除虫脲	83.5	71.7	79.7	78.3	7.69
吡啉酰草胺	93.6	85.9	93.9	91.1	4.98
精二甲吩草胺	89.3	88.5	92.5	90.1	2.35
醚菌胺	89.3	80.8	91.5	87.2	6.48
呋虫胺	88.3	85.3	86.1	86.6	1.79
氟环唑	77.6	82.9	89.1	83.2	6.92
啉唑菌酮	96.5	104	87.7	96.1	8.49
烯肟菌胺	82.1	84.3	91.7	86.0	5.85
苯线磷	91.7	86.1	85.3	87.7	3.98
苯线磷砷	89.9	90.7	89.3	90.0	0.780
苯线磷亚砷	93.3	85.9	87.7	89.0	4.34
啉螨醚	79.7	74.1	76.3	76.7	3.68
氯吡脲	72.0	57.1	67.2	65.4	11.6
安硫磷	86.7	78.1	80.5	81.8	5.43
噻嗪磷	89.6	86.1	88.8	88.2	2.08
呋线威	84.5	82.1	82.4	83.0	1.58
庚烯磷	93.9	92.0	91.5	92.5	1.37
噻嗪酮	81.3	82.9	91.7	85.3	6.57
吡虫啉	91.7	99.2	94.4	95.1	3.99
氯噻啉	92.5	91.2	94.9	92.9	2.02
茚虫威	106	84.5	83.7	91.4	13.8
氯唑磷	86.9	78.4	88.3	84.5	6.34
异丙威	94.1	90.9	90.1	91.7	2.31
甲硫威	89.3	84.5	91.7	88.5	4.14
甲硫威亚砷	82.9	88.5	84.5	85.3	3.38
灭多威	90.1	97.1	92.8	93.3	3.78
烯虫酯	88.3	82.4	82.4	84.4	4.04
甲氧虫酰肼	93.1	86.9	95.7	91.9	4.92

异丙甲草胺	92.0	82.1	91.7	88.6	6.36
速灭威	88.5	85.3	89.3	87.7	2.41
苯菌酮	98.4	101	103	101	2.28
噻草酮	88.5	96.5	95.7	93.6	4.71
速灭磷	89.3	93.3	88.3	90.3	2.93
啉氧菌酯	94.1	79.7	85.9	86.6	8.34
咪鲜胺	89.6	102	84.8	92.1	9.64
咪鲜胺-脱氨基咪唑	88.5	78.9	86.7	84.7	6.02
咪鲜胺-脱咪唑甲酰胺基	86.9	78.9	75.2	80.3	7.45
吡唑醚菌酯	77.9	74.7	82.4	78.3	4.94
吡草醚	99.7	94.9	102	98.9	3.66
唑胺菌酯	94.1	80.5	94.1	89.6	8.76
吡啶磺隆	81.6	72.8	80.5	78.3	6.12
除虫菊素 I	91.7	85.1	85.3	87.4	4.30
啉啉肟草醚	91.2	83.7	82.9	85.9	5.33
啉霉胺	80.5	70.9	78.9	76.8	6.70
多杀霉素 D	48.5	44.0	41.3	44.6	8.16
螺螨酯	94.1	89.9	88.5	90.8	3.21
螺甲螨酯	92.5	84.5	88.8	88.6	4.52
螺虫乙酯	88.8	72.0	90.9	83.9	12.4

虫酰肼	82.1	79.2	82.7	81.3	2.30
丁噻隆	92.5	85.1	88.3	88.6	4.19
氟苯脲	80.5	75.5	82.9	79.6	4.74
特丁硫磷	76.5	89.3	85.6	83.8	7.86
特丁硫磷砒	95.7	84.5	89.9	90.0	6.22
特丁硫磷亚砒	93.6	86.1	83.7	87.8	5.88
噻虫嗪	92.3	85.6	86.1	88.0	4.24
苯酰菌胺	91.2	92.5	99.5	94.4	4.73
唑螨酯	90.9	82.9	87.7	87.2	4.62
咯菌腈	95.5	94.1	95.7	95.1	0.917
氟噻草胺	94.7	86.1	88.5	89.8	4.94
氟虫脲	94.9	87.7	93.3	92.0	4.11
氟吡菌胺	100	93.9	102	98.6	4.28
氟吡菌酰胺	95.7	87.7	95.7	93.0	4.97
乙羧氟草醚	86.1	82.1	88.0	85.4	3.53
呋草酮	95.7	85.6	96.3	92.5	6.50
氟硅唑	88.3	85.3	110	94.5	14.3
醚菊酯	91.7	91.2	88.0	90.3	2.22
粉唑醇	86.9	84.0	90.1	87.0	3.51
氟菌唑酰胺	94.7	89.3	97.3	93.8	4.35

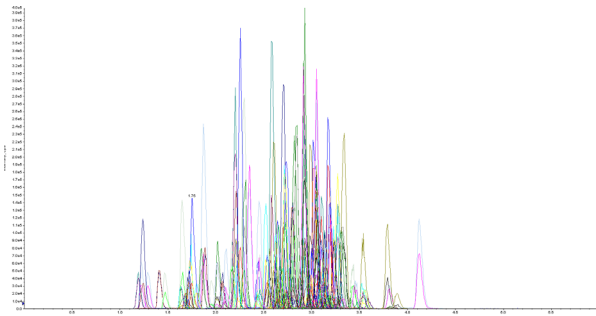


图 1 上海青中农药多残留总离子流图

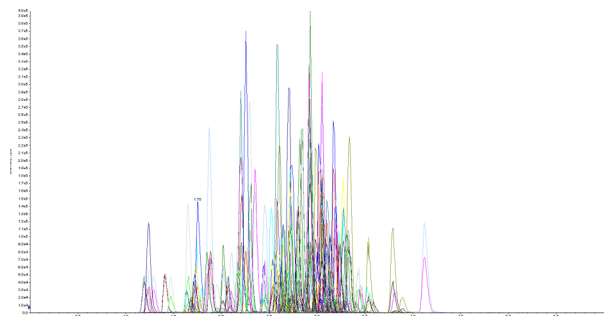
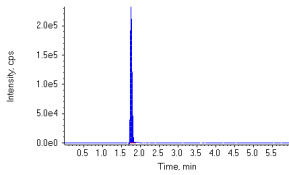


图 2 茶叶中农药多残留总离子流图

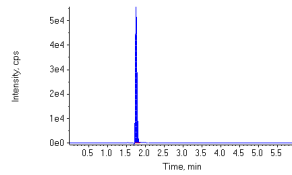
啉虫脒

223.000/126.000 Da



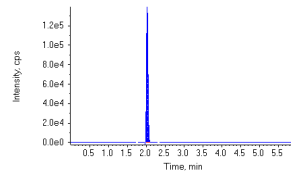
啉虫脒 (定性)

223.000/99.000 Da



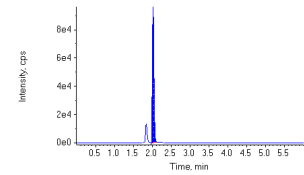
涕灭威

208.000/116.000 Da



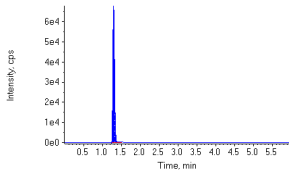
涕灭威 (定性)

208.000/89.000 Da



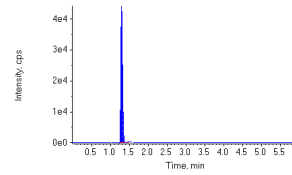
涕灭威砒

240.100/148.000 Da



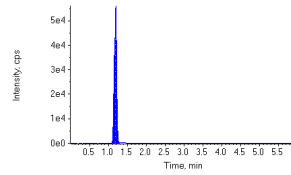
涕灭威砒 (定性)

240.100/166.000 Da



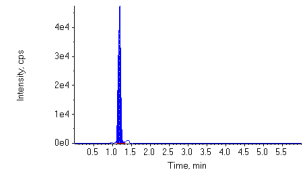
涕灭威亚砒

207.000/132.000 Da



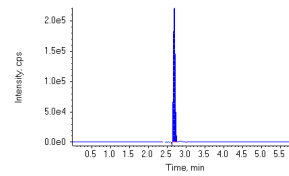
涕灭威亚砒 (定性)

207.000/89.000 Da



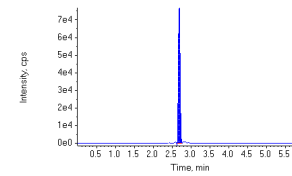
莠灭净

228.100/186.200 Da



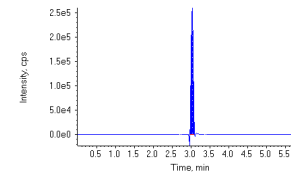
莠灭净 (定性)

228.100/96.000 Da



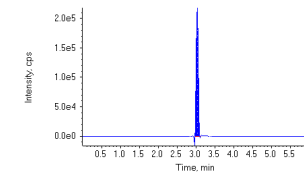
莎稗磷

368.000/199.000 Da



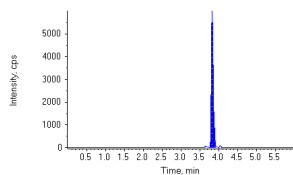
莎稗磷 (定性)

368.000/125.000 Da



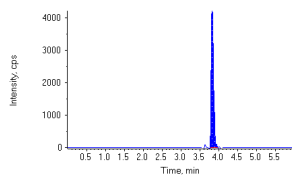
阿维菌素

890.500/305.000 Da



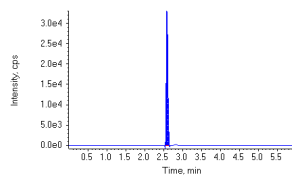
阿维菌素 (定性)

890.500/567.300 Da



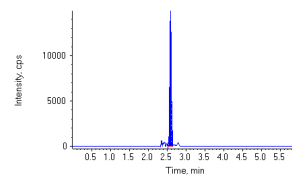
保棉磷

318.000/132.000 Da



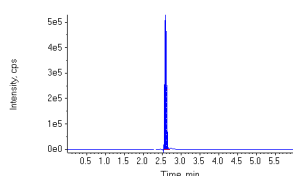
保棉磷 (定性)

318.000/125.000 Da



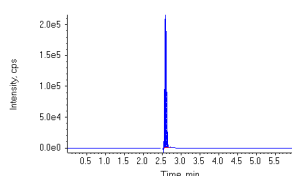
啞菌酯

404.100/372.000 Da



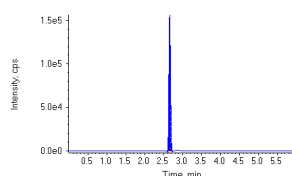
啞菌酯 (定性)

404.100/344.100 Da



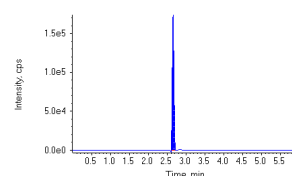
草除灵

272.000/198.000 Da



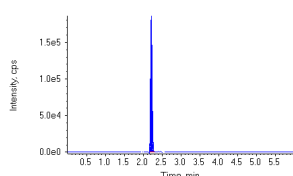
草除灵 (定性)

272.000/170.000 Da



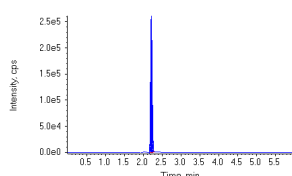
恶虫威

224.100/167.000 Da



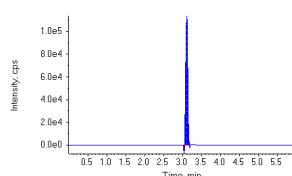
恶虫威 (定性)

224.100/109.000 Da



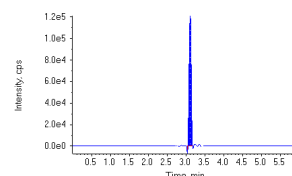
苯螨特

364.100/199.000 Da



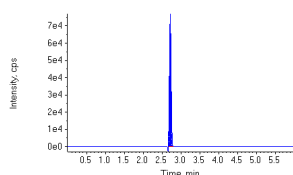
苯螨特 (定性)

364.100/105.000 Da



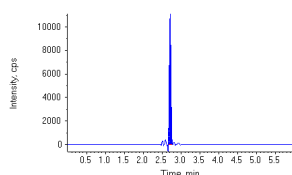
啞酰菌胺

343.000/307.000 Da



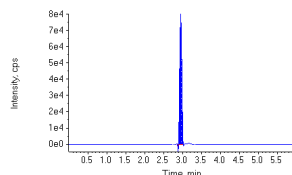
啞酰菌胺 (定性)

343.000/140.000 Da



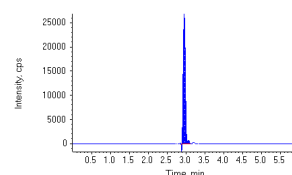
乙啞酚磺酸酯

317.000/166.000 Da



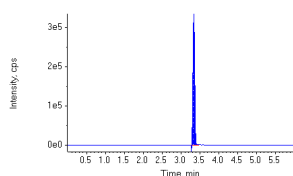
乙啞酚磺酸酯 (定性)

317.000/210.000 Da



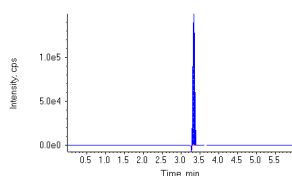
噻嗪酮

306.200/201.100 Da



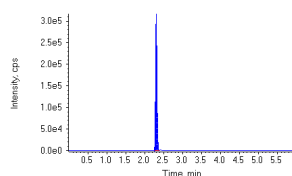
噻嗪酮 (定性)

306.200/116.200 Da



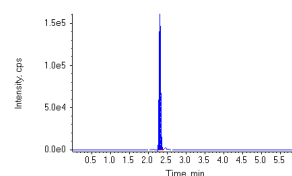
甲萘威

202.100/145.000 Da



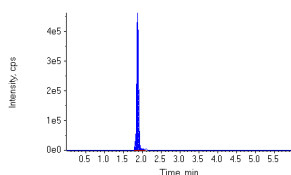
甲萘威 (定性)

202.100/127.000 Da



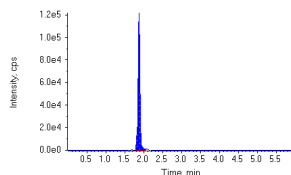
多菌灵

192.000/160.000 Da



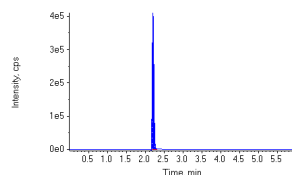
多菌灵 (定性)

192.000/132.000 Da



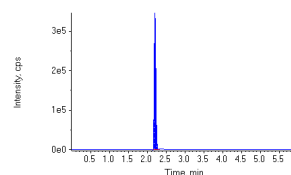
克百威

222.100/165.000 Da

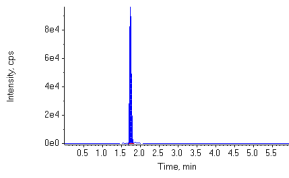


克百威 (定性)

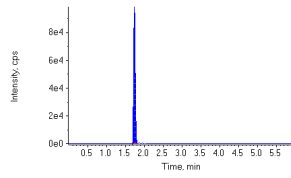
222.100/123.100 Da



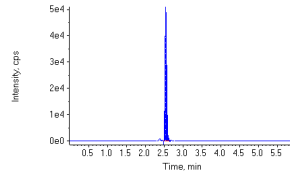
3- 羟基克百威
238.000/181.000 Da



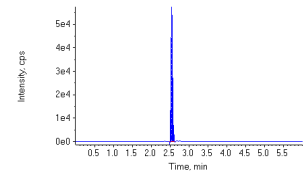
3- 羟基克百威 (定性)
238.000/163.000 Da



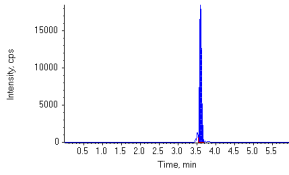
氯虫苯甲酰胺
483.900/452.900 Da



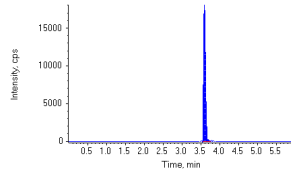
氯虫苯甲酰胺 (定性)
483.900/285.900 Da



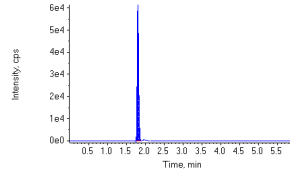
氟啶脲
540.000/383.000 Da



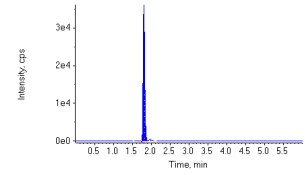
氟啶脲 (定性)
542.000/385.000 Da



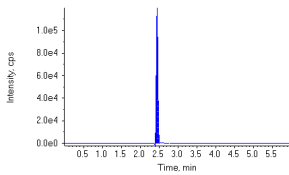
杀草敏
222.000/104.000 Da



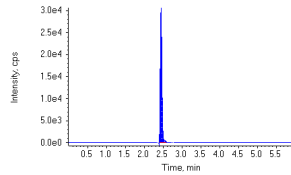
杀草敏 (定性)
222.000/92.000 Da



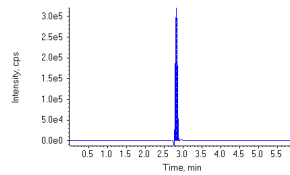
绿麦隆
213.100/72.100 Da



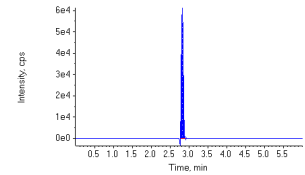
绿麦隆 (定性)
213.100/46.100 Da



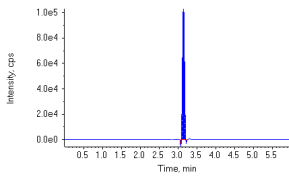
环虫酰肼
395.200/175.000 Da



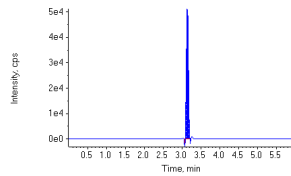
环虫酰肼 (定性)
395.200/339.000 Da



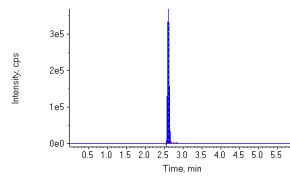
四螨嗪
303.000/138.000 Da



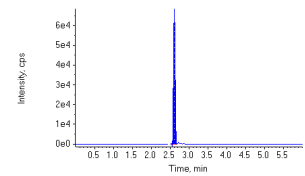
四螨嗪 (定性)
303.000/102.000 Da



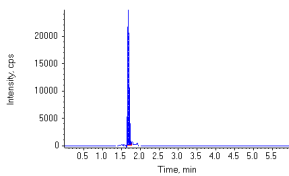
异噁草酮
240.100/125.000 Da



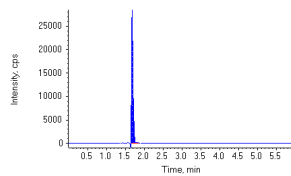
异噁草酮 (定性)
240.100/89.100 Da



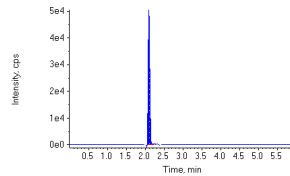
噻虫胺
250.000/169.100 Da



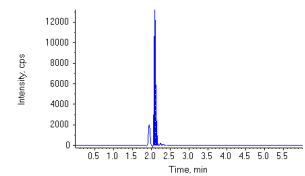
噻虫胺 (定性)
250.000/132.000 Da



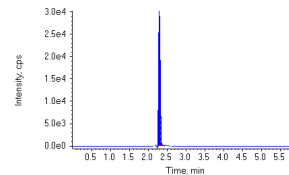
氟草津
241.100/214.100 Da



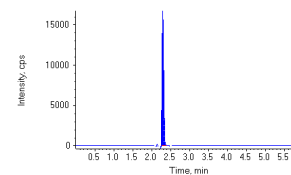
氟草津 (定性)
241.100/104.100 Da



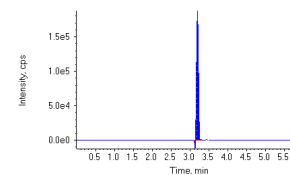
溴氟虫酰胺
475.000/286.000 Da



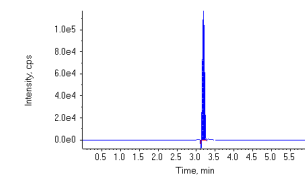
溴氟虫酰胺 (定性)
475.000/444.000 Da



丁氟螨酯
465.200/173.000 Da

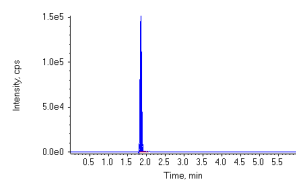


丁氟螨酯 (定性)
465.200/249.100 Da



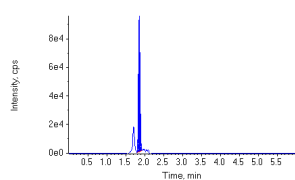
霜脍氰

199.100/128.000 Da



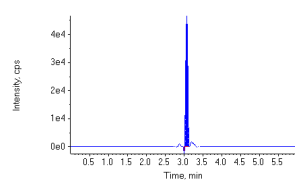
霜脍氰 (定性)

199.100/111.000 Da



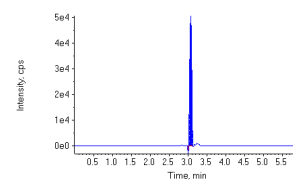
啉菌环胺

226.100/93.000 Da



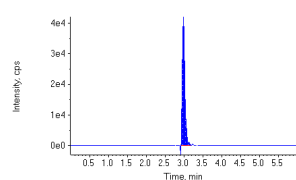
啉菌环胺 (定性)

226.100/108.100 Da



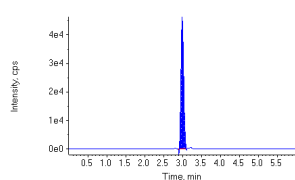
除虫脲

311.000/158.000 Da



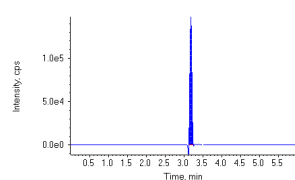
除虫脲 (定性)

311.000/141.200 Da



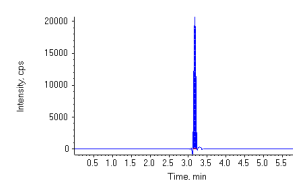
吡氟酰草胺

395.100/266.000 Da



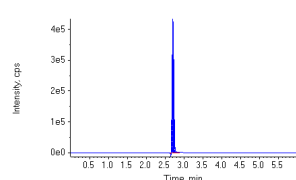
吡氟酰草胺 (定性)

395.100/246.000 Da



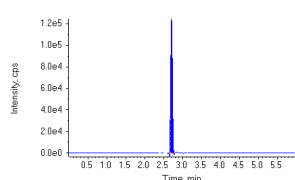
精二甲吩草胺

276.100/244.100 Da



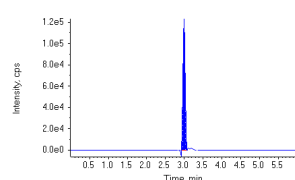
精二甲吩草胺 (定性)

276.100/168.100 Da



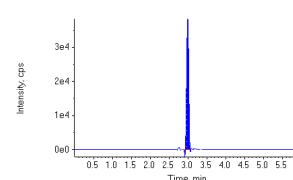
醚菌胺

327.200/205.000 Da



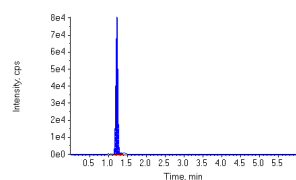
醚菌胺 (定性)

327.200/238.100 Da



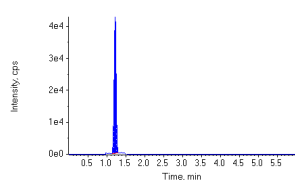
呋虫胺

203.100/129.000 Da



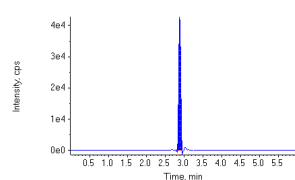
呋虫胺 (定性)

203.100/157.000 Da



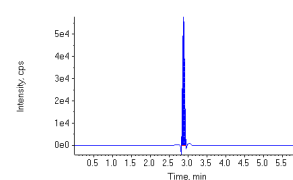
氟环唑

330.000/121.000 Da



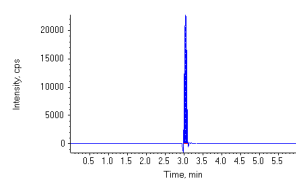
氟环唑 (定性)

330.000/101.000 Da



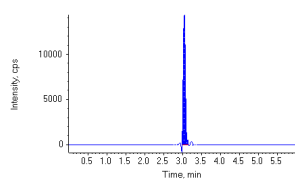
噁唑菌酮

392.000/331.000 Da



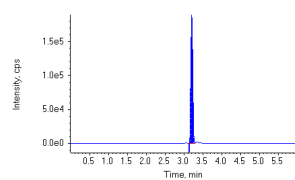
噁唑菌酮 (定性)

392.000/238.000 Da



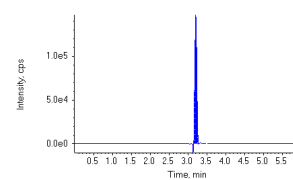
烯肟菌胺

434.100/171.000 Da



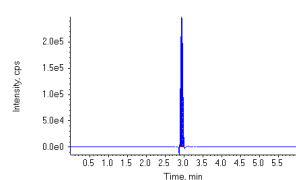
烯肟菌胺 (定性)

434.100/212.000 Da



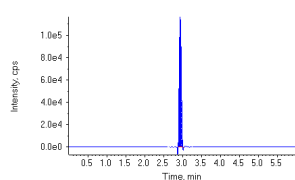
苯线磷

304.200/217.100 Da



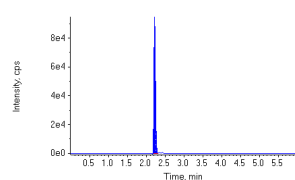
苯线磷 (定性)

304.200/202.000 Da



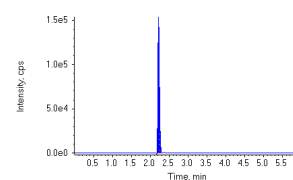
苯线磷砒

336.000/308.000 Da



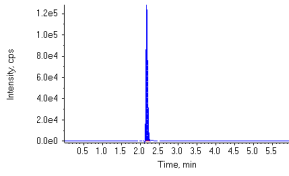
苯线磷砒 (定性)

336.000/266.000 Da



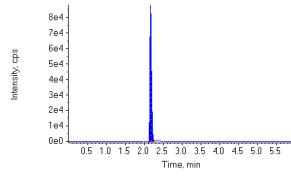
苯线磷亚砷

320.100/233.000 Da



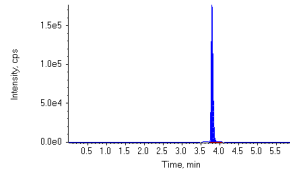
苯线磷亚砷 (定性)

320.100/171.000 Da



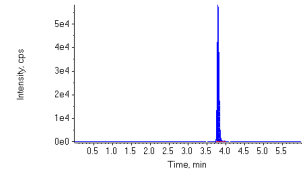
啶螨醚

307.200/161.000 Da



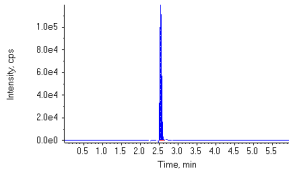
啶螨醚 (定性)

307.200/131.100 Da



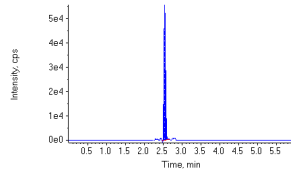
氯吡脞

248.100/129.000 Da



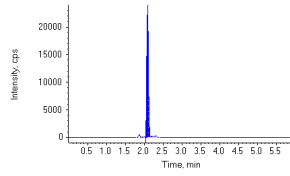
氯吡脞 (定性)

248.100/93.000 Da



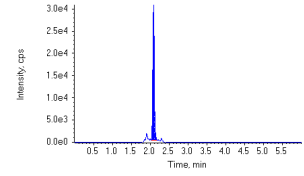
安硫磷

258.000/199.000 Da



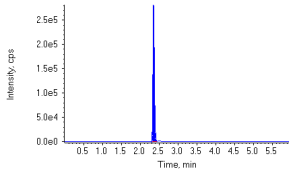
安硫磷 (定性)

258.000/125.000 Da



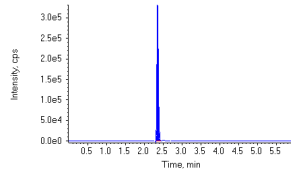
噻唑磷

284.000/228.000 Da



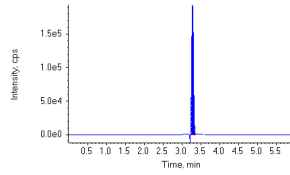
噻唑磷 (定性)

284.000/104.000 Da



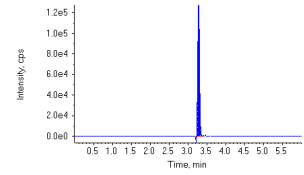
呋线威

383.200/195.000 Da



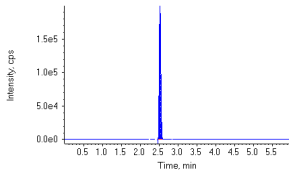
呋线威 (定性)

383.200/252.000 Da



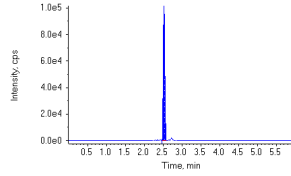
庚烯磷

251.000/127.000 Da



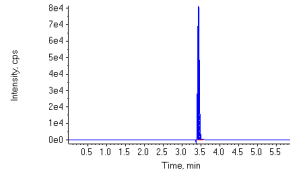
庚烯磷 (定性)

251.000/125.000 Da



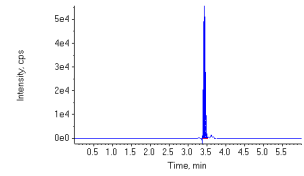
噻螨酮

353.000/228.000 Da



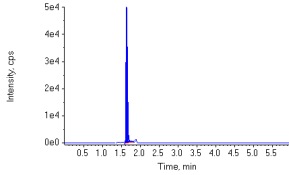
噻螨酮 (定性)

353.000/168.000 Da



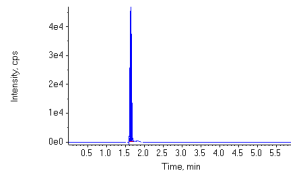
吡虫啉

256.100/175.000 Da



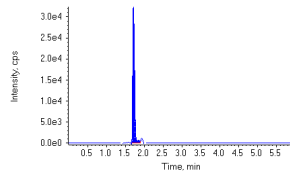
吡虫啉 (定性)

256.100/209.000 Da



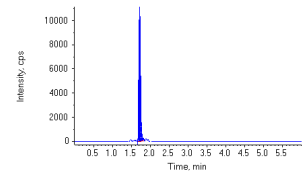
氯噻啉

262.100/181.100 Da



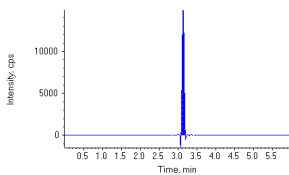
氯噻啉 (定性)

262.100/122.000 Da



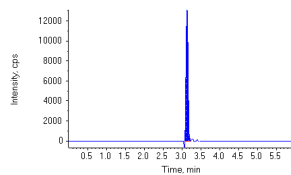
茚虫威

528.000/293.000 Da



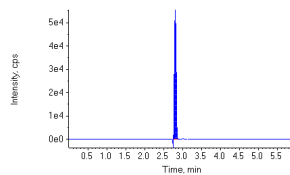
茚虫威 (定性)

528.000/249.000 Da



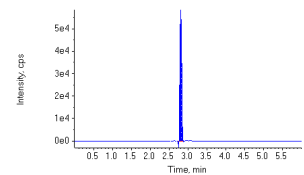
氯唑磷

316.000/164.000 Da



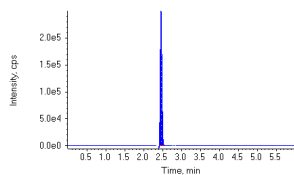
氯唑磷 (定性)

316.000/122.000 Da



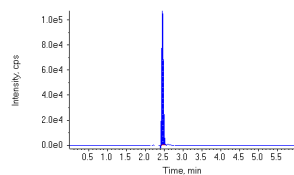
异丙威

194.000/95.000 Da



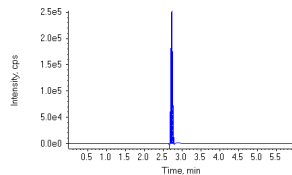
异丙威 (定性)

194.000/137.000 Da



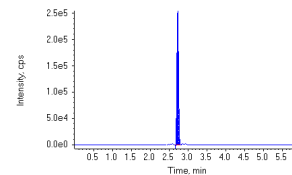
甲硫威

226.100/169.200 Da



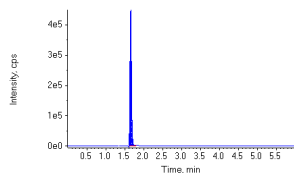
甲硫威 (定性)

226.100/121.100 Da



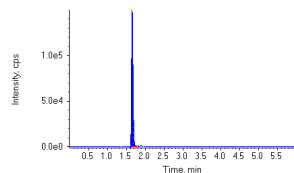
甲硫威亚砷

242.000/185.000 Da



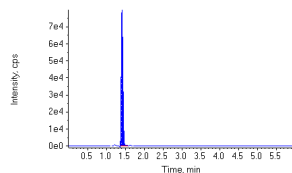
甲硫威亚砷 (定性)

242.000/122.000 Da



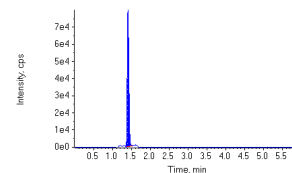
灭多威

163.000/88.000 Da



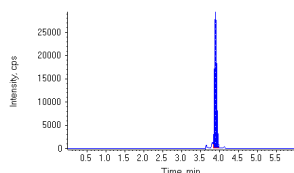
灭多威 (定性)

163.000/106.000 Da



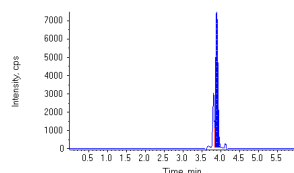
烯虫酯

279.000/191.000 Da



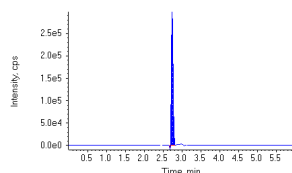
烯虫酯 (定性)

279.000/237.000 Da



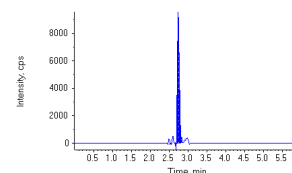
甲氧虫酰肼

369.200/149.100 Da



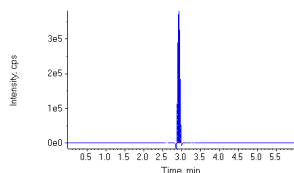
甲氧虫酰肼 (定性)

369.200/133.000 Da



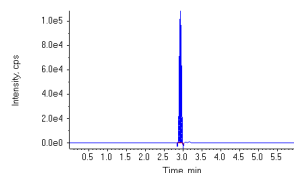
异丙甲草胺

284.100/251.900 Da



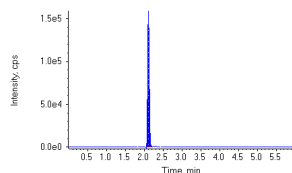
异丙甲草胺 (定性)

284.100/176.000 Da



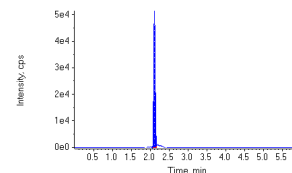
速灭威

166.100/109.000 Da



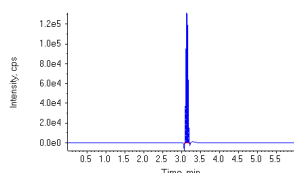
速灭威 (定性)

166.100/94.200 Da



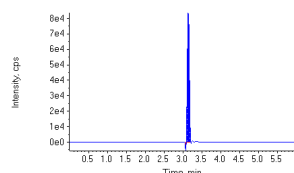
苯菌酮

409.000/209.100 Da



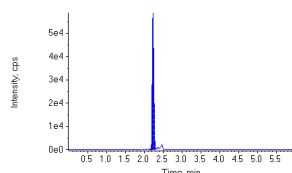
苯菌酮 (定性)

409.000/227.100 Da



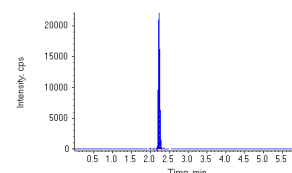
噻草酮

215.100/187.100 Da



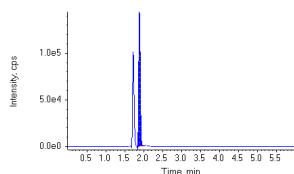
噻草酮 (定性)

215.100/84.100 Da



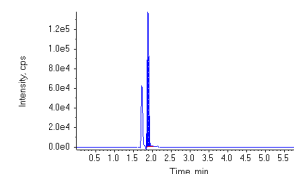
速灭磷

225.000/127.000 Da



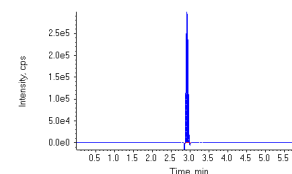
速灭磷 (定性)

225.000/193.000 Da



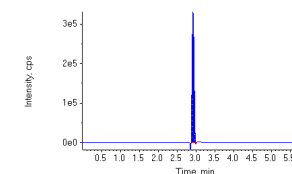
啶氧菌酯

368.100/205.100 Da



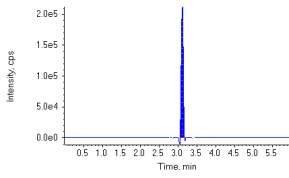
啶氧菌酯 (定性)

368.100/145.100 Da



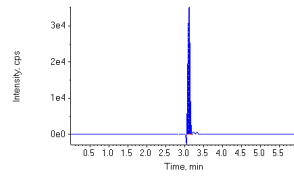
咪鲜胺

376.200/308.000 Da



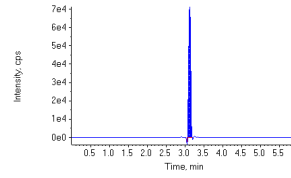
咪鲜胺 (定性)

376.200/266.000 Da



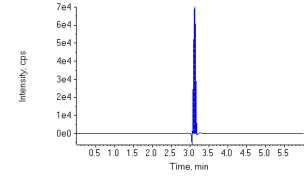
咪鲜胺 - 脱氨基咪唑

325.000/282.000 Da



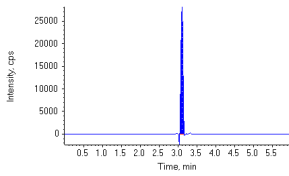
咪鲜胺 - 脱氨基咪唑 (定性)

327.000/284.000 Da



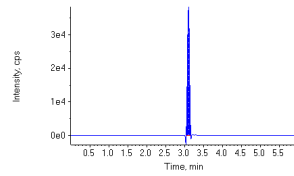
咪鲜胺 - 脱咪唑甲酰胺基

353.000/308.000 Da



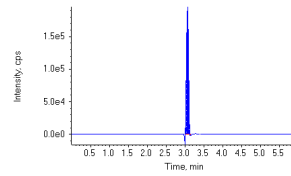
咪鲜胺 - 脱咪唑甲酰胺基 (定性)

355.000/310.000 Da



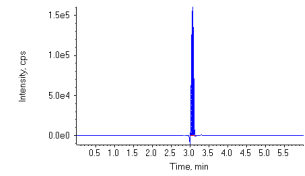
吡唑醚菌酯

388.100/194.000 Da



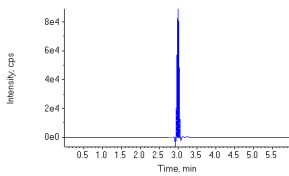
吡唑醚菌酯 (定性)

388.100/163.000 Da



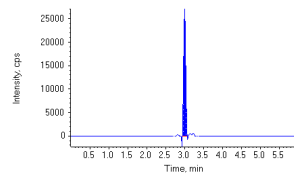
吡草醚

413.000/339.000 Da



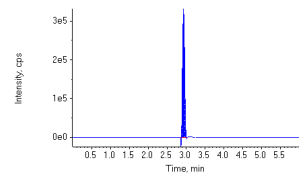
吡草醚 (定性)

413.000/253.000 Da



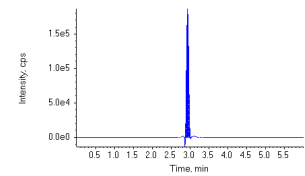
唑胺菌酯

382.100/194.100 Da



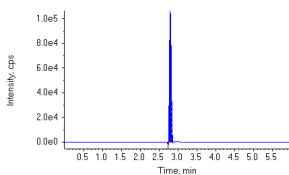
唑胺菌酯 (定性)

382.100/163.000 Da



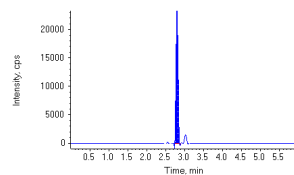
吡啶磺隆

415.100/182.000 Da



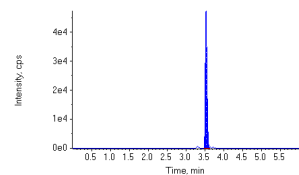
吡啶磺隆 (定性)

415.100/139.000 Da



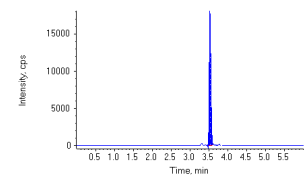
除虫菊素 I

329.200/161.100 Da



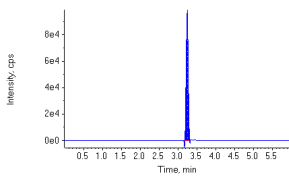
除虫菊素 I (定性)

329.200/133.100 Da



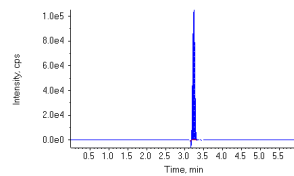
啞啞肟草醚

610.200/413.100 Da



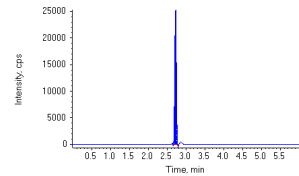
啞啞肟草醚 (定性)

610.200/180.100 Da



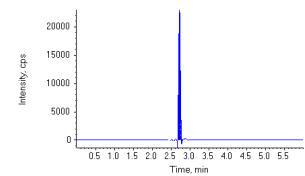
啞霉胺

200.000/183.000 Da



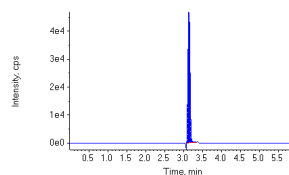
啞霉胺 (定性)

200.000/168.000 Da



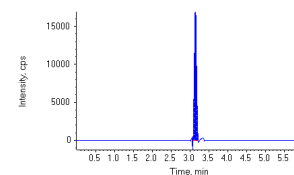
多杀霉素 D

746.400/142.000 Da



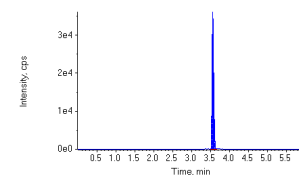
多杀霉素 D (定性)

746.400/98.000 Da



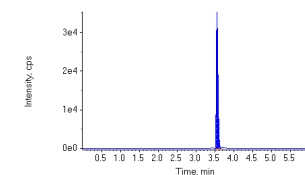
螺螨酯

411.200/313.100 Da



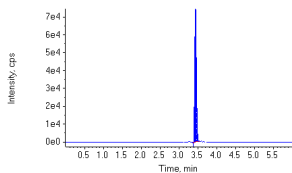
螺螨酯 (定性)

411.200/71.100 Da



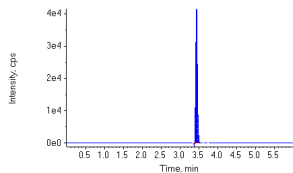
螺甲螨酯

388.000/273.000 Da



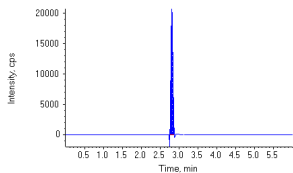
螺甲螨酯 (定性)

388.000/255.000 Da



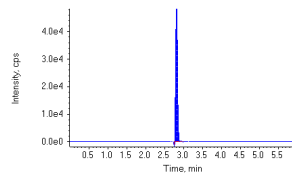
螺虫乙酯

374.000/302.000 Da



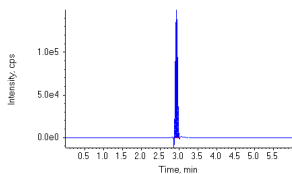
螺虫乙酯 (定性)

374.000/330.000 Da



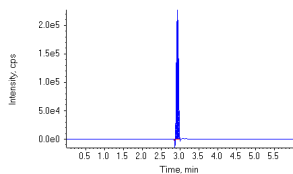
虫酰肼

353.100/133.100 Da



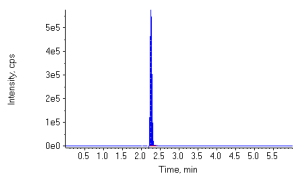
虫酰肼 (定性)

353.100/297.100 Da



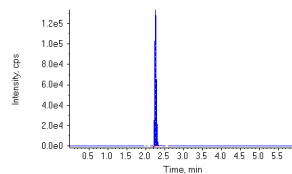
丁噻隆

229.100/172.000 Da



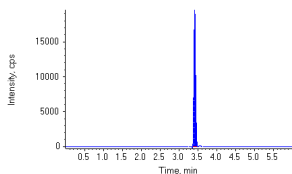
丁噻隆 (定性)

229.100/116.100 Da



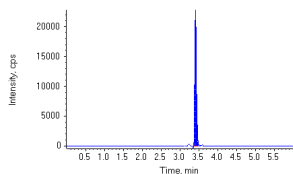
氟苯脲

381.100/158.200 Da



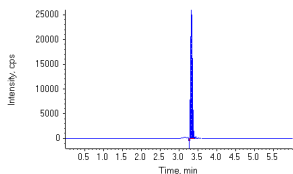
氟苯脲 (定性)

381.100/141.200 Da



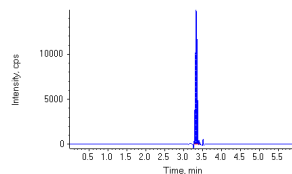
特丁硫磷

289.100/103.100 Da



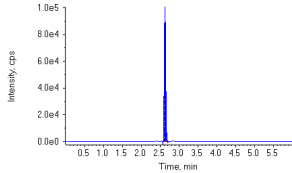
特丁硫磷 (定性)

289.100/233.200 Da



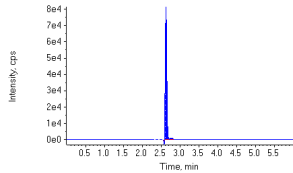
特丁硫磷砒

321.000/97.000 Da



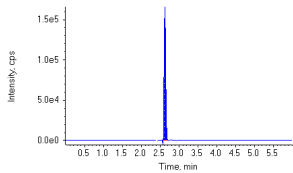
特丁硫磷砒 (定性)

321.000/115.000 Da



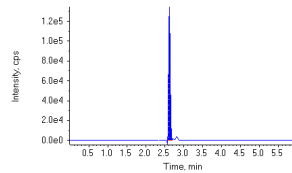
特丁硫磷亚砒

305.000/187.000 Da



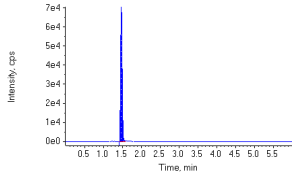
特丁硫磷亚砒 (定性)

305.000/131.000 Da



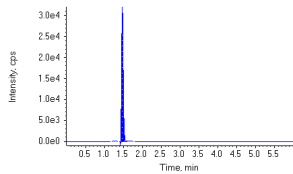
噻虫嗪

292.000/211.000 Da



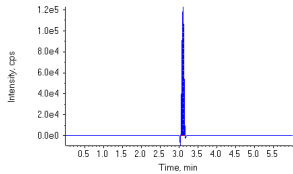
噻虫嗪 (定性)

292.000/181.000 Da



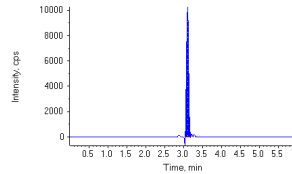
苯酰菌胺

336.000/186.900 Da



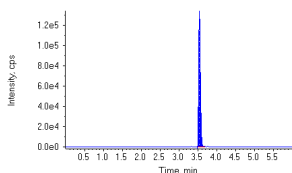
苯酰菌胺 (定性)

336.000/204.000 Da



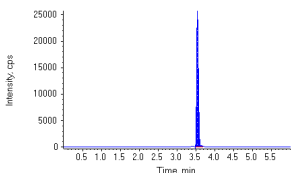
啉螨酯

422.000/366.100 Da



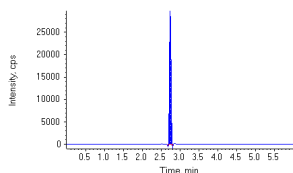
啉螨酯 (定性)

422.000/135.100 Da



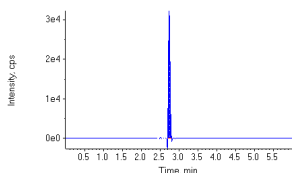
咯菌腈

266.100/229.000 Da

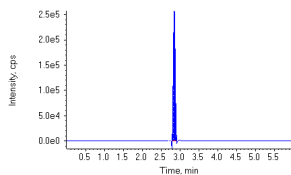


咯菌腈 (定性)

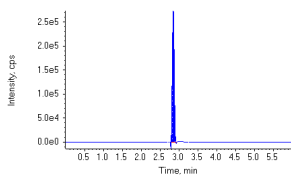
266.100/158.000 Da



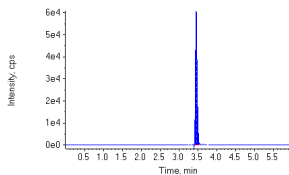
氟噻草胺
364.000/194.000 Da



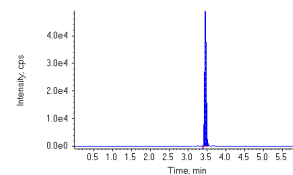
氟噻草胺 (定性)
364.000/152.000 Da



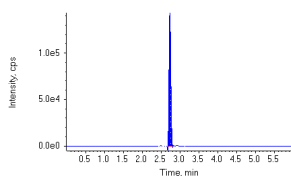
氟虫脲
489.000/158.100 Da



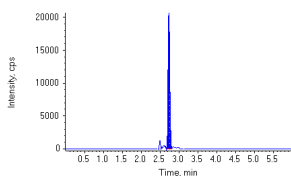
氟虫脲 (定性)
489.000/141.200 Da



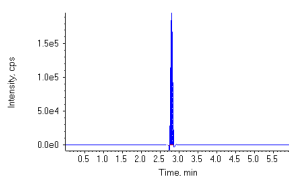
氟吡菌胺
382.900/172.900 Da



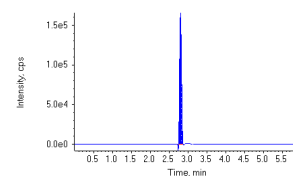
氟吡菌胺 (定性)
382.900/364.900 Da



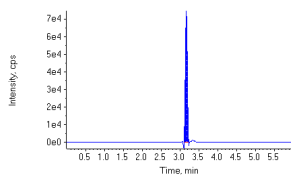
氟吡菌酰胺
397.000/207.900 Da



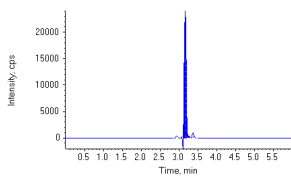
氟吡菌酰胺 (定性)
397.000/172.900 Da



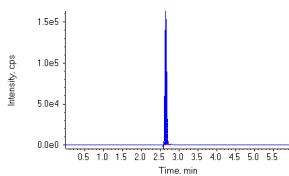
乙羧氟草醚
465.100/344.000 Da



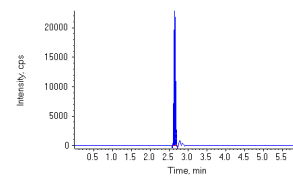
乙羧氟草醚 (定性)
465.100/223.000 Da



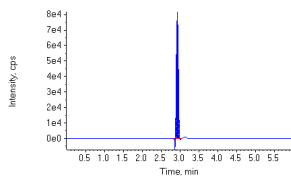
呋草酮
334.100/247.100 Da



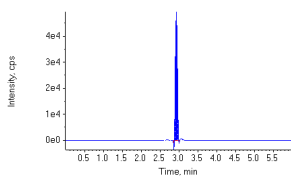
呋草酮 (定性)
334.100/303.000 Da



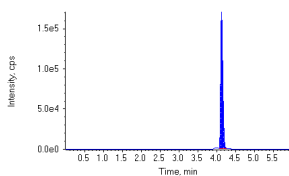
氟硅唑
316.000/247.100 Da



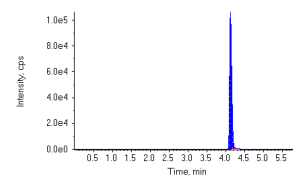
氟硅唑 (定性)
316.000/165.000 Da



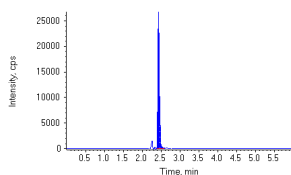
醚菊酯
394.200/177.100 Da



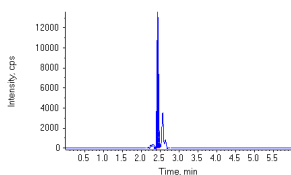
醚菊酯 (定性)
394.200/107.100 Da



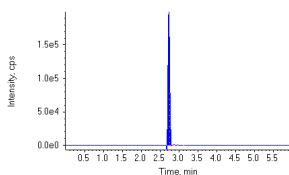
粉唑醇
302.100/123.000 Da



粉唑醇 (定性)
302.100/109.000 Da



氟唑菌酰胺
382.100/362.000 Da



氟唑菌酰胺 (定性)
382.100/342.100 Da

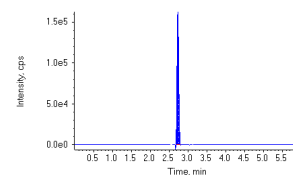


图3 农药多残留标准溶液特征离子质量色谱图 (0.0200mg/L)

订购信息

货号	描述	包装
COQ050010CH	4 g 无水硫酸镁、1 g 氯化钠、1 g 柠檬酸钠、0.5 g 柠檬酸钠 + 陶瓷均质子, 50 ml 离心管	50 支 / 盒
COQ050020CH	6g 无水硫酸镁、1.5g 醋酸钠 + 陶瓷均质子, 50 ml 离心管	50 支 / 盒
COQ015020H	900 mg 无水硫酸镁、150 mg PSA、15 mg GCB, 15 mL 离心管	50 支 / 盒
COQ015047H	1200 mg 无水硫酸镁、400 mg PSA、400mgC18 及 200 mg GCB, 15 mL 离心管	50 支 / 盒
SDC-3000-D	biocomma® 多管涡旋混匀仪	1 台 / 箱
SF130-22-NL	尼龙针式过滤器, 直径 13 mm, 孔径 0.22 μm, 有机系	100 个 / 盒
SC2-1	2 mL 蓝色聚丙烯盖, 白色 PTFE/ 红色硅胶垫, 9-425	100 个 / 盒
V2-AL	2 mL 螺纹棕色样品瓶, 带书写处 11.6*32 mm, 9-425	100 个 / 盒