

Separation Evaluation of 97 Pesticides using Different Columns (Part 2)

■ Introduction

Application News No. M237, introduced Rtx-5MS and Rtx-200MS separation evaluations of 97 pesticides using standard pesticide mixture 21 and 22 manufactured by Kanto Chemical Co. This Application News introduces the results of separation evaluations of 97 pesticides using Rtx-CLPesticides and Rtx-

OPPesticides2. Rtx-CLPesticides is a column designed for "EPA Method 8081,608 Chlorine-based Pesticide Analysis". Rtx-OPPesticides2 is a low bleed column designed for use in the analysis of organophosphorus pesticides.

■ Separation Evaluation

Analytical conditions are shown in Table 1. The analysis was performed using 1 mg/L of the standard solution. The Rtx-CLPesticides total ion chromatogram (TIC) is shown in Fig.1 and the retention time of each compound is shown in Table 2. Using Rtx-OPPesticides2, fensulfthion was not detected. The Rtx-OPPesticides2 TIC is shown in Fig.2 and the

retention time of each compound is shown in Table 3. In the separation evaluation of the standard sample, Rtx-OPPesticides2 showed better results having the least number of overlapping of compounds. When selecting a column for an actual pesticide residue analysis, consideration should be given to the effects of interfering compounds found in the test sample.

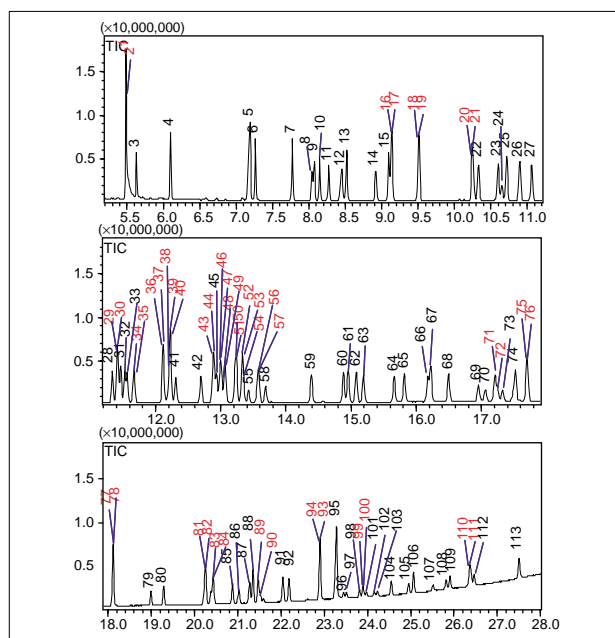


Fig.1 Rtx-CLPesticides Total Ion Chromatogram (TIC)

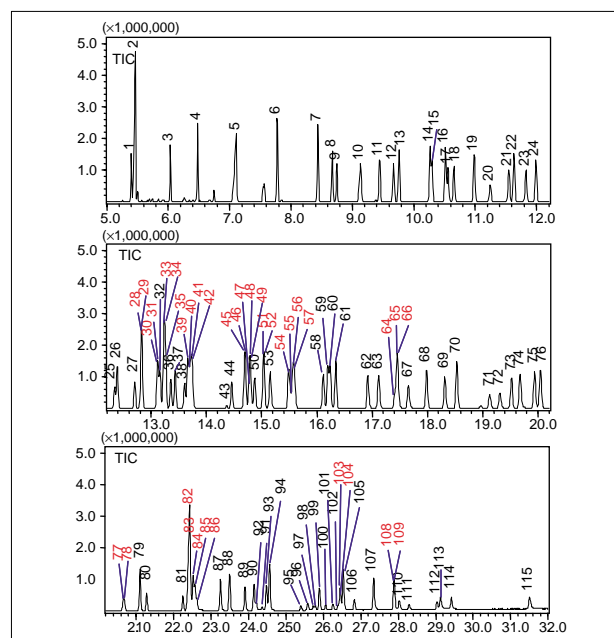


Fig.2 Rtx-OPPesticides2 Total Ion Chromatogram (TIC)

Table 1 Analytical Conditions

Model	: GCMS-QP2010	
–GC–		
Column	: Rtx-CLPesticides,Rtx-OPPesticides2 30 m × 0.25 mm I.D. df=0.25 μm	High Press.Injection : 250 kPa (1 min) Inj.Temp. : 260 °C
Col.Temp.	: 80 °C(1 min)-20 °C/min-180 °C-5 °C/min-280 °C(10 min)	Injection Method : Splitless (1 min)
Carrier Gas	: He, 45.0 cm/sec; Constant Linear Velocity Mode	Injection Volume : 1 μL
–MS–		Ionization : EI
I.F. Temp.	: 260 °C	Scan Range : m/z 40~470
I.S. Temp.	: 230 °C	Scan Interval : 0.5 sec

Table 2 Rtx-CL Pesticides Retention Time

ID#	Pesticide name	R.T(min)	ID#	Pesticide name	R.T(min)	ID#	Pesticide name	R.T(min)	ID#	Pesticide name	R.T(min)
1	Dichlorvos	5.484	30	Chlorpyrifos	11.423	59	Paclobutrazol	14.39	88	Pyridaben	21.351
2	Methamidophos	5.486	31	Fenthion	11.465	60	Pretilachlor	14.88	89	Bitertanol	21.474
3	EPTC	5.632	32	Benfuresate	11.529	61	p,p'-DDD	14.96	90	Cyhalothrin 2	21.520
4	Butylate	6.099	33	Diethofencarb	11.564	62	Chlorobenzilate	15.08	91	Halfenprox	22.046
5	Acephate	7.189	34	Methyl parathion	11.663	63	Flutolanil	15.19	92	Acrinathrin	22.187
6	Isoprocarb	7.266	35	Dicofol product	11.681	64	Flusilazole	15.66	93	Silafluofen	22.897
7	Fenobucarb	7.773	36	Malathion	12.112	65	Cyproconazole	15.82	94	Pyrimidifen	22.903
8	Chlorpropham	8.043	37	Pyrifenoxy1	12.116	66	Myclobutanil	16.18	95	Acetamiprid	23.286
9	Ethoprophos	8.073	38	Metolachlor	12.212	67	Mepronil	16.22	96	Cyfluthrin 1	23.446
10	Bendiocarb	8.149	39	Fenitrothion	12.227	68	Edifenphos	16.50	97	Cypermethrin 1	23.514
11	α -BHC	8.274	40	(Z) Dimethylvinphos	12.229	69	Tricyclazole	16.95	98	Cyfluthrin 2	23.818
12	Cadusafos	8.450	41	Dichlofluaniid	12.310	70	Propiconazole 1	17.06	99	Cyfluthrin 3	23.898
13	Thiometon	8.519	42	Quinomethionate	12.696	71	Lenacil	17.21	100	Cypermethrin 2	23.899
14	β -BHC	8.919	43	Quinalphos	12.880	72	Propiconazole 2	17.25	101	Cypermethrin 3	23.974
15	Diazinon	9.094	44	PAP	12.895	73	Dicofol	17.32	102	Cyfluthrin 4	24.163
16	Terbufos	9.133	45	Isofenphos oxon	12.935	74	Tebufenpyrad	17.52	103	Cypermethrin 4	24.228
17	γ -BHC	9.143	46	Parathion	12.986	75	Thenylchlor	17.70	104	Flucythrinate 1	24.551
18	Etrimfos	9.509	47	Pyrifenoxy2	13.006	76	Captafol	17.71	105	Flucythrinate 2	24.955
19	δ -BHC	9.511	48	α -CVP	13.042	77	Pyriproxyfen	18.11	106	Fenvalerate 1	25.066
20	Pirimicarb	10.240	49	Isofenphos	13.065	78	Tebuconazole	18.11	107	Fenvalerate 2	25.520
21	Tefluthrin	10.260	50	Pendimethalin	13.217	79	Iprodione	18.99	108	Difenoconazole 1	25.820
22	Ethiofencarb	10.330	51	p,p'-DDE	13.241	80	EPN	19.29	109	Difenoconazole 2	25.906
23	Tolclofos-methyl	10.600	52	Captan	13.332	81	Fenarimol	20.23	110	Deltamethrin	26.361
24	Dimethipin	10.650	53	β -CVP	13.331	82	Mefenacet	20.26	111	Fluvalinate 1	26.397
25	Esprocarb	10.720	54	Fosthiazate 1	13.350	83	Permethrin 1	20.42	112	Fluvalinate 2	26.465
26	Pirimiphos-methyl	10.900	55	Fosthiazate 2	13.426	84	Phosalone	20.44	113	Imibenconazol	27.509
27	Benthiocarb	11.060	56	Triadimenol 1	13.566	85	Permethrin 2	20.88			
28	Methiocarb	11.340	57	Prothiofos	13.581	86	Cyhalothrin 1	21.02			
29	Carbaryl	11.410	58	Triadimenol 2	13.689	87	Pyraclafos	21.27			

*Cells highlighted in gray indicate overlapping of TIC peak and cells in yellow indicate compounds with overlapping of retention times.

Table 3 Rtx-OPPesticides2 Retention Time

ID#	Pesticide name	R.T(min)	ID#	Pesticide name	R.T(min)	ID#	Pesticide name	R.T(min)	ID#	Pesticide name	R.T(min)
1	Dichlorvos	5.402	30	Fenitrothion	13.114	59	Pretilachlor	16.203	88	Fenarimol	23.507
2	Methamidophos	5.456	31	Methiocarb	13.129	60	Flutolanil	16.245	89	Pyraclafos	23.916
3	EPTC	6.038	32	Diethofencarb	13.165	61	p,p'-DDE	16.348	90	Bitertanol 1	24.159
4	Butylate	6.483	33	Metolachlor	13.241	62	Flusilazole	16.927	91	Bitertanol 2	24.372
5	Acephate	7.091	34	Benthiocarb	13.242	63	Myclobutanil	17.123	92	Permethrin 1	24.228
6	Isoprocarb	7.782	35	Malathion	13.267	64	Cyproconazole 1	17.416	93	Permethrin 2	24.493
7	Fenobucarb	8.444	36	Dichlofluaniid	13.36	65	Chlorobenzilate	17.459	94	Pyridaben	24.577
8	Ethoprophos	8.677	37	Chlorpyrifos	13.441	66	Cyproconazole 2	17.474	95	Cyfluthrin 1	25.409
9	Chlorpropham	8.751	38	Parathion	13.609	67	Tricyclazole	17.658	96	Cyfluthrin 2	25.593
10	Cadusafos	9.137	39	Fenthion	13.664	68	p,p'-DDD	17.995	97	Cyfluthrin 3	25.735
11	Bendiocarb	9.449	40	Dicofol product	13.696	69	Fensulfothion	18.323	98	Cyfluthrin 4	25.8
12	α -BHC	9.676	41	(Z) Dimethylvinphos	13.722	70	Mepronil	18.539	99	Halfenprox	25.905
13	Thiometon	9.768	42	Isofenphos oxon	13.749	71	Propiconazole 1	19.131	100	Cypermethrin 1	26.058
14	Terbufos	10.271	43	α -CVP	14.371	72	Propiconazole 2	19.317	101	Cypermethrin 2	26.268
15	Tefluthrin	10.303	44	Pendimethalin	14.465	73	Edifenphos	19.527	102	Cypermethrin 3	26.409
16	Diazinon	10.52	45	Fosthiazate 1	14.69	74	Tebuconazole	19.682	103	Flucythrinate 1	26.459
17	γ -BHC	10.563	46	Isofenphos	14.703	75	Lenacil	19.941	104	Cypermethrin 4	26.467
18	β -BHC	10.66	47	Fosthiazate 2	14.776	76	Thenylchlor	20.052	105	Silafluofen	26.537
19	Etrimfos	10.99	48	Pyrifenoxy1	14.791	77	Captafol	20.673	106	Flucythrinate 2	26.837
20	Dimethipin	11.249	49	Triadimenol 1	14.803	78	Iprodione	20.701	107	Pyrimidifen	27.356
21	δ -BHC	11.556	50	β -CVP	14.874	79	Tebufenpyrad	21.118	108	Fluvalinate 1	27.892
22	Pirimicarb	11.637	51	Triadimenol 2	15.037	80	EPN	21.297	109	Fenvalerate 1	27.9
23	Ethiofencarb	11.835	52	Quinalphos	15.046	81	Cyhalothrin 1	22.264	110	Fluvalinate 2	28.034
24	Benfuresate	11.998	53	PAP	15.16	82	Acetamiprid	22.408	111	Fenvalerate 2	28.297
25	Methyl parathion	12.342	54	Paclobutrazol	15.491	83	Pyriproxyfen	22.457	112	Difenoconazole 1	29.045
26	Tolclofos-methyl	12.391	55	Captan	15.524	84	Phosalone	22.535	113	Difenoconazole 2	29.134
27	Carbaryl	12.709	56	Pyrifenoxy2	15.571	85	Acrinathrin	22.587	114	Deltamethrin	29.427
28	Esprocarb	12.825	57	Quinomethionate	15.597	86	Cyhalothrin 2	22.634	115	Imibenconazol	31.514
29	Pirimiphos-methyl	12.838	58	Prothiofos	16.122	87	Mefenacet	23.264			

*Cells highlighted in gray indicate overlapping of TIC peak and cells in yellow indicate compounds with overlapping of retention times.

NOTES:

*This Application News has been produced and edited using information that was available when the data was acquired for each article. This Application News is subject to revision without prior notice.



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